UNITED STATES GOVERNMENT MEMORANDUM

June 24, 2016

To: Public Information (MS 5030)

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

Subject: Public Information copy of plan

Control # - S-07801

Type - Supplemental Exploration Plan

Lease(s) - OCS-G34460 Block - 811 Mississippi Canyon Area
OCS-G34461 Block - 812 Mississippi Canyon Area

Operator - Shell Offshore Inc.

Description - Subsea Wells F and G

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.

Tommy Hoke
Plan Coordinator

Site Type/Name	**Botm Lse/Area/Blk**	**Surface Location**	**Surf Lse/Area/Blk**
WELL/D	G34460/MC/811	3126 FNL, 5149 FEL	G34461/MC/812
WELL/E	G34460/MC/811	3072 FNL, 5160 FEL	G34461/MC/812
WELL/F	G34460/MC/811	3082 FNL, 5160 FEL	G34461/MC/812
WELL/G	G34460/MC/811	4133 FNL, 5326 FEL	G34461/MC/812

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Public Information Copy

June 3, 2016

Mrs. Michelle Picou, Section Chief
Bureau of Ocean Energy Management
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394

Attn: Plans Group GM 235D

SUBJECT: Amendment to Supplemental Exploration Plan Control No. S-7801
OCS-G 34460 and OCS-G 34461, Mississippi Canyon (MC) Blocks 811 and 812
Offshore Louisiana

Dear Mrs. Picou:

In compliance with 30 CFR 550.211 and NTLs 2008-G04, 2009-G27 and 2010-N06, giving Exploration Plan guidelines, Shell Offshore Inc. (Shell) requests your approval of this Amended Supplemental Exploration Plan to amend two surface locations previously submitted April 5, 2016. Additionally we are changing the well names from "D" and "E" to "F" and "G".

This plan consists of a series of attachments describing our intended operations. The attachments we desire to be exempted from disclosure under the Freedom of Information Act are marked "Proprietary" and excluded from the Public Information Copies of this submittal. The cost recovery fee is attached to the Proprietary copy of the plan.

Shell previously provided two copies of following report prepared by Gems, Inc. (Project No. 0912-2139) of the shallow drilling hazards and archeological assessment entitled "Geologic, Stratigraphic and Archeological Assessment of Blocks 768, 811 and 812, Mississippi Canyon Area, Gulf of Mexico" dated May 9, 2013 with plan N-9727.

Should you require additional information, please contact Tracy Albert at 504.425.4652 or tracy.albert@shell.com or myself at 504.425.7215.

Sincerely,

Sylvia A. Bellone

SHELL OFFSHORE INC.

SUPPLEMENTAL EXPLORATION PLAN

for

OCS-G 34460, Mississippi Canyon Block 811
OCS-G 34461, Mississippi Canyon Block 812

PUBLIC INFORMATION COPY

APRIL 2016

PREPARED BY:

Tracy W. Albert
Regulatory Specialist

504.425.4652

tracy.albert@shell.com

REVISIONS TABLE:

Date of Request	Plan Section	What was Corrected	Date Resubmitted
RFI No. 1			
4/19/2016	Section 1, 2, 14 & 18	Distance to shore	4/21/2016
RFI No. 2			
4/22/2016	Section 8	AQR	4/22/2016
RFI No. 3			
5/30/2016	Section 2B	Drilling fluids table	6/3/2016
Shell Amendment No. 1			
6/1/2016	Section 1	Well names/schedule Surface and Bottom Hole Location Plats	6/3/2016
	Section 3	Well names	
	Section 6	Well names	
	Section 7	2016/2017 AQR	

SUPPLEMENTAL EXPLORATION PLAN
OCS-G 34460, Mississippi Canyon Block 811
OCS-G 34461, Mississippi Canyon Block 812
OFFSHORE LOUISIANA

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SECTION 1: PLAN CONTENTS

A. DESCRIPTION, OBJECTIVES & SCHEDULE

Shell Offshore Inc. (Shell) is submitting this supplemental exploration plan (EP/plan) for Mississippi Canyon (MC) Block 811 and 812, OCS-G 34460 and OCS-G 34461 respectfully. Shell submitted plan N-9727 in 2013 for wells A, B, C, D and E for MC 768 (BHL) and MC 812 (SL). Shell drilled well location A (MC 768 Well 001 ST00 BP01) in 2014. Shell filed plan N-9840 for wells B, C, D and E to move the BHL to MC 811 for well B.

Location A: MC 768 001 API 608174127800 was spud 5/6/2014 – Well ST'd
Location A: MC 768 001 BP01 API 608174127801 was spud 7/18/2014 – Well TA'd

Location C: MC 812 001 Drilled and PA'd (API number not assigned)

Location B: MC 811 001 API 608174129800 spudded 2/2/2015
Location B: MC 811 001 ST01 API 608174129801 spudded 6/23/2015

This amended supplemental plan is requesting to rename the D & E locations from Plan S-7801 to F & G and to move surface locations of he renamed well to within 500' of the E surface location (previously cleared and approved in Plan N-9840). Wells F & G will be drilled, completed and temporarily abandoned in accordance with 30 CFR 250.1721 until the well(s) are developed under future plans. If the wells are unsuccessful, they will be permanently plugged and abandoned in accordance with the Bureau of Safety and Environmental Enforcement (BSEE) regulations.

The lease area is 56 statute miles from the nearest shoreline, 102 statute miles from the onshore support base at Port Fourchon, Louisiana and 81 statute miles from the helicopter base at Boothville, Louisiana. Water depths at the well sites range from 4,549' to 4,478' (Attachment 1A).

The proposed rig is either a dynamically positioned (DP) semi-submersible (Atwood Condor or similar) or a Drill Ship (Noble Don Taylor or similar); both are self-contained drilling vessels with accommodations for a crew which include quarters, galley and sanitation facilities. The rigs will comply with the requirements in the Interim Final Rules. The drilling activities will be supported by the support vessels and aircraft as well as onshore support facilities as listed in Sections 14 and 15 of the EP. Shell has employed or contracted with trained personnel to carry out its exploration activities. Shell is committed to local hire, local contracting and local purchasing to the maximum extent possible. Shell personnel and contractors are experienced at operating in the Gulf of Mexico and are well versed in all Federal and State laws regulating operations. Shell's employees and contractors share Shell's deep commitment to operating in a safe and environmentally responsible manner.

Shell, through its parent and affiliate corporations, has extensive experience safely exploring for oil and gas in the Gulf of Mexico. Shell will draw upon this experience in organizing and carrying out its drilling program. Shell believes that the best way to manage blowouts is to prevent them from happening. Significant effort goes into the design and execution of wells and into building and maintaining staff competence. In the unlikely event of a spill, Shell's Regional Oil Spill Response Plan (OSRP) is designed to contain and respond to a spill that meets or exceeds the worst case discharge (WCD) as detailed in Section 9 of this EP. The WCD does not take into account potential flow mitigating factors such as well bridging, obstructions in wellbore, reservoir barriers, or early intervention. We continue to invest in research and development to improve safety and reliability of our well systems. All operations will be conducted in accordance with applicable federal and state laws, regulations and lease and permit requirements. Shell will have trained personnel and monitoring programs in place to ensure such compliance.

B. LOCATION

See attached location plat (Attachments 1A and 1B) and BOEM forms (Attachments 1C through 1D).

C. <u>RIG SAFETY AND POLLUTION FEATURES</u>

The rig (Atwood Condor or similar or Noble Don Taylor or similar) will comply with all of the regulations of the American Bureau of Shipping (ABS), International Maritime Organization (IMO) and the United States Coast Guard (USCG). All drilling operations will be conducted under the provisions of 30 CFR, Part 250, Subpart D and other applicable regulations and notices, including those regarding the avoidance of potential drilling hazards and safety and pollution prevention control. Such measures as inflow detection and well control, monitoring for loss of circulation and seepage loss and casing design will be our primary safety measures. Primary pollution prevention measures are contaminated and non-contaminated drain system, mud drain system and oily water processing.
The following drain items are typical for rigs in Shell's fleet.

DRAIN SYSTEM POLLUTION FEATURES

Drains are provided on the rig in all spaces and on all decks where water or oil can accumulate. The drains are divided into two categories, non-contaminated and contaminated. All deck drains are fitted with a removable strainer plate to prevent debris from entering the system.

Deck drainage from rainfall, rig washing, deck washing and runoff from curbs and gutters, including drip pans and work areas, are discharged depending on if it comes in contact with the contaminated or non-contaminated areas of the Rig.

1) Non-contaminated Drains

Non-contaminated drains are designated as drains that under normal circumstances do not contain hydrocarbons and can be discharged directly overboard. These are mostly located around the main deck and outboard in places where it is unlikely that hydrocarbons will be found.

Drains within 50 feet of a designated chemical storage area which uses the weather deck as a primary containment means shall be designated "normally plugged." An adequate number of drains around the rig shall be designated as "normally open" to allow run-off of rain water. Normally open drains shall have a plug located in a conspicuous area near the drain which can be easily installed in the event of a spill.

The rig's drain plug program consists at a minimum of a weekly check of all deck drains leading to the sea to verify that their status is as designated. If normally open they shall verify that the drain is open and that the plug is available in the area. If normally closed they shall verify that the plug is securely installed in the drain.

In the event a leak or spill is observed, the event shall be contained (drain plug installation and/or spill kit deployment as appropriate) and reported immediately.

Rig personnel shall ensure that the perimeter kick-plates on weather decks are maintained and drain plugs are in place as needed to ensure a proper seal.

2) Contaminated Drains

Contaminated drains are designated as drains that contain hydrocarbons and cannot be discharged overboard. When oil-based mud is used for drilling it will have to be collected in portable tanks and sent to shore for processing.

3) Mud Drain System

None

4) Oily Water Processing

Oily water is collected in an oily water tank. It must be separated and not pumped overboard until oil content is <15 ppm. The separated oil is pumped to a dirty oil tank and has to be sent ashore for disposal. On board the MODU an oil record log has to be kept according to instructions included in the log. Any and all pollution pans are subjected to a sheen test before being pumped out. If the water passes the sheen test then it is pumped overboard. If it does not pass the sheen test then the water/oil mixture is pumped to a dirty oil tank and sent to shore for disposal. All waste oil that is sent in to be disposed of is recorded in the MODU's oil log book.

All discharges will be in accordance with applicable NPDES permits. See Section 18, EIA.

5) Lower Hull Bilge System

- The main bilge system is designed to drain the pontoons. There are Goulds electrically driven, self-priming centrifugal pumps - one for each main pump room. The aux pumps can be pump out with the bilge pump but has to be lined up manually from the main pump room.
- Bilge water is pumped overboard after a sheen test has been completed.
- The pontoon bilge pumps are operable from the Bridge and have audible and visual bilge alarms set for high and low levels.
- Portable submersible pumps are carried onboard the rig to service all column void spaces and are also used for emergency bilge pumps in the event of the main pump room flooding.
- Alternate means of pumping the bilges in each pontoon pump room include the use of:
  - The ballast system emergency bilge valve which is operated from the control panel.
  - Portable submersible pumps
  - Emergency bilge suction line connected directly to the ballast manifold. (Main Pump rooms only)

The Bilge pumps are manual/automatic type pumps. They are equipped with sensors that give a high and a high-high alarm. They are set to a point at which the water gets to a certain point they will automatically turn on to pump water out in order to keep flooding under control. The pumps are also capable of being put in manual mode in which they can be turned on by hand.

6) Emergency Bilge System

Main ballast pumps may also be used for emergency bilge pumping directly from the pump rooms via remotely actuated direct bilge suction valves on the ballast system. These valves will operate in a fully flooded compartment. The ballast pumps can be supplied from the emergency switchboard.

7) Oily Water Drain/Separation System

Oily water/engine room bilge water is collected in an oily water tank. It must be separated and not pumped overboard until oil content is <15 ppm. The separated oil is pumped to a dirty oil tank and has to be sent ashore for disposal. On board all drilling Units, an oil record log has to be kept according to instructions included in the log. The rig floor has two skimmer tanks and each is subjected to a sheen test before pumping overboard to ensure environmental safety. All three anchor winch windlasses have skimmer tanks and are subjected to sheen tests before discharge as well.

8) Drain, Effluent and Waste Systems

- The rig's drainage system is designed in line with our environmental and single point discharge policies. Drains are either hazardous, i.e. from a hazardous area as depicted on the Area Classification drawings, or non-hazardous drains from nonhazardous areas.
- To prevent migration of hazardous materials and flammable gas from hazardous to non-hazardous areas, the drainage systems are segregated.
- The rig drainage systems tie into oily water separators that take out elements in the drainage that could harm the environment. This is part of Noble's initiative to be good stewards of the environment.

9) Rig Floor Drainage

The rig floor is typically outfitted with a Facet International MAS 34-3 separator. The separator has coalescent plates that remove the solids from the drainage and the remaining drainage goes to a skimmer tank. From the skimmer tank it is drained to one of the column dirty oil tank systems where it is then sent through 2 separators and cleaned further to reduce oil content to less than 15 ppm.

10) Columns #3 & 4

The drains on the decks and machinery spaces are separated at mid ship and directed to either the #3 or #4 columns. The separators in these columns go through three cycles of circulation and remove oil to <15 ppm, then discharge the clean product to sea.

11) Main Engine Rooms

The engine rooms have their own drainage and handling system. The engine rooms are outfitted with a dirty oil tank and the drainage in the tank is processed through the separator, the waste from the separator goes back to the dirty oil tank and the clean water (<15 ppm) goes overboard.

12) Helideck Drains

The helideck has a dedicated drainage system around its perimeter to drain heli-fuel from a helicopter incident. The fuel can be diverted to the designated heli fuel recovery tank which is located under the Helideck structure.

Operating configurations are as follows:

- The overboard piping valves and hydrocarbons take on valves are closed and locked. To unlock overboard or take on valves a permit has to be filled out.
- The oily water collection tank overflow valve is closed.
- The drill floor drains are lined-up to the drill floor skimmer tank. The kkimmer tanks have a high alarm which sounds by means of an air horn. Before tanks are pumped out a sheen test is performed. Water is pumped out the skimmer tanks down the shunt line. Oil containment side is pumped out into 550 gal tote tanks.
- The BOP test area drains are normally lined-up to drain overboard.
- The oily water separator continuously circulates the oily water collection tank. Waste oil is discharged into the waste oil tank and oily water is re-circulated back into the oily water collection tank. Clean water is pumped overboard, which is controlled/monitored by the oil content detector, set at 15 ppm.
- The solids control system is capable of being isolated for cuttings collection.
- The bilge system is normally pumped directly overboard after a sheen test has been performed.
- The engine dirty oil sump can be drained down in port column oily water separator which discharges water overboard from the water side and oil being pumped out into a 550 gal tote tank oil containment side. There is a high audible alarm on the ballast control panel.

D. Storage Tanks – Atwood Condor DP Semi-Submersible or similar:

Type of Storage Tank	Type of Facility	Tank Capacity (bbls)	Number of Tanks	Total Capacity (bbls)	Fluid Gravity (Specific)
Diesel Tank in stbd 1 80% fill in all hull tanks	Drilling Rig	3597	1		Marine Diesel (0.91 SG)
Diesel Tank in stbd 2	Drilling Rig	2713	1		Marine Diesel (0.91 SG)
Diesel Tank in stbd 3	Drilling Rig	3456	1		Marine Diesel (0.91 SG)
Diesel Tank in stbd 4	Drilling Rig	653	1		Marine Diesel (0.91 SG)
Diesel Tank in port 1	Drilling Rig	2090	1		Marine Diesel (0.91 SG)
Diesel Tank in port 2	Drilling Rig	1366	1		Marine Diesel (0.91 SG)
Diesel Tank in port 3	Drilling Rig	4787	1		Marine Diesel (0.91 SG)
Diesel Tank in port 4	Drilling Rig	3456	1		Marine Diesel (0.91 SG)
Total storage in hull tanks	Drilling Rig			22118	Marine Diesel (0.91 SG)
Diesel Settling Tanks	Drilling Rig	129	1		Marine Diesel (0.91 SG)
Diesel Settling Tanks	Drilling Rig	129	1		Marine Diesel (0.91 SG)
Diesel Settling Tanks	Drilling Rig	139	1		Marine Diesel (0.91 SG)
Diesel Settling Tanks	Drilling Rig	129	1		Marine Diesel (0.91 SG)
Diesel Day Tank	Drilling Rig	100	1		Marine Diesel (0.91 SG)
Diesel Day Tank	Drilling Rig	115	1		Marine Diesel (0.91 SG)
Diesel Day Tank	Drilling Rig	114	1		Marine Diesel (0.91 SG)
Diesel Day Tank	Drilling Rig	115	1		Marine Diesel (0.91 SG)
Total engine room diesel	Drilling Rig			970	Marine Diesel (0.91 SG)
Lube Oil Tank	Drilling Rig	86.25	4	345	Lube Oil (0.91 SG)

Storage Tanks – Noble Don Taylor Drillship or similar:

Type of Storage Tank	Type of Facility	Tank Capacity (bbls)	Number of Tanks	Total Capacity (bbls)	Fluid Gravity (Specific)
Fuel oil	Drilling Rig	2,889	4	11,556	Marine Diesel (0.91 SG)
Fuel oil	Drilling Rig	3,225	4	12,900	Marine Diesel (0.91 SG)
Fuel oil	Drilling Rig	2,887	4	11,548	Marine Diesel (0.91 SG)
Fuel oil	Drilling Rig	2,680	4	10,720	Marine Diesel (0.91 SG)
Fuel oil	Drilling Rig	178	8	1,424	Marine Diesel (0.91 SG)

E. Pollution Prevention Measures

Pursuant to NTL 2008-G04 the proposed operations covered by this EP do not require Shell to specifically address the discharges of oil and grease from the rig during rainfall or routine operations. Nevertheless, Shell has provided this information as part of its response to 1(c) above.

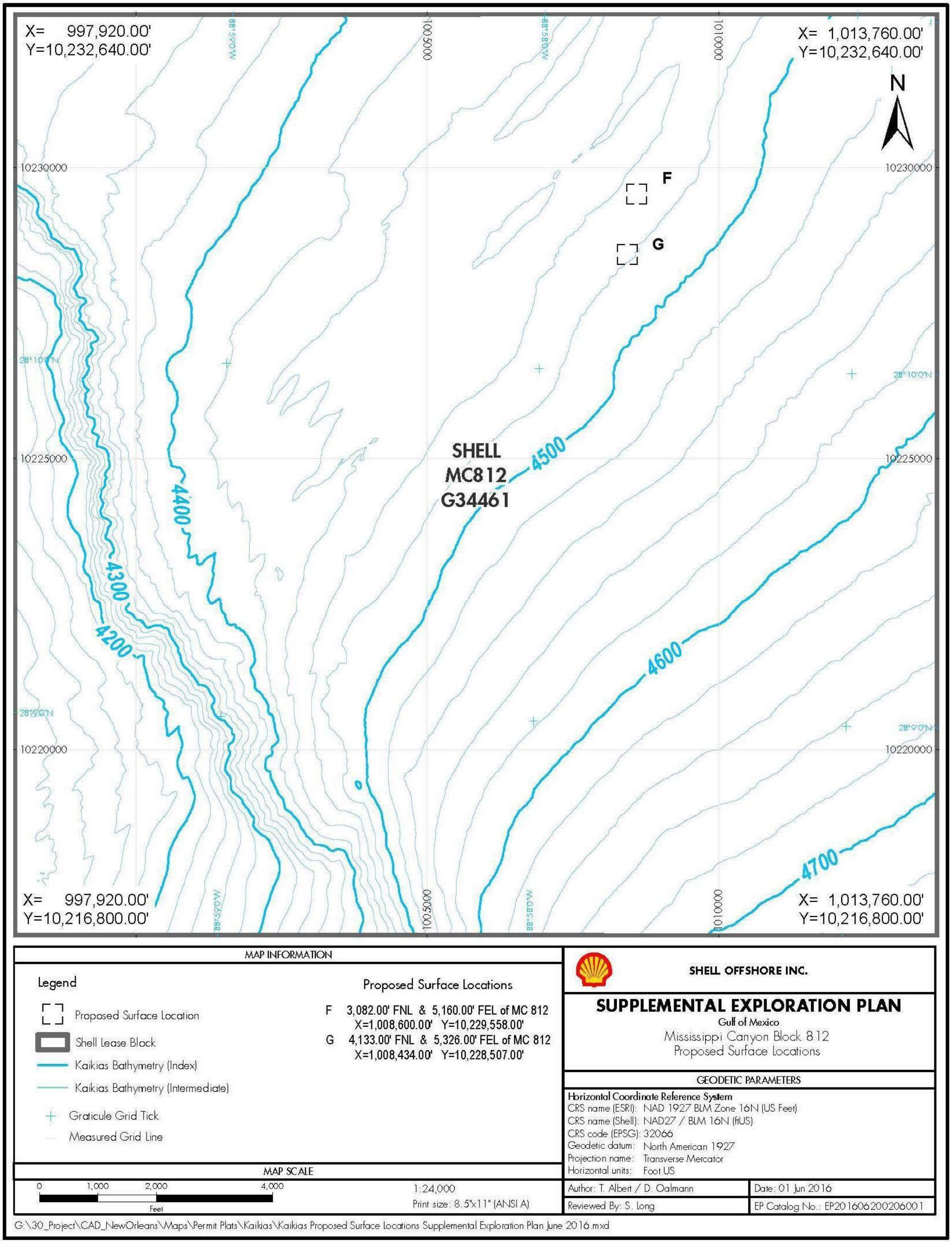
F. Additional Measures

- HSE (health safety and environment) are the primary topics in pre-tour and pre-job safety meetings. The discussion around no harm to people or environment is a key mindset. All personnel are reminded daily to inspect work areas for safety issues as well as potential pollution issues.
- All tools that come to and from the rig have their pollution pans inspected, cleaned and confirmation of plugs installed prior to leaving dock and prior to loading on the boat.
- Preventive maintenance of rig equipment includes visual inspection of hydraulic lines and reservoirs on routine scheduled basis.
- All pollution pans on rig are inspected daily.
- Containment dikes are installed around all oil containment, drum storage areas, fuel vents and fuel storage tanks.
- All used oil and fuel is collected and sent in for recycling.
- Every drain on the rig is assigned a number on a checklist. The checklist is used daily to verify drain plugs are installed.
- All trash containers are checked and emptied daily. The trash containers are kept covered. Trash is disposed of in a compactor and shipped in via boat.
- The rig is involved in a recycling program for cardboard, plastic, paper, glass and aluminum.
- Fuel hoses and SBM are changed on annual basis.
- TODO spill prevention fittings are installed on all liquid take on hoses.
- Waste paint thinner is recycled on board with a solvent still to reduce hazard of shipping and storage.
- All equipment on board utilizes Envirorite hydraulic fluid as opposed to hydraulic oil.
- Shell has obtained ISO14001 certification.
- Shell uses low sulfur fuel.

G. Description of Previously Approved Lease Activities

See Section 1A for this information.

Attachment 1A
Bathymetry and Surface Locations



Attachment 1B
Bottom-Hole Locations

Proprietary Data

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

Attachment 1C

OMB Control Number: 1010-0151
OMB Approval Expires: 12/31/14

OCS PLAN INFORMATION FORM

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

Company Name: Shell Offshore Inc.	BOEM Operator Number: 0689
Address: 701 Poydras St., Room 3464	Contact Person: Tracy Albert
New Orleans, LA 70131	Phone Number: 504.425.4652
	Email Address: tracy.albert@shell.com

If a service fee is required under 30 CFR 550.125(a) provide:	Amount Paid: $7,346.00	Receipt No. 25QS1K6I

Project and Worst Case Discharge (WCD) Information

Lease(s) OCS-G 34460 & 34461	Area: MC	Block(s): 811 & 812	Project Name: Kaikias

Objectives(s):	X	Oil		Gas		Sulphur		Salt	Onshore Support Base(s) Fourchon & Boothville

Platform/Well Name: B	Total Volume of WCD: 468,000 BOPD	API Gravity: 31°

Distance to Closest Land (Miles): 56	Volume from uncontrolled blowout: 53 MMBBL

Have you previously provided information to verify the calculations and assumptions of your WCD?	X	Yes		No
If so, provide the Control Number of the EP or DOCD with which this information was provided	N-9840			
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
Exploratory drilling	See attached		
Development drilling			
Well completion	See attached		
Well test flaring (for more than 48 hours)			
Installation or modification of structure			
Installation of production facilities			
Installation of subsea wellheads and/or dry hole tree	See attached		
Installation of lease term pipelines			
Commence production			
Other (Specify and attach description)			

Description of Drilling Rig				**Description of Structure**			
	Jackup	x	Drillship		Caisson		Tension Leg Platform
	Gorilla Jackup		Platform rig		Fixed Platform		Compliant Tower
	Semisubmersible		Submersible		Spar Other		Guyed tower
x	DP Submersible		Other (attached description)		Floating production system		Other (attached description)

Drilling Rig Name (If known): Noble Don Taylor or similar, Atwood Condor or Similar

Description of Lease Term Pipelines

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

Form BOEM-0137 December 2011 – Supersedes all previous editions of this form which may not be used.)

Attachment 1C.1 Schedule

Schedule to drill, complete and install tree:

Well	Start date	Duration	End date
F	8/15/2016	150	1/12/2017
G	1/13/2017	250	9/20/2017

Attachment 1D

Proposed Well/Structure Location					
Well or Structure Name/Number (if renaming well or structure, reference previous name): F	Previously reviewed under an approved EP or DOCD?		Yes	X	No

Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API Number:	NA

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 Blowouts (bbls/day): 468,000 BOPD	For structures, volume of all storage and pipelines (bbls): NA	API Gravity of fluid	31°

	Surface Location	Bottom Hole Location (for Wells)	Completion (for multiple enter separate lines)
Lease Number	OCS G 34461		OCS OCS
Area Name	MC		
Block No.	812		
Blockline Departure (in feet)	N/S Departure: 3,082 FNL		N/S Departure: N/S Departure:
	E/W Departure 5,160' FEL		E/W Departure: E/W Departure:
Lambert X-Y Coord.	X: 1,008,600		X:
	Y: 10,229,558		Y:
Lat/Long	Latitude 28°10' 30.091"		Latitude
	Longitude -88°57' 41.631"		Longitude

Water Depth (Feet): 4,549'			MD (Feet)	TVD (Feet)

Anchor Radius (if applicable) in feet:

Anchor locations for drilling rig or construction barge (if anchor radius is 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=	

Attachment 1E

Proposed Well/Structure Location						
Well or Structure Name/Number (if renaming well or structure, reference previous name): G	Previously reviewed under an approved EP or DOCD?		Yes	X	No	

Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API Number: NA

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 Blowouts (bbls/day): 468,000 BOPD	For structures, volume of all storage and pipelines (bbls): NA	API Gravity of fluid	31°

	Surface Location	Bottom Hole Location (for Wells)	Completion (for multiple enter separate lines)
Lease Number	OCS G 34461		OCS OCS
Area Name	MC		
Block No.	812		
Blockline Departure (in feet)	N/S Departure: 4,133' FNL		N/S Departure: N/S Departure:
	E/W Departure 5,326' FEL		E/W Departure: E/W Departure:
Lambert X-Y Coord.	X: 1,008,434		X:
	Y: 10,228,507		Y:
Lat/Long	Latitude 28°10' 19.659"		Latitude
	Longitude -88°57'43.296"		Longitude

Water Depth (Feet): 4,478'			MD (Feet)	TVD (Feet)

Anchor Radius (if applicable) in feet:

Anchor locations for drilling rig or construction barge (if anchor radius is 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=	

SECTION 2: GENERAL INFORMATION

A. Application and Permits

There are no individual or site-specific permits other than general NPDES permit and rig move notification that need to be obtained. Prior to beginning exploration operations, an Application for Permit to Drill (APD) will be submitted and approved by the Bureau of Safety and Environmental Enforcement (BSEE).

B. Drilling Fluids

C. Type of Drilling Fluid	Est. Volume of Drlg. Fluid per Well
Water based fluid or mud	85,000 bbls/well
Synthetic based fluid or mud	6,500 Bbls/well

See Section 7, Tables 7A and 7B for drilling fluids to be used and disposal of same.

D. Production

Information regarding production is not included in this EP as such information is only necessary in the case of DOCDs.

E. Oil Characteristics

Information regarding oil characteristics is not included in this EP as such information is only necessary in the case of DOCDs.

F. New Or Unusual Technology

Shell is not proposing to use new or unusual technology as defined in 30 CFR 250.200 to carry out the proposed activities in this EP.

G. Bonding

The bond requirement for the activities proposed in this EP are satisfied by an area-wide bond furnished and maintained according to 30 CFR Part 256, Subpart I-Bonding; NTL No. 2000-G16, "Guideline for General Lease Surety Bonds" and additional security under 30 CFR 256.53(d) and National NTL No. 2008-N07, "Supplemental Bond Procedures."

H. Oil Spill Financial Responsibility (OSFR)

Shell Offshore Inc., BOEM Operator Number 0689, has demonstrated oil spill financial responsibility for the activities proposed in this EP according to 30 CFR Parts 250 and 253 and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities."

I. Deepwater well control statement

Shell Offshore Inc., BOEM Operator Number 0689, has the financial capability to drill a relief well and conduct other emergency well control operations if required.

J. Suspension of Production

Information regarding Suspension of Production is not included in this EP as such information is only necessary in the case of DOCDs.

J. Blowout scenario

Summary

The below was submitted and accepted by BOEM in plan N-9840. The wells proposed in this EP do not exceed this amount. The following is provided for your convenience and remains as previously accepted (updated NTL number only).

This Section 2J was prepared by Shell pursuant to the guidance provided in the BOEM's NTL 2015-N01 with respect to blowout and worst case discharge (WCD) scenario descriptions. Shell intends to comply with all applicable laws, regulations, rules and Notices to Lessees.

Shell focuses on an integrated, three-pronged approach to a blowout, including prevention, intervention, containment, and recovery.

1. Shell believes that the best way to manage blowouts is to prevent them from happening. Significant effort goes into design and execution of wells and into building and maintaining staff competence. Shell continues to invest independently in R&D to improve safety and reliability of our well systems.

2. Shell is a founding member of the MWCC, which provides robust well containment (shut-in and controlled flow) capabilities. Additionally, Shell is investing in R&D to improve containment systems.

3. As outlined in Shell's OSRP, and detailed in EP Section 9a (ii), Shell has contracts with OSROs to provide the resources necessary to respond to this WCD scenario. The capabilities for on-water recovery, aerial and subsea dispersant application, in-situ burning, and nighttime monitoring and tracking have been significantly increased.

The WCD blowout scenario for this plan is calculated for the MC 811 Well B location penetration of the target interval and is based on the guidelines outlined in NTL 2015-N01 along with subsequent Frequently Asked Questions (FAQ). In the unlikely event of a spill, Shell's Regional OSRP (approved in April 2013) is designed to contain and respond to a spill that exceeds this WCD. This WCD does not take into account potential flow mitigating factors such as well bridging, obstructions in wellbore, reservoir barriers, and early intervention including containment capabilities.

Uncontrolled blowout (volume first day)	468,000 bbls.
Uncontrolled blowout rate (first 30-days average daily rate)	432,000 bopd
Duration of flow (days) based on relief well	185 days
Total volume of spill (bbls) for 185 days	53 MMBO

Table 2.1. Kaikias Worst Case Discharge Summary

The exploration prospect is located approximately 59 statute miles south-southeast of the nearest Louisiana shoreline in the Gulf of Mexico, in water depths of 3833-4738' across blocks MC 768, MC811 and MC812, where the prospect is located. The prospect comprises an embayment culmination against the base salt. The objective interval for the proposed well with flow potential is the MC811-B well, which is expected to have the highest flow rates. The alternate well locations (C, D, E, and A-ST) were also evaluated; however, their flow rates are lower than the WCD calculated for the MC 811 B well.

1) Purpose

Pursuant to 30 CFR 250.213(g), 250.219, 250.250, and NTL 2015-N01, this document provides a blowout scenario description, further information regarding any potential oil spill, the assumptions and calculations used to determine the WCD and the measures taken to 1) enhance the ability to prevent a blowout and 2) respond and manage a blowout scenario if it were to occur. These calculations are based on best technical estimates of subsurface parameters that are derived from the regional formation of offset well data and seismic data. These parameters are better than or consistent with the estimates used by Shell to justify the investment. Therefore, these assumed parameters were used to calculate the WCD. They do not reflect probabilistic estimates.

2) Background

This attachment has been developed to document the additional information requirements for EPs as requested by NTL No. 2015-N01 in response to the explosion and sinking of the MODU Deepwater Horizon and the resulting subsea well blowout and recovery operations of the exploration well at the MC-252 Macondo location.

3) Information Requirements

a) Blowout scenario

All well locations addressed in this EP were assessed for WCD. The MC 811 well from the B location represents the highest flow potential. The "B" well penetrates the objective interval as outlined in the Geological and Geophysical Information Section of the EP using a subsea wellhead system, conductor, surface and intermediate casing program, and using a DP MODU with a marine riser and subsea blowout preventer (BOP). A hydrocarbon influx and a well control event are modeled to occur from reservoirs in the objective interval. The modeled blowout results in unrestricted flow from the well at the seafloor, which represents the WCD (no restrictions in wellbore, failure/loss of the subsea BOP, and a blowout to the seabed).

b) Estimated flow rate of the potential blowout

Category	**EP**
Type of Activity	Drilling
Facility Location (area/block)	MC-811
Facility Designation	MODU
Distance to Nearest Shoreline (Statute miles)	56
Uncontrolled blowout (volume first day)	468,000 bbl.
Uncontrolled blowout rate (first 30-days average daily rate)	432,000 bopd

Table 2.2 Estimated Flow Rates of a Potential Blowout

c) Total volume and maximum duration of the potential blowout

Duration of flow (days)	185 days total duration to drill relief well (14 days rig demobilization, 3 days rig mobilization, 102 days spud to ranging point, 30 days ranging, 36 days contingency).
Total volume of spill (bbls)	53 MMBO based on 185 days flowing. Note: From GAP/Prosper/MBAL model

Table 2.3 Estimated Duration and Volume of a Potential Blowout

There is usually a decline in the discharge rate as time proceeds, which is illustrated by the differences between the first 24-hour volume and 30-day average rate. The total volume calculated until a well is killed in a potential blowout further demonstrates this decline. At very short times, e.g. during the first 24 hours, the pressure profile in the reservoir changes from the moment when a well first starts flowing to a pseudo-steady state pressure profile with time, and as a result the rate declines. At somewhat longer time scales, effects such as reservoir voidage and the impact of boundaries can cause the rate to drop continuously with production. Simulation and material balance models can include these effects and form the basis of the NTL 2015-N01 calculations for 24-hour and 30-day rates as well as maximum duration volumes.

d) Assumptions and calculations used in determining the worst case discharge (**Proprietary**)

e) Potential for the well to bridge over

Mechanical failure/collapse of the borehole in a blowout scenario is influenced by several factors including in-situ stress, rock strength and fluid velocities at the sandface. Based on the nodal analysis and reservoir simulation models outlined above, a seabed blowout would create a high drawdown at the sand face. Given the substantial fluid velocities inherent in the worst case discharge, and the scenario as defined where the formation is not supported by a cased and cemented wellbore, it is possible that the borehole may fail/collapse/bridge over within the span of a few days, significantly reducing the outflow rates. However, this WCD scenario does not include any bridging.

f) Likelihood for intervention to stop the blowout.

Safety of operations is our top priority. Maintaining well control at all times to prevent a blowout is the key focus of our operations. Our safe drilling record is based on our robust standards, conservative well design, prudent operations practices, competency of personnel, and strong HSE focus. Collectively, these constitute a robust system making blowouts extremely rare events.

Intervention Devices: Notwithstanding these facts, the main scenario for recovery from a blowout event is via intervention with the BOP attached to the well. There are built in redundancies in the BOP system to allow activation of selected components with the intent to seal off the well bore. As a minimum, the Shell contracted rig fleet in the GOM will have redundancies meeting the Interim Final Drilling Safety Rule with respect to Remotely Operated Vehicle (ROV) hot stab capabilities, a deadman system, and an autoshear system.

Additionally the rig (either dynamically positioned semisubmersible or drillship) has a gas handler system at the top of the riser consisting of two annular preventers that can be closed in to allow hydrocarbons in the riser to be contained or circulated thru the rig's well control system. The rig has two shearing rams in the BOP for added redundancy. Also, the rig selected will be equipped with a deadman system and an auto shear system.

Containment: The experience of gaining control over the Macondo well has resulted in a better understanding of the necessary equipment and systems for well containment. As a result, industry and government are better equipped and prepared today to contain an oil well blowout in. Shell is further analyzing these advances and incorporating them into its comprehensive approach to help prevent and, if needed, control another deepwater control incident.

Pursuant to NTL 2010-N10 Shell will provide additional information regarding our containment capabilities in a subsequent filing.

g) Availability of a rig to drill a relief well and rig package constraints

Blowout intervention can be conducted from an ROV equipped vessel, the existing drilling rig or from another drilling rig. Shell has an active portfolio of well operations in the GOM which will be supported by a total of four to six MODU rigs in 2016 – 2018 timeframe. The dynamically positioned rigs under contract, the Atwood Condor, Noble Globetrotter I, and the Noble Bully I will be the preferred rigs for blowout intervention work. However, moored rigs can also be used in some scenarios. Additionally, in the event of a blowout, there is the distinct possibility that other non-contracted rigs in the GOM could be utilized whether for increased expediency or better suitability. All efforts will be made at the time to secure the appropriate rig. Shell's current contracted rigs capable of operating at Kaikias water depths and reservoir depths without constraints are in the following table:

Rig Name	Rig Type
Atwood Condor	Dynamically positioned semisubmersible
Noble Globetrotter I	Dynamically positioned drillship
Noble Bully I	Dynamically positioned drillship

Table 2.4 Shell contracted rigs capable at Kaikias

Future modifications may change the rig's capability. Rig capabilities need to be assessed on a work scope specific basis.

h) Time taken to contract a rig, move it onsite, and drill a relief well

Relief well operations will immediately take priority and displace any activity from Shell's contracted rig fleet. Table 2.4 lists the Shell contracted rigs capable of operating at Kaikias. It is expected to take an average of 14 days to safely secure the well that the rig is working on up to the point the rig departs location, and an additional 3 days transit to mobilize to the relief well site depending on distance to the site. The relief well will take approximately 102 days to drill down to the last casing string above the blowout zone, plus approximately 30 days for precision ranging activity to intersect the blowout well bore. Additionally, 36 extra days for contingency are added. The total time to mobilize and drill a relief well would be 185 days for the Kaikias well.

If a moored rig is chosen to conduct the relief well operations, anchor handlers would be prioritized to prepare mooring on the relief well site while the rig is being mobilized. This mooring activity is not expected to delay initiation of relief well drilling operations.

It is not possible to drill relief wells from any existing platforms due to the distance to reach the sub-surface.

i) Measures proposed to enhance ability to prevent blowout and to reduce likelihood of a blowout.

Shell believes that the best way to manage blowouts is to prevent them from happening. Detailed below are the measures employed by Shell with the goal of no harm to people or the environment. The Macondo incident has highlighted the importance of these practices. The lessons learned from the investigation are, and will continue to be, incorporated into our operations.

Standards: Shell's well design and operations adhere to internal corporate standards, the Code of Federal Regulations, and industry standards. A robust management of change process is in place to handle un-defined or exception situations. Ingrained in the Shell standards for well control is the philosophy of multiple barriers in the well design and operations on the well.

Risk Management: Shell believes that prevention of major incidents is best managed through the systematic identification and mitigation process (Safety Case). All Shell contracted rigs in the GOM have been operating with a Safety Case and will continue to do so. A Safety Case requires both the owner and contractors to systematically identify the risks in drilling operations and align plans to mitigate those risks; an alignment which is critical before drilling begins.

Well Design Workflow: The Well Delivery Process (WDP) is a rigorous internal assurance process with defined decision gates. The WDP leverages functional experts (internal and external) to examine the well design at the conceptual and detailed design stages for robustness before making a recommendation to the management review board. Shell's involvement in global deepwater drilling, starting in the GOM in the mid-1980's, provides a significant depth and breadth of internal drilling and operational expertise. Third party vendors and rig contractors are involved in all stages of the planning, providing their specific expertise. A Drill the Well on Paper (DWOP) exercise is conducted with rig personnel and vendors involved in execution of the well. This forum communicates the well plan, and solicits input as to the safety of the plan and procedures proposed.

Well and rig equipment qualification, certification, and quality assurance: All rigs will meet all applicable rules, regulations, and Notice to Lessees. Shell works closely with rig contractors to ensure proper upkeep of all rig equipment, which meets or exceeds the strictest of Shell, industry, or regulatory requirements. Well tangibles are governed by our internal quality assurance/control standards and industry standards.

MWD/LWD/PWD Tools: Shell intends to use these tools at Kaikias. The MWD/LWD/PWD tools are run on the drill string so that data on subsurface zones can be collected as the well advances in real time instead of waiting until the drill string is pulled to run wireline logs. Data from the tools are monitored and interpreted real time against prognosis to provide early warning of abnormal pressures to allow measures to be taken to progress the well safely.

Mud Logger: Mud-logging personnel continually monitor returning drilling fluids for indications of hydrocarbons, utilizing both a hot wire and a gas chromatograph. An abrupt increase in gas or oil carried in the returning fluid can be an indication of an impending kick. The mud logger also monitors drill cuttings returned to the surface in the drilling fluid for changes in lithology that can be an indicator that the well has penetrated or is about to penetrate a hydrocarbon-bearing interval. Mud logging instruments also monitor penetration rate to provide an early indication of drilling breaks that show the bit penetrating a zone that could contain hydrocarbons. The mud logging personnel are in close communication with both the offshore drilling foremen and onshore Shell representative(s) to report any observed anomalies so appropriate action can be taken.

Remote Monitoring: The Real Time Operating Center has been used by Shell to complement and support traditional rig-site monitoring since 2003. Well site operations are monitored 24/7 virtually by onshore teams consisting of geoscientists, petrophysicists, well engineers, and monitoring specialists. The same real time well control indicators monitored by the rig personnel are watched by the monitoring specialist for an added layer of redundancy.

Competency and Behavior: A structured training program for Well Engineers and Foremen is practiced, which includes internal professional examinations to verify competency. Other industry training in well control, such as by International Association of Drilling Contractors (IADC) and International Well Control Forum (IWCF) are also mandated. Progressions have elements of competency and Shell continues to have comprehensive internal training programs. The best systems and processes can be defeated by lack of knowledge and/or improper values. We believe that a combination of HSE tools (e.g. stop work, pre-job analysis, behavior based safety, DWOPs, audits), management HSE involvement and enforcement (e.g. compliance to life saving rules) have created a strong safety culture in our operations.

j) Measures to conduct effective and early intervention in the event of a blowout.

The response to a blowout is contained in our Well Control Contingency Plan (WCCP) which is a specific requirement of our internal well control standards. The WCCP in turn is part of the wider emergency response framework within Shell that addresses the overall organization response to an emergency situation. Resources are dedicated to these systems and drills are run frequently to test preparedness (security, medical, oil spill, and hurricane). This same framework is activated and tested during hurricane evacuations, thereby maintaining a fresh and responsive team.
The WCCP specifically addresses implementing actions at the emergency site that will ensure personnel safety, organizing personnel and their roles in the response, defining information requirements, establishing protocols to mobilize specialists, pre-selecting sources, and developing mobilization plans for personnel, material and services for well control procedures. The plan references individual activity checklists, a roster of equipment and services, initial information gathering forms, a generic description of relief well drilling, strategy and guidelines, intervention techniques and equipment, site safety management, exclusion zones, and re-boarding.

As set forth in 3f of this document, Shell is currently analyzing recent advances in containment technology and equipment and will incorporate them as they become available.

k) Arrangements for drilling a relief well

The size of the Shell contracted rig fleet in the GOM ensures that there is adequate well equipment (e.g. casing and wellhead) available for relief wells. Rigs and personnel will also be readily available within Shell, diverted from their active roles elsewhere. Resources from other operators can also be leveraged should the need arise. Generally, relief well plans will mirror the blowout well, incorporating any learning on well design based on root cause analysis of the blowout. A generic relief well description is outlined in the WCCP.

l) Assumptions and calculations used in approved or proposed Regional OSRP

All proposed Kaikias locations were evaluated and Location B was determined to have the greatest WCD volume. Shell has designed a response program (Regional OSRP) based upon a regional capability of responding to a range of spill volumes, from small operational spills up to and including the WCD from a well blowout. Shell's program is developed to fully satisfy federal oil spill planning regulations. The Regional OSRP presents specific information on the response program that includes a description of personnel and equipment mobilization, the incident management team organization and the strategies and tactics used to implement effective and sustained spill containment and recovery operations.

SECTION 3: GEOLOGICAL AND GEOPHYSICAL INFORMATION

A. Geological description

Proprietary Data

B. Structure Contour Map(s)

Proprietary Data

C. Interpreted 2D and/or 3D Seismic line(s)

Proprietary Data

D. Geological Structure Cross-section(s)

Proprietary Data

E. Stratigraphic Column with Time vs Depth Table

Proprietary Data

F. Shallow Hazards Report

The following reports (previously submitted to BOEM) were used in our analysis:

Geoscience Earth and Marine Services, Inc., Geologic, Stratigraphic, and Archaeological Assessment of Blocks 768 (OCS G 34458), 811 (OCS G 34460), and 812 (OCS G 34461) Mississippi Canyon Area, Gulf of Mexico, Project No. 0912-2139, dated April 11, 2013. Data: AUV side-scan sonar and sub-bottom profiler, and frequency enhanced 3-D seismic.

Geoscience Earth and Marine Services, Inc, Archaeological Assessment, Blocks 766-769 and 810-813, Mississippi Canyon Area, Gulf of Mexico, Project Nom 0912-2139B, dated March 22, 2013. Data: AUV side-scan sonar and Sub-bottom profiler – 4 data sets (Fugro GeoSurvey Services Inc., 2012, primary dataset; C&C 2007 MC854 & vicinity; C&C 2008, MC 810 & vicinity; C&C 2009, MC 720-722 & vicinity.

G. Shallow Hazards Assessment
See Section 6A of this plan for detailed site assessment, Power Spectrums and Top-hole Prognosis.

H. Geochemical Information
This information is not required for plans submitted in the GOM Region.

I. Future G&G Activities
This information is not required for plans submitted in the GOM Region.

SECTION 4: HYDROGEN SULFIDE (H_2S)

A. Concentration

0 ppm

B. Classification

Based on 30 CFR 550.215, Shell requests that the Regional Supervisor, Field Operations, classify the area in the proposed drilling operations as an area where the absence of H_2S is confirmed.

C. H_2S Contingency Plan

Shell is not required to provide an H_2S Contingency Plan with the Application for Permit to Drill before conducting the proposed exploration activities.

D. Modeling Report

We do not anticipate to encounter or handle H_2S at concentrations greater than 500 parts per million (ppm) and therefore have not included modeling for H_2S.

SECTION 5: MINERAL RESOURCE CONSERVATION INFORMATION

Information regarding Mineral Resource Conservation is not included in this EP as such information is only necessary in the case of DOCDs.

SECTION 6: BIOLOGICAL, PHYSICAL AND SOCIOECONOMIC INFORMATION

A. Chemosynthetic Communities Report

Shallow Hazards Reports and Data:

Geoscience Earth and Marine Services, Inc, Geologic, Stratigraphic, and Archaeological Assessment of Blocks 768 (OCS G 34458), 811 (OCS G 34460), and 812 (OCS G 34461) Mississippi Canyon Area, Gulf of Mexico, Project No. 0912-2139, dated April 11, 2013. Data: AUV side-scan sonar and sub-bottom profiler, and frequency enhanced 3-D seismic. (This report was previously submitted to BOEM with plan N-9827.)

Archaeological Reports:

Geoscience Earth and Marine Services, Inc., Archaeological Assessment, Blocks 766-769 and 810-813, Mississippi Canyon Area, Gulf of Mexico, Project Nom 0912-2139B, dated March 22, 2013. Data: AUV side-scan sonar and Sub-bottom profiler – 4 data sets (Fugro GeoSurvey Services Inc., 2012, primary dataset; C&C 2007 MC854 & vicinity; C&C 2008, MC 810 & vicinity; C&C 2009, MC 720-722 & vicinity. (This report was previously submitted to BOEM with plan N-9827.)

Proposed Locations F and G are revised and will be within 500ft of approved Location E, Plan N-9840. Revised Locations F and G are approximately 55 ft. apart and will be discussed together.

Amended Proposed Locations and Coordinates:

Proposed Location	X coordinate	Y coordinate	Water Depth
Prop Loc F, MC 812	1,008,600	10,229,558	4,549′
Prop Loc G, MC 812	1,008,434	10,228,507	4,549′

Coordinates are in UTM 16, NAD27

Site Assessment MC 812, Revised Location F and G:

Mississippi Canyon 812, Revised Proposed Locations F and G are located in a water depth of approximately 4,549′ and lie along the floor of an arcuate valley. Locations F and G will be located 1,610′ from the nearest seafloor fault and won't cross the seafloor fault. The locations are in the area of (within 500′) the Approved Location E, Plan N-9840.

The stratigraphy at the site of MC 812, amended revised Proposed Locations F and G consists of:

- Unit 1 (Seafloor – 377′ BML) – 18′ of transparent drape, 50′ layered hemipelagic deposits, 152′ of mass-transport deposits (MTD's) with lower water content, and 157′ of MTD's with thin intervals of layered hemipelagic sediments.
- Unit 2 (377′ – 528′ BML) – 151′ sediments that compose the base of massive submarine landslides
- Unit 3 (528′ – 1228′ BML) – 221′ of layered turbidites consisting of clays, silts and sands, 252′ of chaotic MTD's consisting of muds with scattered sand layers and pocket, and 227′ of think sand layers and pockets the comprise a mix of bedded turbidites and thin MTD's.
- Unit 4 (1228′ – 1906′ BML) – 238′ of chaotic MTD's, and 440′ of layered turbidites interbedded with thin MTD's.
- Unit 5 (1906′ – 2813′ BML) – 503′ of discontinuous channelized reflections and 404′ of turbidite deposits
- Unit 6 (2813′ – 3523′ BML) – 710′ of bedded turbidites with alternating intervals of chaotic MTD's.

Fault penetration is not anticipated in MC 812, Proposed Locations F & G.

Shallow Water Flow Potential:
- Negligible Potential – Seafloor – 377' BML
- Low Potential – 377' – 528' BML
- High Potential – 528' – 1228' BML
- Low Potential – 1228' – 1906' BML
- Moderate Potential – 1906' – 2813' BML
- Low Potential – 2813' – 3523' BML

Shallow Gas Potential
- Negligible Potential – Seafloor – 528' BML
- Low Potential – 528' – 3523' BML

Benthic/Anchor Assessment, MC 812, Revised Locations F and G (no anchors – DP Vessel)

Mississippi Canyon 812, amended revised Locations F and G are located in a water depth of approximately 4,459' and lie along the floor of an arcuate valley.

The locations will be located 1610' from the nearest seafloor fault and won't cross the seafloor fault. There is no other evidence of seafloor or near-surface faulting, slumping, amplitudes or fluid expulsion features within 2000' of this location. The location will not disturb any high-density areas of benthic communities.

There are no marine avoidance areas identified within 2000' of MC 812, amended proposed Locations F & G.

Currently, there are no flowlines or umbilicals in this vicinity.

Based on a high-resolution geophysical survey consisting of AUV Side-Scan Sonar and Sub-Bottom profiler, frequency enhanced 3-D Seismic, Enhanced Surface Renderings (ESR's) and ESR's with amplitudes applied, MC 812, amended proposed Locations F & G appears suitable for the planned activity.

Conclusion

Based on a high-resolution geophysical survey consisting of AUV Side-Scan Sonar and Sub-Bottom profiler, frequency enhanced 3-D Seismic, Enhanced Surface Renderings (ESR's) and ESR's with amplitudes applied, MC 812, Locations F and G appear suitable for the planned activity.

B. <u>Topographic Features Map</u>

The proposed activities are not within 1,000' of a no-activity zone or within the 3-mile radius zone of an identified topographic feature. Therefore, no map is required per NTL No. 2008-G04.

C. <u>Topographic Features Statement (Shunting)</u>

Shell does not plan to drill more than two wells from the same surface location within the Protective Zone of an identified topographic feature. Therefore, the topographic features statement required by NTL No. 2008-G04 is not applicable.

D. <u>Live Bottoms (Pinnacle Trend) Map</u>

The activities proposed in this plan are not within 200' of any pinnacle trend feature with vertical relief equal to or greater than 8'. Therefore, no map is required per NTL No. 2008-G04.

E. <u>Live Bottoms (Low Relief) Map</u>

The activities proposed in this plan are not within 100' of any live bottom low relief features. Therefore, no map is required per NTL No. 2008-G04.

F. Potentially Sensitive Biological Features

The activities proposed in this plan are not within 200' of any potentially sensitive biological features. Therefore, no map is required per NTL No. 2008-G04.

G. Remotely Operated Vehicle (ROV) Monitoring Plan

This information is no longer required by BOEM GoM.

H. Threatened and Endangered Species Information

Under Section 7 of the Endangered Species Act (ESA) all federal agencies must ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species, or destroy or adversely modify its designated critical habitat.

In accordance with the 30 CFR 250, Subpart B, effective May 14, 2007 and further outlined in Notice to Lessees (NTL) 2008-G04, lessees/operators are required to address site-specific information on the presence of federally listed threatened or endangered species and critical habitat designated under the ESA and marine mammals protected under the Marine Mammal Protection Act (MMPA) in the area of proposes activities under this plan.

Currently there are no designated critical habitats for the listed species in the Gulf of Mexico Outer Continental Shelf; however, it is possible that one or more of these species could be seen in the area of our operations. The following table reflects the Federally-listed endangered and threatened species in the lease area and along the northern Gulf coast:

Common Name	Scientific Name	T/E Status
Hawksbill Turtle	*Eretmochelys imbricata*	E
Green Turtle	*Chelonia mydas*	T/E
Kemp's Ridley Turtle	*Lepidochelys kempii*	E
Leatherback Turtle	*Dermochelys coriacea*	E
Loggerhead Turtle	*Caretta caretta*	T

Table 6.6 – Threatened and Endangered Sea Turtles

The green sea turtle is threatened, except for the Florida breeding population, which is listed as endangered.

There are 29 species of marine mammals that may be found in the Gulf of Mexico (see Table 6.7 below). Of the species listed as Endangered, only the Sperm whale is commonly found in the project area. No critical habitat for these species has been designated in the Gulf of Mexico.

Common Name	Scientific Name	T/E Status
Atlantic Spotted Dolphin	*Stenella frontalis*	
Blainville's Beaked Whale	*Mesoplodon densirostris*	
Blue Whale	*Balaenoptera musculus*	E
Bottlenose Dolphin	*Tursiops truncatus*	
Bryde's Whale	*Balaenoptera edeni*	
Clymene Dolphin	*Stenella clymene*	
Cuvier's Beaked Whale	*Ziphius cavirostris*	
Dwarf Sperm Whale	*Kogia simus*	
False Killer Whale	*Pseudorca crassidens*	
Fin Whale	*Balaenoptera physalus*	E
Fraser's Dolphin	*Lagenodelphis hosei*	

Gervais' Beaked Whale	*Mesoplodon europaeus*	
Humpback Whale	*Megaptera novaeangliae*	E
Killer Whale	*Orcinus orca*	
Melon-headed Whale	*Peponocephala electra*	
Minke Whale	*Balaenoptera acutorostrata*	
North Atlantic Right Whale	*Eubalaena glacialis*	E
Pantropical Spotted Dolphin	*Stenella attenuata*	
Pygmy Killer Whale	*Feresa attenuata*	
Pygmy Sperm Whale	*Kogia breviceps*	
Risso's Dolphin	*Grampus griseus*	
Rough-toothed Dolphin	*Steno bredanensis*	
Sei Whale	*Balaenoptera borealis*	E
Short-finned Pilot Whale	*Globicephala macrorhynchus*	
Sowerby's Beaked Whale	*Mesoplodon bidens*	
Sperm Whale	*Physeter macrocephalus*	E
Spinner Dolphin (Long-snouted)	*Stenella longirostris*	
Striped Dolphin	*Stenella coeruleoalba*	
Florida manatee	*Trichechus manatus*	E

Table 6.7 – Threatened and Endangered Marine Mammals

The blue, fin, humpback, North Atlantic right and sei whales are rare or extralimital in the Gulf of Mexico and are unlikely to be present in the lease area. The Environmental Impact Analysis found in Section 18 discusses potential impacts and mitigation measures related to threatened and endangered species.

I. Archaeological Report

The following reports were used in this analysis:

Geoscience Earth and Marine Services, Inc, Archaeological Assessment, Blocks 766-769 and 810-813, Mississippi Canyon Area, Gulf of Mexico, Project Nom 0912-2139B, dated March 22, 2013. Data: AUV side-scan sonar and Sub-bottom profiler – 4 data sets (Fugro GeoSurvey Services Inc, 2012, primary dataset; C&C 2007 MC854 & vicinity; C&C 2008, MC 810 & vicinity; C&C 2009, MC 720-722 & vicinity.

Archaeological Analysis

Review of all available AUV data for the survey area delineated no potential submerged cultural resources in Blocks 766-769 and 810-813, Mississippi Canyon Protraction Area. The BOEM proprietary database lists one known shipwreck in the survey area in MC 811. The "known" site could not be located in the collected data. No potential archaeological avoidances were delineated in the collected AUV data.

J. Air and Water Quality Information

Mississippi Canyon Block 812 is located 56 miles from the nearest shoreline. Drilling/completion operations will produce air pollutant emissions, but as provided in the Air Emissions Spreadsheet (see Section 8 of this Plan), these operations are below the exemption levels.

These drilling operations will result in the discharge of authorized effluents under the EPA Region VI General permit. Impacts of these discharges are expected to be minimal on water quality in the area.

For specific information relating to air and water quality information please refer to Section 18.

K. Socioeconomic Information

1) Shell will utilize its existing shorebase located in Fourchon, Louisiana which is fully staffed and operational and does not expect to employ persons from within the State of Florida.

2) Shell does not expect to purchase major supplies, services, energy, water or other resources from within the State of Florida for these operations.

3) Shell does not expect to hire contractors or vendors from within the State of Florida.

For specific information relating to socioeconomic information please refer to Section 18 in this Plan.

L. Waste Barrels Report

Shell is including the "Waste Barrel Avoidance and Release Response in the Mississippi Rev 2" dated October 20, 2010 in this section of the plan.

Shell Exploration & Production

OLYMPUS Host – MARS "B" Development
MISSISSIPPI CANYON BLOCK 807

Waste Barrel Avoidance and Release Response in the Mississippi Canyon Area

Project	OLYMPUS Host – MARS "B" Development
Document Title	Waste Barrel Avoidance and Release Response in the Mississippi Canyon Area
Document Number	MRB-100-HX-0505-0000002-000
Document Revision	REV 2
Version Code	Not Applicable
Document Status	Issued for Review
EIS Discipline / Document Type	Hazard Analysis Report
Originator / Author	Robert Kuehn
Classification	Restricted
ECCN	EAR 99
Issue Date	10/20/10

Revision History is shown on next page

REVISION HISTORY

Rev #	Date of Issue	Issue Description	Originator	Reviewer	Approver
2	10/20/10	Formalized existing document into Document Mgmt program	RB Kuehn	RB Kuehn	Nilesh Popat

Summary

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REVISION HISTORY 4
BACKGROUND 4
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DECONTAMINATION OF EQUIPMENT 6

Purpose

This document provides expectations and guidance for avoiding, and responding to a release of the contents of, a seafloor waste barrel. The procedures below describes Shell's expectations for routine barrel avoidance, data management, and response to inadvertent release of barrel contents.

Applicability

This document applies to all ROV, anchor and other operations which could cause a seafloor barrel rupture.

Changes to this procedure must be approved by BOEMRE.[1]

Revision History

Date	Person	Revision
12/16/08	RBKuehn	Incorporated comments from MMS[2] and issued as final.
8/16/10	RBKuehn	Incorporated comment from BOEMRE[3] to include New Orleans District manager in the notification of Step 2 of the section ***Barrel Impact Reporting.*** Also revised all relevant references to MMS as BOEMRE
10/20/10	RBKuehn	➢ In Background, added in summary of suspected materials disposed at the site, based on research of the site in public records. ➢ In section on Equipment Decontamination- **Decon Procedure:** o clarified what types of detergents are preferred/allowed, using the NPDES Vessel General Permit as a guide. o Expanded on appropriate PPE and other personnel precautions o Noted a need for secondary containment as appropriate Significant changes to the text are shown in yellow shade. ➢ Added page numbers and cleaned up format. ➢ Issued as REV 2

Background

Various projects will be carried out in an area of the Mississippi Canyon known to contain barrels of chemical waste.

1 Per MMS approval of West Boreas Supplemental Exploration Plan, MS 5231 December 16, 2008 Control No. S-07273, Lease(s) OCS-G07957, Block 762, Mississippi Canyon Area OCS-G07962, Block 806, Mississippi Canyon Area

2 Per MMS approval of West Boreas Supplemental Exploration Plan, MS 5231 December 16, 2008 Control No. S-07273, Lease(s) OCS-G07957, Block 762, Mississippi Canyon Area OCS-G07962, Block 806, Mississippi Canyon Area

3 Per BOEM approval of the Supplement to the Conceptual DWOP for Mars B project, 8/12/10, MS 5220

- The barrels were discharged in this area in the 1970's under government approved permits.

- The content, and its toxicity, of each individual barrel is not known. However, there are records of a wide range of industrial waste materials that were disposed in the barrels including chlorinated hydrocarbons and liquid metal salts. Below is a summary of the barrel contents based on available records.

    1. Metallic sodium and calcium; calcium oxide, sodium oxide, and inert salts.[4]

    2. 80-90% dichlorobutene, 20% organic high-boilers, and 1% quaternary ammonium salts. "Other wastes produced from the manufacture of fungicides and herbicides".[5]

- Within the area there are/could be many hundreds of waste barrels. Many of the barrels may have released their contents over time. However, an unknown number of barrels still look intact, and they may or may not still contain their original content. Also, as some of the barrels contained metal based solid waste, some of the barrels that no longer look intact may still contain some waste.

- Extensive sonar surveys of the area exist and are available for planning purposes.

Potential Hazards

Although there are no records of any issues regarding the barrels during the many years of Oil and Gas operations in the Mississippi Canyon area, the following potential hazards exist:

- Personnel exposure or equipment damage due to adherence of waste chemicals to recovered subsea equipment
- Equipment damage from sodium exposure to water (very vigorous reaction).

Normal Operations

For normal operations, all contractors and Shell employees must meet the following expectations:

1. Shell's over-arching policy is to avoid barrel contact.

2. Press releases making any reference to the chemical waste or barrels, or any incidents involving any chemical waste or barrels, will require the express written permission from

[4] EPA Permit Application No. 730D009E from Ethyl Corp, March 1, 1977, Public Notice April 20, 1977,
[5] Chapter 5 "Ocean Discharge" in the book Assessing Potential Ocean Pollutants, A Report of the Study Panel on Assessing Potential Ocean Pollutants. National Academy of Sciences, Washington DC, 438 pp. This document details DuPont's application to dispose of the following at the ocean disposal site

Shell.

3. All recorded video material is confidential and the property of Shell (standard contract provision).

   If during normal ROV operations there is a discovery of any potential archaeological resource (i.e., cannot be definitively identified as waste barrel/barrel remnant, modern debris, or refuse), any seafloor-disturbing activities in its proximity, must be stopped, the discovery must be reported to Dr. Chris Horrell at 504-736-2796, and further instructions must be obtained before proceeding.

4. Equipment Placement/Stand-off Distance
   4.1. A safe stand-off distance from the waste barrels is considered 10m (33ft). Care must be taken that flexible components (e.g. ROV tether, anchor lines, seismic cables) are controlled as well (e.g. don't drag through a barrel field).
   4.2. If a seafloor action will generate cuttings or debris, increase the stand-off distance as needed to avoid debris contact with nearby barrels.
   4.3. Do not investigate any barrels or remainders of barrels. Remain the minimum stand-off of 10m (33ft) at all times.
   4.4. Survey the anchor/pile/export locations with an ROV to ensure barrel avoidance.
   4.5. Record the (approximate) location of any chemical waste barrel seen, if feasible, without getting closer than the 10m (33ft) stand-off distance.

5. Contact the Shell EP Company Environmental Duty Phone for any questions or concerns. 1-504-390-1330

6. Decontamination of Equipment: In the event of contact with a barrel contents decontaminate equipment per **Decontamination of Equipment** below.

7. Make reports of barrel contact/rupture per **Barrel Release Reporting** below.

Decontamination of Equipment

1. **General**
   In the unlikely case that contact is suspected or has been made with any wastes from a barrel, appropriate action needs to be taken to guarantee the topside safety of personnel handling the equipment (e.g. ROV, anchor lines, etc).
   It is left solely to the judgment of the Person-in-Charge of the equipment/vessel to determine if it is necessary to abandon all or part of the equipment on the sea floor.

2. **Decon Procedure**

Based on various factors[6], Shell recommends the following:

2.1. Use the ocean to "wash" the equipment (e.g. fly an ROV for at least an hour at depth high enough above sea floor to prevent umbilical dragging or other disturbance of the sea floor). For other equipment, provide any movement through the water column that's possible, again avoiding seafloor dragging.

2.2. Retrieve the equipment to the surface, but do not bring onboard if feasible.

2.3. Hose the equipment off before retrieving onto the vessel. Use as high a water flow as is available/safe. **CAUTION-** detergent/soap may be used BUT in as low a quantity as practicable to minimize foam. Only non-toxic and phosphate free cleaners and detergents may be used. Furthermore, cleaners and detergents should not be caustic or only minimally caustic and should be biodegradable[7].

2.4. Avoid physical contact with the equipment, and keep the equipment off the vessel at this point..

2.5. Dunk the equipment back in the sea and "wash" the equipment for approximately 15 minutes.

2.6. Retrieve the equipment to the surface. Before recovering, visually inspect the equipment, umbilical, cable surfaces with binoculars for signs of corrosion, discoloration, air reaction such as fuming/smoking, or any other signs of chemical contact. Rewash and dunk the equipment as needed.

2.7. Retrieve the equipment onto the back deck. Monitor the equipment and surrounding storage area for indications of chemical contamination (corrosion, discoloration, air reaction such as fuming/smoking, etc). Establish secondary containment as necessary to collect any potentially contaminated drips.

2.8. Only essential personnel should be allowed near the equipment, once retrieved on the back deck.

2.9. While performing cleaning operations on the equipment, involving contact with potentially contaminated surfaces, personal protective equipment must be worn including, but not limited to: safety eye goggles, safety clothing such as coverall and

---

[6] Shell assumes, for purposes of this decontamination guidance, that:

- The most toxic material identified in the disposal area's permits and other available documents is involved . However Shell cannot guarantee there are not other toxic materials present than those identified in the permits and other documents.
- It is assumed that the materials do not chemically interact with the materials of the ROV, its tools and equipment.

[7] The NPDES General Permit for Discharges Incidental to the Normal Operation of a Vessel provides insight into managing any washing. Also, EPA provides the following definitions:
"Non-toxic" soaps, cleaners, and detergents means these materials which do not exhibit potentially harmful characteristics as defined by the Consumer Product Safety Commission regulations found at 16 CFR Chapter II, Subchapter C, Part 1500.
"Phosphate Free" soaps, cleaners, and detergents means these materials which contain, by weight, 0.5% or less of phosphates or derivatives of phosphates.

aprons, Nitrile type chemical resistant industrial-safety gloves, and PVC boots.

2.10. Wash hands thoroughly and take a shower after performing cleaning operations on the equipment.

2.11. Avoid drinking liquids or eating food in the work area.

2.12. If contamination is still suspected, consult with the Shell representatives/management for further actions including additional washing, abandonment on the seafloor, segregated storage on the boat, wrapping the equipment partially or fully in plastic sheeting, etc.

2.13. Document all actions and results in a log.

Barrel Impact Reporting

1. <u>Initial reporting:</u>

   1.1. Equipment operator is to inform the Shell onsite representative and the Shell operations supervisor on duty.

   1.2. The Shell onsite representative or the Shell operations supervisor will call the SEPCO Environmental Duty Engineer at 1-504-390-1330. As a back-up, call 337-281-0783 (Rob Kuehn).

   - The call should be made at the earliest convenience.
   - Be prepared to report the lat/long of the ruptured barrel (not the surface location) and water depth.

2. The SEPCO Environmental Duty Engineer will call

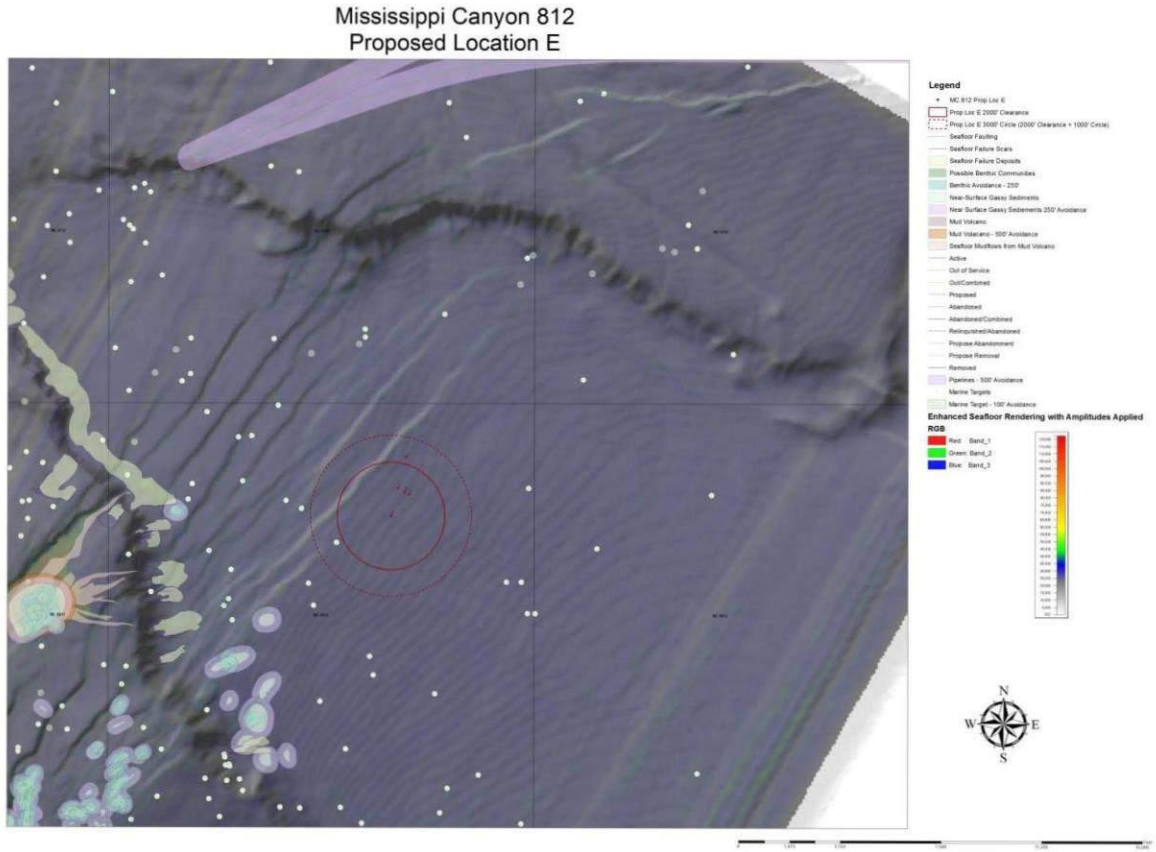
   - the regulatory Affairs Duty Phone 504-782-7823,
   - Mr. Broussard of the BOEMRE (504-736-3245) and
   - BOEMRE New Orleans District Manager

   to report the event. The call should include the lat/long and any circumstances of note.

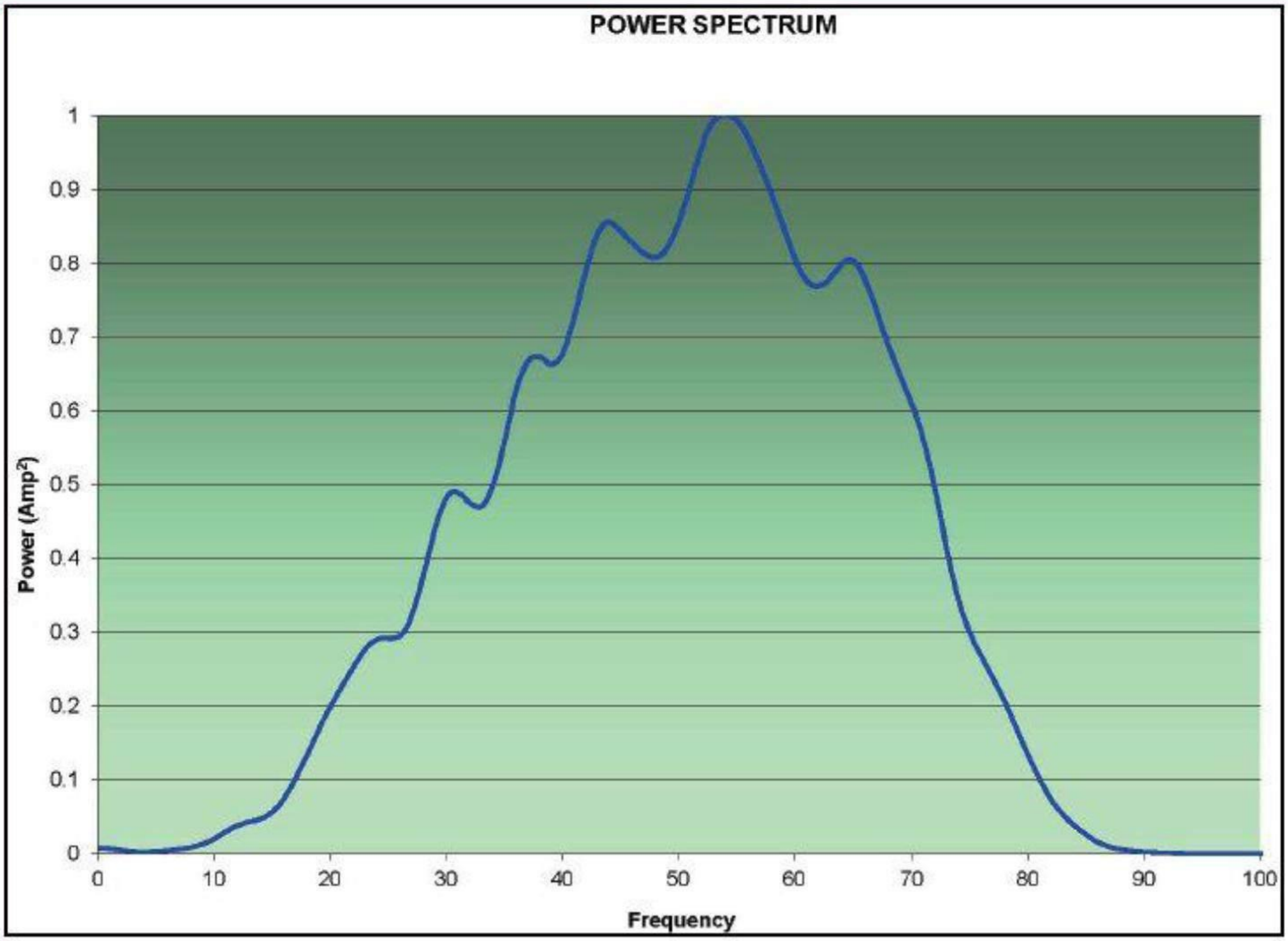
3. <u>Follow-up Reporting</u>
   The SEPCO Environmental Duty Engineer or Rob Kuehn follows up with an email to Mr. Broussard of BOEMRE.

   The BOEMRE have requested submission of a copy of whatever relevant video is available for the event period. *No dedicated* video survey is required for a barrel rupture (i.e. just be prepared to submit whatever video was obtained as normal part of the activities). BOEM has agreed we can submit any video after the project is completed.

Attachment 6A – Enhanced Seafloor Rendering Map Wells F & G (within 500' of Well E)



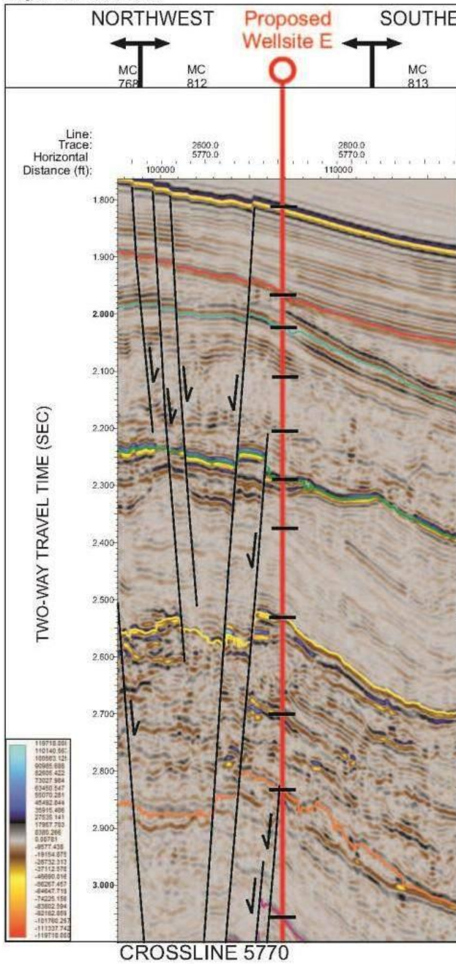
Attachment 6B
Power Spectrum – Well F & G (within 500' of well E)



Power Spectrum Analysis Curve, Proposed Wellsite MC 812 E

Attachment 6C
Tophole Prognosis– Well F & G (within 500' of well E)

Project No. 0912-2139a | Filename: 122139a_fig_E-1.cdr



3-D Seismic Section Through Proposed Wellsite E
X = 1,008,435 FT; Y = 10,228,457 FT
Inline 2705 at Crossline 5770

NEGLIGIBLE → HIGH: 0, 1, 2, 3 — Shallow Water Flow and Gas Potential

0 = NEGLIGIBLE
1 = LOW
2 = MODERATE
3 = HIGH

Units	Horizon	Water Flow and Gas Potential: Water Flow	Water Flow and Gas Potential: Gas	Horizon TWT (sec, bsl)	Depth (ft, bsl)	Depth (ft, bml)	Unit (Interval) Thickness (ft)	Lithology/Stratigraphy
	SEAFLOOR			1.8121	-4,479			Seafloor slopes at 1.2° Southeast
UNIT 1	HORIZON A	0	0	1.9651	-4,856	377	377	Very soft, pelagic drape at seafloor. Alternating intervals of bedded hemipelagic silty clays with chaotic mass-transport deposits.
UNIT 2	HORIZON E 01	1	0	2.0243	-5,007	528	151	Bedded hemipelagic muds with intervals of chaotic, mud-rich mass-transport deposits.
UNIT 3	INTERFACE	3	1	2.1100	-5,228	749	(221)	Bedded turbidites intercalated with mud-rich mass-transport intervals. Thin sand layers possible.
	INTERFACE	3	1	2.2050	-5,480	1,001	(252)	Mass-transport deposits, muds with scattered sand pockets.
	SUB BLUE 1	3	1	2.2888	-5,707	1,228	700/(227)	Alternating bedded and chaotic intervals, thin sand layers and isolated sand pockets possible.
UNIT 4	INTERFACE	1	1	2.3750	-5,945	1,466	(238)	Chaotic, mud-rich mass-transport deposits.
	SUB BLUE 2	1	1	2.5298	-6,385	1,906	678/(440)	Bedded mud-rich turbidite deposits interbedded with thin mass-transport deposits.
UNIT 5	INTERFACE	2	1	2.7000	-6,888	2,409	(503)	Channelized interval with bedded turbidites. Clay and silt with thin sand layers and pockets.
	HORIZON F	2	1	2.8323	-7,292	2,813	907/(404)	Turbidites and thin mass-transport deposits. Thin sand layers possible.
UNIT 6	HORIZON MAGENTA	1	1	3.0562	-8,002	3,523	710	Bedded turbidites alternating with chaotic mass-transport deposits. Predominantly a mud-rich interval. Fault at top of unit.

Figure E-1. Tophole Prognosis Chart, Proposed Wellsite E, Mississippi Canyon Block 812

SECTION 7: WASTE AND DISCHARGE INFORMATION

A. Projected Ocean Discharges

TABLE 7A: WASTES YOU WILL GENERATE, TREAT AND DOWNHOLE DISPOSE OR DISCHARGE TO THE GOM

Note: Please specify if the amount reported is a total or per well amount

Projected generated waste			Projected ocean discharges		Projected Downhole Disposal
Type of Waste and Composition	**Composition**	**Projected Amount**	**Discharge rate**	**Discharge Method**	**Answer yes or no**
Will drilling occur ? If yes, you should list muds and cuttings					
EXAMPLE: Cuttings wetted with ynthetic based fluid	*Cuttings generated while using synthetic based drilling fluid.*	*X bbl/well*	*X bbl/day/well*	*discharge pipe*	*No*
Water-based drilling fluid	barite, additives, mud	85,000 bbl/well	13,000 bbls /day	discharge overboard	No
Cuttings wetted with water-based fluid	Cuttings coated with water based drilling mud	66,600 bbls / well	444 bbls /day	discharge overboard	No
Cuttings wetted with synthetic-based fluid	Cuttings generated while using synthetic based drilling fluid.	7,800 bbls/well	52 bbls /day	discharge overboard	No
Synthetic based drilling fluid adhering to washed drill cuttings	Synthetic based drilling fluid adhering to washed drill cuttings	450 bbls/well	3 bbl/day	Overboard discharge line below the water level	No
Will humans be there? If yes, expect conventional waste					
EXAMPLE: Sanitary waste water		*X liter/person/day*	*NA*	*chlorinate and discharge*	*No*
Domestic waste (kitchen water, shower water)	grey water	30,000 bbls/well	200 bbls/day/well	Grinded to less than 25 mm mesh size and discharge overboard	No
Sanitary waste (toilet water)	treated sanitary waste	22,500 bbls/well	150 bbls/day/well	Treated in the MSD** prior to discharge to meet NPDES limits	No
Is there a deck? If yes, there will be Deck Drainage					
Deck Drainage	Contaminated wash and rainwater	3,000 bbls / well	20 bbls / day	Drained overboard through deck scuppers	No
Will you conduct well treatment, completion, or workover?					
well treatment fluids	Linear Frac Gel Flush Fluids, Crosslinked Frac Fluids carrying ceramic proppant and acidic breaker fluid	1,500 bbls/well	10 bbls/day	Overboard discharge line below the water level if oil and greese free and meets LC50 requirements.	No
well completion fluids	Completion brine contaminated with WBDM and displacement spacers	2,000 bbls/well	15 bbls/day	Overboard discharge line below the water level if oil and greese free and meets LC50 requirements.	No
workover fluids	NA	NA	NA	NA	No
Miscellaneous discharges. If yes, only fill in those associated with your activity.					
Desalinization unit discharge	Rejected water from watermaker unit	60,000 bbls/well	400 bbls/day/well	RO Desalinization Unit Discharge Line directly Ovbd,	No
Blowout prevent fluid	Water based	30 bbls/well	0.2 bbls /day	seafloor	No
Ballast water	Uncontaminated seawater	491,400 bbls / well	3,276 bbls / day	Ballast Pm. discharge line overboard	No
Bilge water	Bilge and drainage water will be treated to MARPOL standards (< 15ppm oil in water).	231,450 bbls / well	1,543 bbls / day	Bilge and drainage water will be treated to MARPOL standards (< 15ppm oil in water).	No
Excess cement at seafloor	Cement slurry	30,000 bbls/well (assume planned 100% excess is discharged)	200 bbls /day	Discharged at seafloor.	No
Fire water	Treated seawater	10,000 bbls / well	2,000 bbls / month	discharged @ Ea. Quadrant Disch. Ln. , 77' below waterline	No
Cooling water	Treated seawater	68,451,450 bbls / well	456,343 bbl/day/well	discharged @ Ea. Quadrant Disch. Ln. , 77' below waterline	No
Will you produce hydrocarbons? If yes fill in for produced water.					
Produced water	NA	NA	NA	NA	
Will you be covered by an individual or general NPDES permit ?			GENERAL PERMIT	GMG290103	

B. Projected Generated Wastes

TABLE 7B. WASTES YOU WILL TRANSPORT AND/OR DISPOSE OF ONSHORE

Note: Please specify whether the amount reported is a total or per well

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: Oil-based drilling fluid or mud	*NA*	*NA*	*NA*	*NA*	*NA*
Synthetic-based drilling fluid or mud	used SBF and additives	Drums on barges	Newpark Environmental Services (Fourchon, La.) or US Liquids of Louisiana (Fourchon, La.)	6,500 bbls/well	Recycled
Cuttings wetted with Synthetic-based fluid	Drill cuttings from synthetic based interval.	storage tank on supply boat.	Newpark Environmental Services (Fourchon, La.) or US Liquids of Louisiana (Fourchon, La.)	300 bbls / well	Recycled
Cuttings wetted with oil-based fluids	NA	NA	NA	NA	NA
Will you produce hydrocarbons? If yes fill in for produced sand.					
Produced sand	NA	NA	NA	NA	NA
Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.					
EXAMPLE: trash and debris	*cardboard, aluminum,*	*barged in a storage bin*	*shorebase*	*z tons total*	*recycle*
Trash and debris - recyclables	trash and debris	storage bins on supply boat	Omega Waste Managmenet, W. Patterson, LA or ARC, New Iberia, LA	200 lbs/month	recylce
Trash and debris - non-recyclables	trash and debris	storage bins on supply boat	Republic/BFI landfill, Sorrento, LA or the parish landfill, Avondale, LA	400 lbs/month	landfill
Used oil and glycol	used oil, oily rags and pads, empty drums and cooking oil	drums on supply boat	Omega Waste Managmenet, W. Patterson, LA or ARC, New Iberia, LA	20 bbls/month	recycled
Hazardous Waste	paints, solvents and unused chemicals	drums on supply boat	Omega Waste Managmenet, W. Patterson, LA or ARC, New Iberia, LA	60 bbls/mo	recycled
Universal Waste Items	Batteries, lamps, glass and mercury-contaminated waste	drums on supply boat	Lamp Environmental, Hammond, LA	50 bbls/mo	landfill

C. Modeling Report

The proposed activities under this plan do not meet the U.S. Environmental Protection Agency requirements for an individual NPDES permit. Therefore, modeling report requirements per NTL No. 2008-G04 is not applicable to this EP.

SECTION 8: AIR EMISSIONS INFORMATION

A. Emissions Worksheet and Screening Questions

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

***Note: The following AQR is using fuel limitations and Shell will perform fuel monitoring for this project.**

If you answer *no* to all of the above screening questions from the appropriate table, provide:

(1) Summary information regarding the peak year emissions for both Plan Emissions and Complex Total Emissions, if applicable. This information is compiled on the summary form of the two sets of worksheets. You can submit either these summary forms or use the format below. You do not need to include the entire set of worksheets.

Air Pollutant		Plan Emission Amounts (tons)	Calculated Exemption Amounts (tons)		Calculated Complex Total Emission Amounts (tons)
PM					
SO_x					
NOx					
VOC					
CO					

(2) Contact: Tracy Albert, 504.425.4652, tracy.albert@shell.com

B. Worksheets

See attached worksheets.

Attachment 8A – Air Quality Report

Purpose

Shell has reviewed engine information for its GOM fleet of Drillship and DP semi-sub MODUs. The single MODU with the largest power profile is the Noble Don Taylor, which has six main engines of 10,728 hp/engine. The projected fuel usages presented below would therefore be conservative across the fleet of Drillships and DP Semi-subs.

Step 1 - Determine Typical Operating Loads

Description	Value	Notes
Actual average daily fuel use (gal/day)	16128	Based on daily fuel records for the Noble Don Taylor from January1, 2015 to December 31, 2015.
Contingency factor	1.25	See Step 1 above.
Campaign Average Daily Fuel Use (gal/day)	20,000	Calculated Value - PTE fuel use * Proposed Operating Load and rounded up to nearest thousand (for additional conservatism).
CY2013 Fuel Limits MMGals	0.10	Calculated Value - Campaign Average Daily Fuel Use * Campaign Days
CY2014 Fuel Limits MMGals	0.50	Calculated Value - Campaign Average Daily Fuel Use * Campaign Days
CY2015-2018 Fuel Limits MMGals	0.50	Calculated Value - Campaign Average Daily Fuel Use * Campaign Days

Step 3 - Other Vessel Fuel Loads

Description	Value	Notes
Proposed Operating Loads	50%	Shell policy restricts D/P to < 50% near rig. When in standby away from rig but within 25 miles load will be < 50% (conserve fuel). When transiting through field (25 nm), traveling at economical speeds.
Offshore Support Vessels		
PTE Fuel Use (gal/day)	10,943	Offshore Support Vessels are rated at 9440 hp. The PTE fuel use is then estimated using the AQR conversion factor of 0.0483 gal/hp-hr.
Campaign Average Daily Fuel Use (gal/day)	5,471	Calculated Value - PTE fuel use * Proposed Operating Load.
Crew Vessel		
PTE Fuel Use (gal/day)	6,260	Crew Vessels are rated at 5400 hp. The PTE fuel use is then estimated using the AQR conversion factor of 0.0483 gal/hp-hr.
Campaign Average Daily Fuel Use (gal/day)	939	Calculated Value - PTE fuel use * Proposed Operating Load. Note that Crew Vessels are only in field 30% of campaign and daily average value has been adjusted
Total Vessel Activity		
CY2013 Fuel Limits MMGals	0.30	Sum of (vessel daily fuel use * corresponding campaign days)
CY2014 Fuel Limits MMGals	1.07	Sum of (vessel daily fuel use * corresponding campaign days)
CY2015-CY2018 Fuel Limits MMGals	1.07	Sum of (vessel daily fuel use * corresponding campaign days)

Additional Notes

1 - Operating loads are campaign specific and may change in future AQRs depending on the future fuel usage tracking. Fuel levels depicted in this AQR does not restrict Shell from using a different value in future AQRs.

2 - If tracked fuel usage associated with this activity indicates emissions may exceed the approved emissions, Shell will submit revised AQR calculations.

COMPANY	Shell Offshore Inc.
AREA	Mississippi Canyon
BLOCK	812
LEASE	G 34461
PLATFORM	MODU
WELL	F & G
COMPANY CONTACT	Berrtrand Montchanin
TELEPHONE NO.	504-425-2113
REMARKS	Kaikias_AQR_SEP_DP MODU_06022016.xlsx

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

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

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

Per 40 CFR 80.510(a)(1), Locomotive and Marine (LM) diesel fuels are limited to 500 ppm maximum sulfur, effective June 1, 2007.

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
Shell Offshore Inc.	Mississippi Canyon	812	G 34461	DU (DP or DP S	F-G		Bertrand Montchanin	504-425-2113	Kaikias_AQR_SEP_DP MODU_06022016.xlsx

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	HP	GAL/HR	GAL/D												
	Nat. Gas Engines	HP	SCF/HR	SCF/D												
	Burners	MMBTU/HR	SCF/HR	SCF/D	HR/D	DAYS	PM	SOx	NOx	VOC	CO	PM	SOx	NOx	VOC	CO
MODU Drilling	PRIME MOVER>600hp diesel	10728	518	3333	24	150	7.56	4.34	259.93	7.80	56.71	3.65	2.09	125.41	3.76	27.36
DP Drillship or DP Semi	PRIME MOVER>600hp diesel	10728	518	3333	24	150	7.56	4.34	259.93	7.80	56.71	3.65	2.09	125.41	3.76	27.36
	PRIME MOVER>600hp diesel	10728	518	3333	24	150	7.56	4.34	259.93	7.80	56.71	3.65	2.09	125.41	3.76	27.36
	PRIME MOVER>600hp diesel	10728	518	3333	24	150	7.56	4.34	259.93	7.80	56.71	3.65	2.09	125.41	3.76	27.36
	PRIME MOVER>600hp diesel	10728	518	3333	24	150	7.56	4.34	259.93	7.80	56.71	3.65	2.09	125.41	3.76	27.36
	PRIME MOVER>600hp diesel	10728	518	3333	24	150	7.56	4.34	259.93	7.80	56.71	3.65	2.09	125.41	3.76	27.36
	Energency Generator>600hp diesel	2547	123	2952	1	150	1.80	1.03	61.71	1.85	13.46	0.13	0.08	4.63	0.14	1.01
	Emergency Air Compressor< 600hp	26	1	30	1	150	0.02	0.01	0.63	0.02	0.14	0.00	0.00	0.05	0.00	0.01
	All other rig-equipment is electric (e.g cranes) or negligible in emissions potential (e.g. life boats, welding equipment, etc.)															
	Supply Vessel>600hp diesel (gener	9440	456	5471	24	150	6.65	3.82	228.72	6.86	49.90	5.99	3.43	205.85	6.18	44.91
	Supply Vessel>600hp diesel (riserle	9440	456	5471	24	10	6.65	3.82	228.72	6.86	49.90	0.40	0.23	13.72	0.41	2.99
	Supply Vessel>600hp diesel (riserle	9440	456	5471	24	10	6.65	3.82	228.72	6.86	49.90	0.40	0.23	13.72	0.41	2.99
	Crew Vessel>600hp diesel	5400	261	939	24	150	3.81	2.18	130.84	3.93	28.55	1.03	0.59	35.33	1.06	7.71
2016 YEAR TOTAL							70.95	40.69	2438.92	73.17	532.13	29.84	17.11	1025.75	30.77	223.80
EXEMPTION CALCULATION	DISTANCE FROM LAND IN MILES											1864.80	1864.80	1864.80	1864.80	49766.56
	56.0															

Note - The Campaign Average Daily Fuel Use (gal/day) is 20,000 gallons/day and represents total fuel use on the MODU. Since the Prime Movers would be the primary diesel users, the 20,000 gal/day is allocated equally amongst the six prime movers (3,333 gal/day for each Prime Mover). Fuel tracking mitigations should be applied to the total MODU fuel use of 20,000 gal/day, which equates to 0,50 MMgals for CY2016-2017.

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
Shell Offshore Inc.	Mississippi Canyon	812	G 34461	DU (DP or DP S	F-G		Bertrand Montchanin	504-425-2113	Kaikias_AQR_SEP_DP MODU_06022016.xlsx

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	HP	GAL/HR	GAL/D												
	Nat. Gas Engines	HP	SCF/HR	SCF/D												
	Burners	MMBTU/HR	SCF/HR	SCF/D	HR/D	DAYS	PM	SOx	NOx	VOC	CO	PM	SOx	NOx	VOC	CO
MODU Drilling	PRIME MOVER>600hp diesel	10728	518	3333	24	250	7.56	4.34	259.93	7.80	56.71	6.08	3.49	209.02	6.27	45.60
DP Drillship or DP Semi	PRIME MOVER>600hp diesel	10728	518	3333	24	250	7.56	4.34	259.93	7.80	56.71	6.08	3.49	209.02	6.27	45.60
	PRIME MOVER>600hp diesel	10728	518	3333	24	250	7.56	4.34	259.93	7.80	56.71	6.08	3.49	209.02	6.27	45.60
	PRIME MOVER>600hp diesel	10728	518	3333	24	250	7.56	4.34	259.93	7.80	56.71	6.08	3.49	209.02	6.27	45.60
	PRIME MOVER>600hp diesel	10728	518	3333	24	250	7.56	4.34	259.93	7.80	56.71	6.08	3.49	209.02	6.27	45.60
	PRIME MOVER>600hp diesel	10728	518	3333	24	250	7.56	4.34	259.93	7.80	56.71	6.08	3.49	209.02	6.27	45.60
	Energency Generator>600hp diesel	2547	123	2952	1	250	1.80	1.03	61.71	1.85	13.46	0.22	0.13	7.71	0.23	1.68
	Emergency Air Compressor< 600hp	26	1	30	1	250	0.02	0.01	0.63	0.02	0.14	0.00	0.00	0.08	0.00	0.02
	All other rig-equipment is electric (e.g cranes) or negligible in emissions potential (e.g. life boats, welding equipment, etc.)															
	Supply Vessel>600hp diesel (gener	9440	456	5471	24	250	6.65	3.82	228.72	6.86	49.90	9.98	5.72	343.08	10.29	74.85
	Supply Vessel>600hp diesel (riserle	9440	456	5471	24	10	6.65	3.82	228.72	6.86	49.90	0.40	0.23	13.72	0.41	2.99
	Supply Vessel>600hp diesel (riserle	9440	456	5471	24	10	6.65	3.82	228.72	6.86	49.90	0.40	0.23	13.72	0.41	2.99
	Crew Vessel>600hp diesel	5400	261	939	24	250	3.81	2.18	130.84	3.93	28.55	1.71	0.98	58.88	1.77	12.85
2017 YEAR TOTAL							**70.95**	**40.69**	**2438.92**	**73.17**	**532.13**	**49.20**	**28.21**	**1691.29**	**50.74**	**369.01**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**											**1864.80**	**1864.80**	**1864.80**	**1864.80**	**49766.56**
	56.0															

Note - The Campaign Average Daily Fuel Use (gal/day) is 20,000 gallons/day and represents total fuel use on the MODU. Since the Prime Movers would be the primary diesel users, the 20,000 gal/day is allocated equally amongst the six prime movers (3,333 gal/day for each Prime Mover). Fuel tracking mitigations should be applied to the total MODU fuel use of 20,000 gal/day, which equates to 0,83 MMgals for CY2017.

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL
Shell Offshore Inc.	Mississippi Canyon	812	G 34461	MODU (DP or DP Semi)	F-G

Year	Emitted		Substance		
	PM	SOx	NOx	VOC	CO
2016	29.84	17.11	1025.75	30.77	223.80
2017	49.20	28.21	1691.29	50.74	369.01
Allowable	1864.80	1864.80	1864.80	1864.80	49766.56

SECTION 9: OIL SPILL INFORMATION

A. Oil Spill Response Planning

All the proposed activities and facilities in this plan will be covered by the Regional OSRP filed by Shell Offshore Inc. (0689) in accordance with 30 CFR 254.47 and NTL 2013-N02. Shell's regional OSRP was approved by BSEE in December 2014 and the bi-annual review was found to be in compliance on July 17, 2015 and modified August 5, 2015

Primary Response Equipment Locations	Preplanned Staging Location(s)
Ingleside, TX; Galveston, TX; Venice, LA; Ft Jackson, LA; Harvey, LA; Stennis, MS; Pascagoula, MS; Theodore, AL; Tampa, FL	Galveston, TX; Port Fourchon; Venice, LA; Pascagoula, MS ; Mobile, AL; Tampa, FL

Table 9.1 – Response Equipment and Staging Areas

OSRO Information:

The names of the oil spill removal organizations (OSRO's) under contract include Clean Gulf Associates (CGA), Marine Spill Response Company (MSRC) and Oil Spill Response Limited (OSRL). These OSRO's provide equipment and will in some cases provide trained personnel to operate their response equipment (OSRVs, etc.) and Shell also has the option to pull from their trained personnel as needed for assistance/expertise in the Command Post and in the field.

Category	Regional OSRP	EP
Type of Activity	Exploratory Drilling	Exploratory Drilling
Facility Location (area/block)	MC 812	MC 812
Facility Designation	Subsea well B◇	Subsea well B
Distance to Nearest Shoreline (miles)	56	56
Volume Storage tanks (total) Flowlines (on facility) Pipelines Uncontrolled blowout (volume per day) Total Volume	 N/A N/A N/A 468,000* BOPD 468,000 Bbls	 N/A N/A N/A 468,000* BOPD 468,000 Bbls
Type of Oil(s) - (crude oil, condensate, diesel)	Crude oil	Crude oil
API Gravity(s)	31º	31º

Table 9.2 - Worst Case Scenario Determination

***24 hour rate (432,000 BOPD 30 day average)**

◇This well was accepted by BOEM in plan N-9840.

Certification: *Since Shell Offshore Inc. has the capability to respond to the appropriate worst-case spill scenario included in its regional OSRP, approved by BSEE December 2014 and the bi-annual was found to be in compliance on July 17, 2015 and modified August 5, 2015. Since the worst-case scenario determined for our Plan does not replace the appropriate worst-case scenario in our regional OSRP, I hereby certify that Shell Offshore Inc. has the capability to respond, to the maximum extent practicable, to a worst-case discharge, or a substantial threat of such a discharge, resulting from the activities proposed in our plan.*

Modeling:

Based on the requirement per BSEE NTL 2008-G04 and the outcome of the OSRAM Model, Shell Offshore Inc. determined no additional modeling was needed for potential oil or hazardous substance spill for operations proposed in this exploration plan, as the current, approved OSRP adequately meets the necessary response capabilities.

B. Oil Spill Response Discussion

1. Volume of the Worst Case Discharge

Please refer to Section 2j and 9(iv) of this EP.

2. Trajectory Analysis

Trajectories of a spill and the probability of it impacting a land segment have been projected utilizing information in the BSEE Oil Spill Risk Analysis Model (OSRAM) for the Central and Western Gulf of Mexico available on the BSEE website using 30 day impact. Offshore areas along the trajectory between the source and land segment contact could be impacted. The land segment contact probabilities are shown in Table 9.C.1.

Area/Block	OCS-G	Launch Area	Land Segment Contact	%
Exploratory MC 812		58	Galveston, TX	1
			Jefferson, TX	1
			Cameron, LA	3
			Vermillion, LA	2
			Iberia, LA	1
			Terrebonne, LA	3
			LaFourche, LA	3
			Jefferson, LA	1
			Plaquemines, LA	**8**
			St. Bernard, LA	1
			Okaloosa, FL	1

Table 9.C.1 Probability of Land Segment Impact

C. Resource Identification

The locations identified in Table 9.C.1 are the highest probable land segments to be impacted using the BOEMRE Oil Spill Risk Analysis Model (OSRAM). The environmental sensitivities are identified using the appropriate National Oceanic and Atmospheric Administration (NOAA) Environmental Sensitivity Index (ESI) maps for the given land segment. ESI maps provide a concise summary of coastal resources that are at risk if an oil spill occurs nearby. Examples of at-risk resources include biological resources (such as birds and shellfish beds), sensitive shorelines (such as marshes and tidal flats), and human-use resources (such as public beaches and parks).

In the event an oil spill occurs, ESI maps can help responders meet one of the main response objectives: reducing the environmental consequences of the spill and the cleanup efforts. Additionally, ESI maps can be used by planners to identify vulnerable locations, establish protection priorities, and identify cleanup strategies.

The following is a list of resources of special economic or environmental importance that potentially could be impacted by the Mississippi Canyon 812 WCD scenario.

Onshore/Nearshore: Plaquemines Parish has been identified as the most probable impacted Parish within the Gulf of Mexico for the Greater than 10 Mile Worst Case Discharge and the Exploratory Worst Case Discharge. Plaquemines Parish has a total area of 2,429 square miles of which, 845 square miles of it is land and 1,584 square miles is water. Plaquemines Parish includes two National Wildlife Refuges: Breton National Wildlife Refuge and Delta National Wildlife Refuge. This area is also a nesting ground for the brown pelican, an endangered species. Examples of Environmental Sensitivity maps for Plaquemines Parish are detailed in the following pages. Key ESI maps for Plaquemines Parish and the legend are shown in Figures 9.C.1 through 9.C.5.

Offshore: An offshore spill may require an Essential Fishing Habitat (EFH) Assessment. This assessment would include a description of the spill, analysis of the potential adverse effects on EFH and the managed species; conclusions regarding the effects on the EFH; and proposed mitigation, if applicable.

Significant pre-planning of joint response efforts was undertaken in response to provisions of the National Contingency Plan (NCP). Area Contingency Plans (ACPs) were developed to provide a well-coordinated response to oil discharges and other hazardous releases. The One Gulf Plan is specific to the Gulf of Mexico to advance the unity of policy and effort in each of the Gulf Coast ACPs. Strategies used for the response to an oil spill regarding protection of identified resources are detailed in the One Gulf Plan and relevant Gulf Coast ACP.

D. Worst Case Discharge Response

Shell will make every effort to respond to the MC812 Worst Case Discharge as effectively as possible. Below is a table outlining the applicable evaporation and surface dispersion quantity:

	Mississippi Canyon Block 812	**Calculations (BBLS)**
i.	**TOTAL WCD (based on 30 day average (per day))**	**432,000**
ii.	Approximate loss of volume of oil to natural surface dispersion and evaporation base (approximate bbls per day)* (13% Natural surface evaporation and dispersion in 24 hrs)	-56,160
	APPROXIMATE TOTAL REMAINING	**~376,000**

* An ADIOS 2 Model was ran to account for surface dispersion and evaporation.

Table 9.D.1 Oil Remaining After Surface Dispersion

Shell has contracted OSROs to provide equipment, personnel, materials and support vessels as well as temporary storage equipment to be considered in order to cope with a WCD spill. Under adverse weather conditions, major response vessels and Transrec skimmers are still effective and safe in sea states of 6-8 ft. If sea conditions prohibit safe mechanical recovery efforts, then natural dispersion and airborne chemical dispersant application (visibility & wind conditions permitting) may be the only safe and viable recovery option.

MSRC OSRV	8 foot seas
VOSS System	4 foot seas
Expandi Boom	6 foot seas, 20 knot winds
Dispersants	Winds more than 25 knots, Visibility less than 3 nautical miles, or Ceiling less than 1,000 feet.

Table 9.D.2 Operational Limitations of Response Equipment

Upon notification of the spill, Shell would request a partial or full mobilization of contracted resources, including, but not limited to, skimming vessels, oil storage vessels, dispersant aircraft, subsea dispersant, shoreline protection, wildlife protection, and containment equipment. Following is a list of the contracted resources including de-rated recovery capacity, personnel, and estimated response times (procurement, load out, travel time to the site, and deployment). The Incident Commander or designee may contact other service companies if the Unified Command deems such services necessary to the response efforts.

Based on the anticipated worst case discharge scenario, Shell can be onsite with dedicated, contracted on water oil spill recovery equipment with adequate response capacity to contain and recover surface oil, and prevent land impact, within 63 hours (based on the equipment's Estimated Daily Response Capacity (EDRC)). Shell will continue to ramp up additional on-water mechanical recovery resources as well as apply dispersants and in-situ burning as needed and as approved under the supervision of the USCG Captain of the Port (COTP) and the Regional Response Team (RRT).

Subsea Control and Containment: Shell, as a founding member of the MWCC, will have access to the IRCS that can be rapidly deployed through the MWCC. The IRCS is designed to contain oil flow in the unlikely event of an underwater well blowout, and is designed, constructed, tested, and available for rapid response. Shell's specific containment response for MC 812 will be addressed in Shell's NTL 2010-N10 submission at the time the APD is submitted.

Table 9.D.9 Control, Containment, and Subsea Dispersant Package Activation List

Mechanical Recovery (skimming): Response strategies include skimming utilizing available OSROs Oil Spill Response Vessels (OSRVs), Oil Spill Response Barges (OSRBs), ID Boats, and Quick Strike OSRVs. There is a combined de-rated recovery rate capability of approximately 1,197,000 barrels/day. Temporary storage associated with the identified skimming and temporary storage equipment equals approximately 990,000 barrels.

	De-rated Recovery Rate (bopd)	Storage (bbls)
Offshore Recovery and Storage	949,599	976,243
Nearshore Recovery and Storage	248,240	14,188
Total	1,197,839	990,431

Table 9.D.3 Mechanical Recovery Combined De-Rated Capability

Table 9.D.4 Offshore On-Water Recovery and Storage Activation List
Table 9.D.5 Nearshore On-Water Recovery and Storage 5ctivation List

Oil Storage: The strategy for transferring, storing and disposing of oil collected in these recovery zones is to utilize two 150,000-160,000 ton (dead weight) tankers mobilized by Shell (or any other tanker immediately available). The recovered oil would be transferred to Motiva's Norco, LA storage and refining facility, or would be stored at Delta Commodities, Inc. Harvey, LA facility.

Aerial Surveillance: Aircraft can be mobilized to detect, monitor, and target response to oil spills. Aircraft and spotters can be mobilized within hours of an event.

Table 9.D.6 Aerial Surveillance Activation List

Aerial Dispersant: Depending on proximity to shore and water depth, dispersants may be a viable response option. If appropriate and approved, 4 to 5 sorties from three DC-3's can be made within the first 12 hour operating day of the response. These aerial systems could disperse approximately

7,704 to 9,630 barrels of oil per day. Additionally, 3 to 4 sorties from the BE90 King Air and 3 to 4 sorties from the Hercules C-130A within the first 12 hour operating day of the response could disperse 4,600 to 6,100 barrels of oil per day. For continuing dispersant operations, the CCA's Aerial Dispersant Delivery System (ADDS) would be mobilized. The ADDS has a dispersant spray capability of 5,000 gallons per sortie.

Table 9.D.7 Offshore Aerial Dispersant Activation List

Vessel Dispersant: Vessel dispersant application is another available response option. If appropriate, vessel spray systems can be installed on offshore vessels of opportunity using inductor nozzles (installed on fire-water monitors), skid mounted systems, or purpose-built boom arm spray systems. Vessels can apply dispersant within the first 12-24 hours of the response and continually as directed.

Table 9.D.8 Offshore Boat Spray Dispersant Activation List

Subsea Dispersant: Shell has contracted with Wild Well Control for a subsea dispersant package. Subsea dispersant application has been found to be highly effective at reducing the amount of oil reaching the surface. Additional data collection, laboratory tests and field tests will help in facilitating the optimal application rate and effectiveness numbers. For planning purposes, the system has the potential to disperse approximately 24,500 to 34,000 barrels of oil per day.

Table 9.D.9 Control, Containment, and Subsea Dispersant Package Activation List

In-Situ Burning: Open-water in-situ burning (ISB) also may be used as a response strategy, depending on the circumstances of the release. ISB services may be provided by the primary OSRO contractors. If appropriate conditions exist and approvals are granted, one or multiple ISB task forces could be deployed offshore. Task forces typically consist of two to four fire teams, each with two vessels capable of towing fire boom, guide boom or tow line with either a handheld or aerially-deployed oil ignition system. At least one support/safety boat would be present during active burning operations to provide logistics, safety and monitoring support. Depending upon a number of factors, up to 4 burns per 12-hour day could be completed per ISB fire team. Most fire boom systems can be used for approximately 8-12 burns before being replaced. Fire intensity and weather will be the main determining factors for actual burns per system. Although the actual amount of oil that will be removed per burn is dependent on many factors, recent data suggests that a typical burn might eliminate approximately 750 barrels. For planning purposes and based on the above assumptions, a single task force of four fire teams with the appropriate weather and safety conditions could complete four burns per day and remove up to ~12,000 bbls/day. In-situ burning nearshore and along shorelines may be a possible option based on several conditions and with appropriate approvals, as outlined in Section 19, In-situ Burn Plan (OSRP). In-situ burning along certain types of shorelines may be used to minimize physical damage where access is limited or if it is determined that mechanical/manual removal may cause a substantial negative impact on the environment. All safety considerations will be evaluated. In addition, Shell will assess the situation and can make notification within 48 hours of the initial spill to begin ramping up fire boom production through contracted OSRO(s). There are potential limitations that need to be assessed prior to ISB operations. Some limitations include atmospheric and sea conditions; oil weathering; air quality impacts; safety of response workers; and risk of secondary fires.

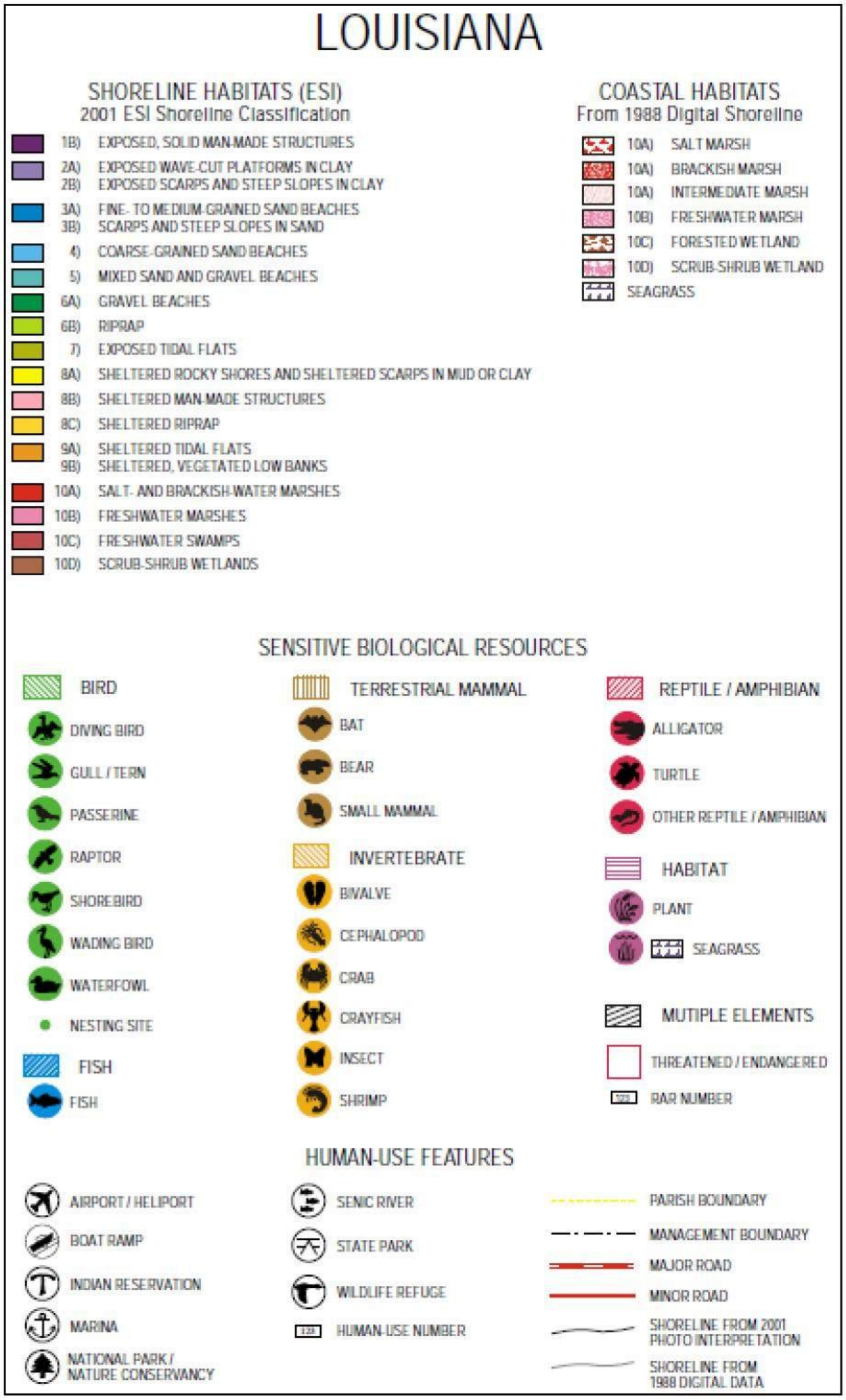
Table 9.D.10 In-Situ Burn Equipment Activation List

Shoreline Protection: If the spill went unabated, shoreline impact in Plaquemines Parish, LA would depend upon existing environmental conditions. Nearshore response may include the deployment of shoreline boom on beach areas, or protection and sorbent boom on vegetated areas. Strategies would be based upon surveillance and real time trajectories provided by The Response Group that depict areas of potential impact given actual sea and weather conditions. Strategies from the New Orleans, Louisiana Area Contingency Plan, Unified Command would be consulted to ensure that environmental and special economic resources would be correctly identified and prioritized to ensure optimal protection. Shell has access to shoreline response guides that depict the protection response modes applicable for oil spill clean-up operations. Each response mode is schematically represented to show optimum deployment and operation of the equipment in areas of environmental concern. Supervisory personnel have the option to modify the deployment and operation of equipment allowing a more effective response to site-specific circumstances.

Table 9.D.11 Shoreline Protection and Wildlife Support List

Wildlife Protection: If wildlife is threatened due to a spill, the contracted OSRO's have resources available to Shell, which can be utilized to protect and/or rehabilitate wildlife. The resources under contract for the protection and rehabilitation of affected wildlife are in Table 9.D.11.

New or unusual technology in regards to spill, prevention, control and clean-up:
Shell will use our normal well design and construction processes with multiple barrier approach as well as new stipulations mandated by NTL 2008-N05. Response techniques will utilize new learnings from Macondo response to include in-situ burning and subsea dispersant application. Mechanical recovery advancements are continuing to be made to incorporate utilization of Koseq arms outfitted on barges, conversion of Platform Support Vessels for Oil Spill Response, and inclusion of nighttime spill detection radar to improve tracking capabilities (X-Band radar, Infrared sensing, etc.). In addition, new response technologies/techniques are continuing to be considered by Shell and the appropriate government organizations for incorporation into our planned response. Any additional response technologies/techniques presented at the time of response will be used at the discretion of the Unified Command and USCG.


LOUISIANA
SHORELINE HABITATS (ESI)
2001 ESI Shoreline Classification
1B) EXPOSED, SOLID MAN-MADE STRUCTURES
2A) EXPOSED WAVE-CUT PLATFORMS IN CLAY
2B) EXPOSED SCARPS AND STEEP SLOPES IN CLAY
3A) FINE- TO MEDIUM-GRAINED SAND BEACHES
3B) SCARPS AND STEEP SLOPES IN SAND
4) COARSE-GRAINED SAND BEACHES
5) MIXED SAND AND GRAVEL BEACHES
6A) GRAVEL BEACHES
6B) RIPRAP
7) EXPOSED TIDAL FLATS
8A) SHELTERED ROCKY SHORES AND SHELTERED SCARPS IN MUD OR CLAY
8B) SHELTERED MAN-MADE STRUCTURES
8C) SHELTERED RIPRAP
9A) SHELTERED TIDAL FLATS
9B) SHELTERED, VEGETATED LOW BANKS
10A) SALT- AND BRACKISH-WATER MARSHES
10B) FRESHWATER MARSHES
10C) FRESHWATER SWAMPS
10D) SCRUB-SHRUB WETLANDS
COASTAL HABITATS
From 1988 Digital Shoreline
10A) SALT MARSH
10A) BRACKISH MARSH
10A) INTERMEDIATE MARSH
10B) FRESHWATER MARSH
10C) FORESTED WETLAND
10D) SCRUB-SHRUB WETLAND
SEAGRASS
SENSITIVE BIOLOGICAL RESOURCES
BIRD
DIVING BIRD
GULL / TERN
PASSERINE
RAPTOR
SHOREBIRD
WADING BIRD
WATERFOWL
NESTING SITE
FISH
FISH
TERRESTRIAL MAMMAL
BAT
BEAR
SMALL MAMMAL
INVERTEBRATE
BIVALVE
CEPHALOPOD
CRAB
CRAYFISH
INSECT
SHRIMP
REPTILE / AMPHIBIAN
ALLIGATOR
TURTLE
OTHER REPTILE / AMPHIBIAN
HABITAT
PLANT
SEAGRASS
MUTIPLE ELEMENTS
THREATENED / ENDANGERED
RAR NUMBER
HUMAN-USE FEATURES
AIRPORT / HELIPORT
BOAT RAMP
INDIAN RESERVATION
MARINA
NATIONAL PARK / NATURE CONSERVANCY
SENIC RIVER
STATE PARK
WILDLIFE REFUGE
HUMAN-USE NUMBER
PARISH BOUNDARY
MANAGEMENT BOUNDARY
MAJOR ROAD
MINOR ROAD
SHORELINE FROM 2001 PHOTO INTERPRETATION
SHORELINE FROM 1988 DIGITAL DATA

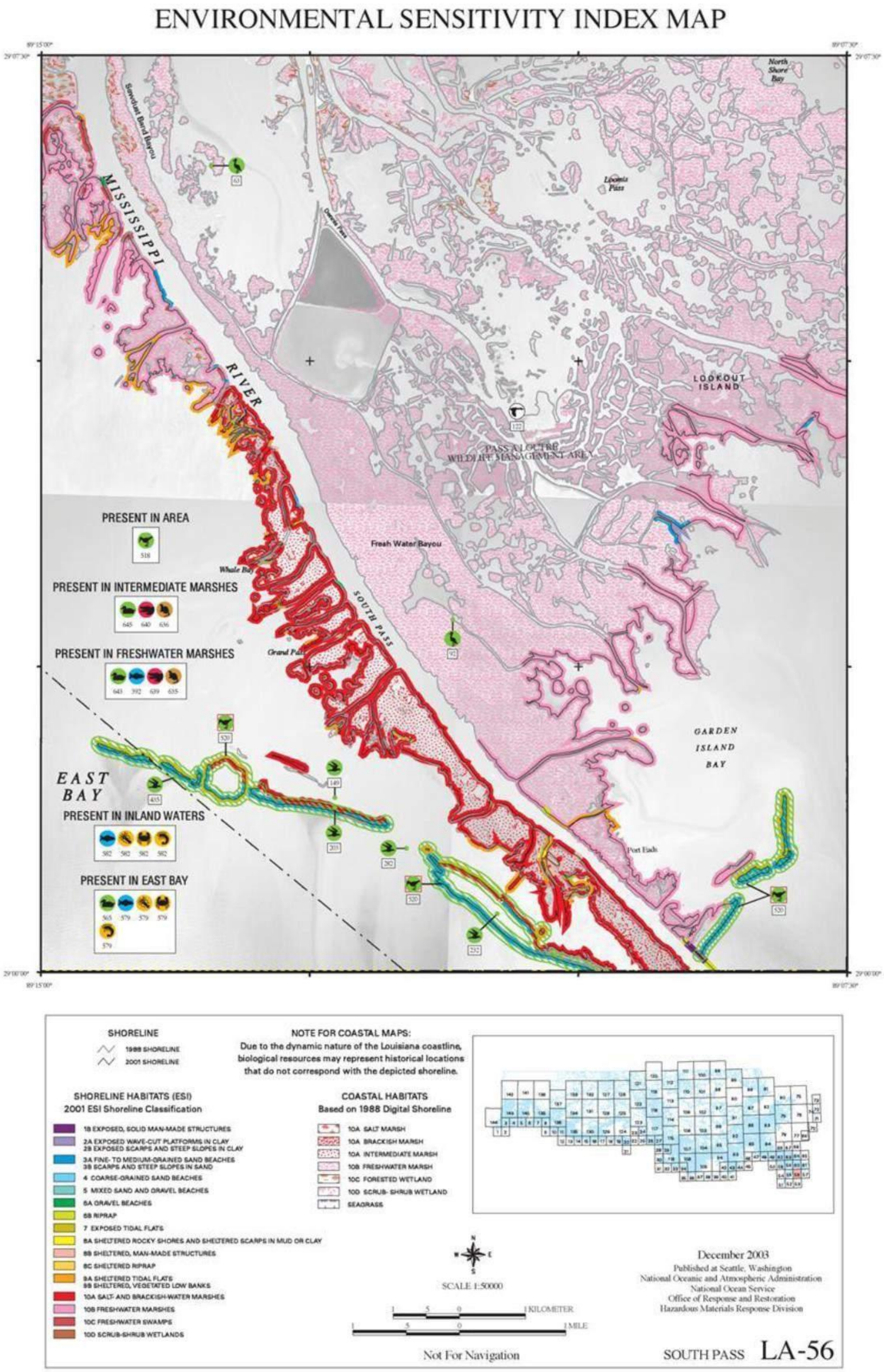


Figure 9.C.2 South Pass ESI Map

ENVIRONMENTAL SENSITIVITY INDEX MAP

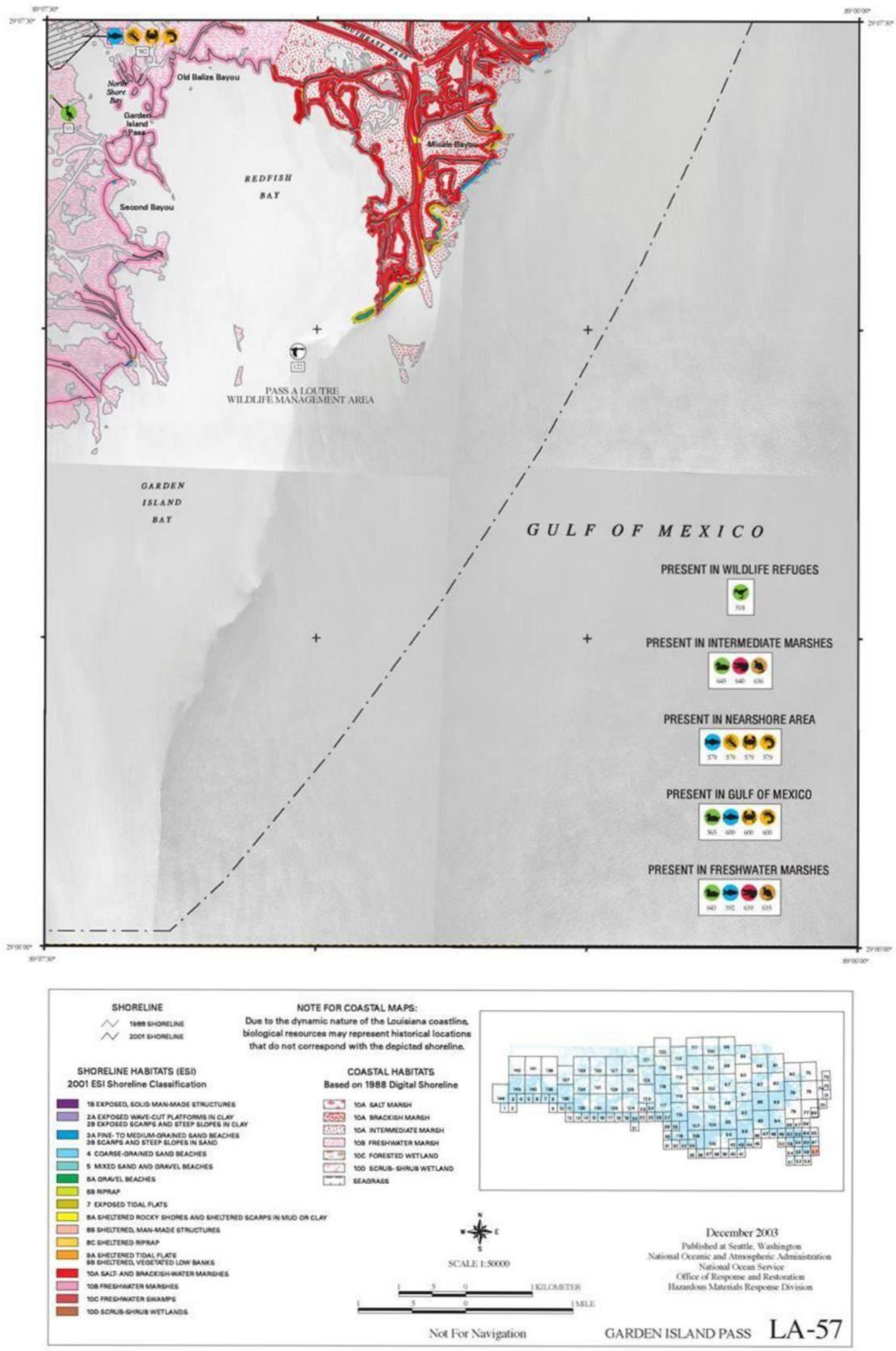


Figure 9.C.3 Garden Island Pass ESI Map

ENVIRONMENTAL SENSITIVITY INDEX MAP

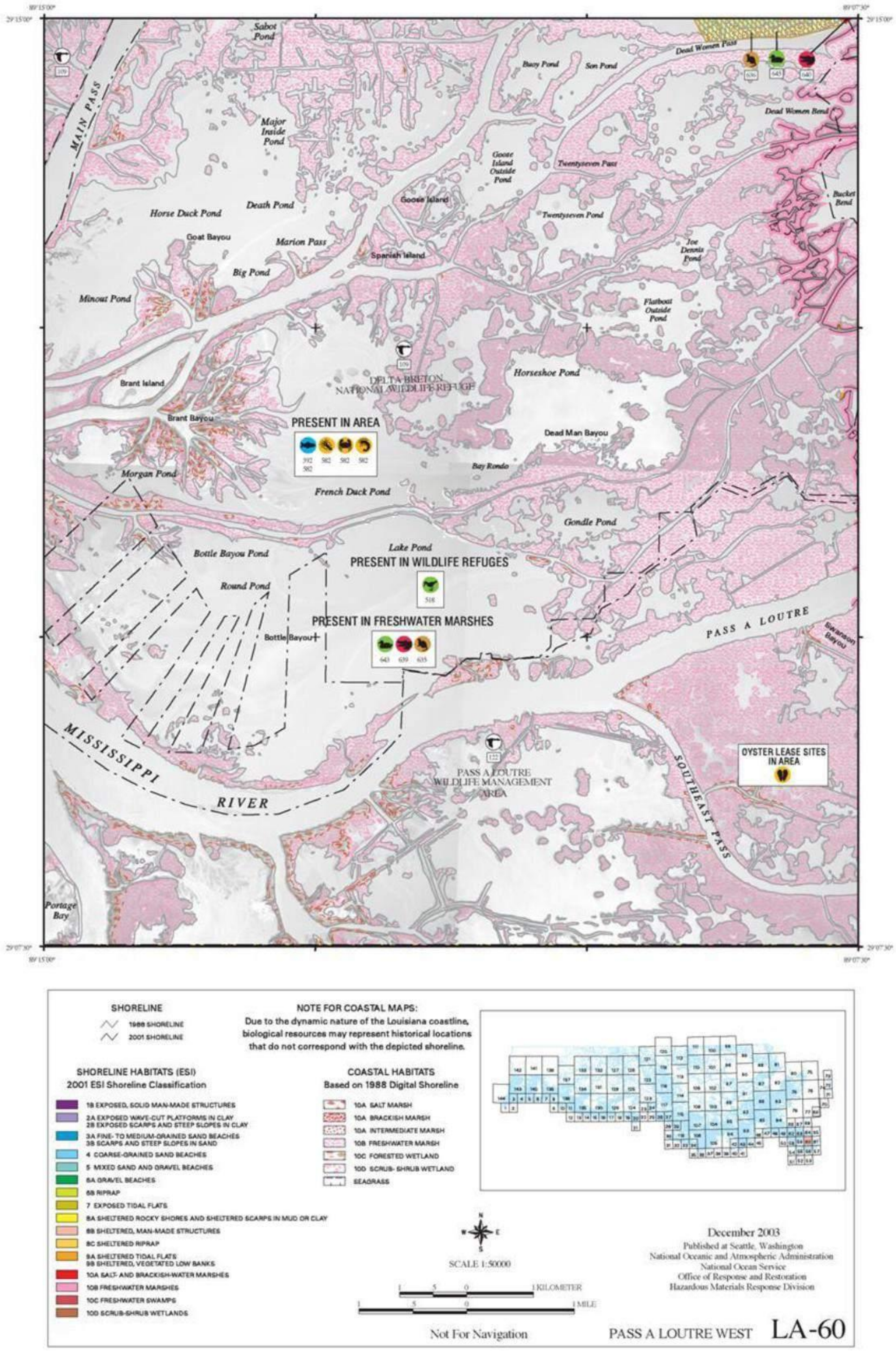


Figure 9.C.4 Pass a Loutre West ESI Map

ENVIRONMENTAL SENSITIVITY INDEX MAP

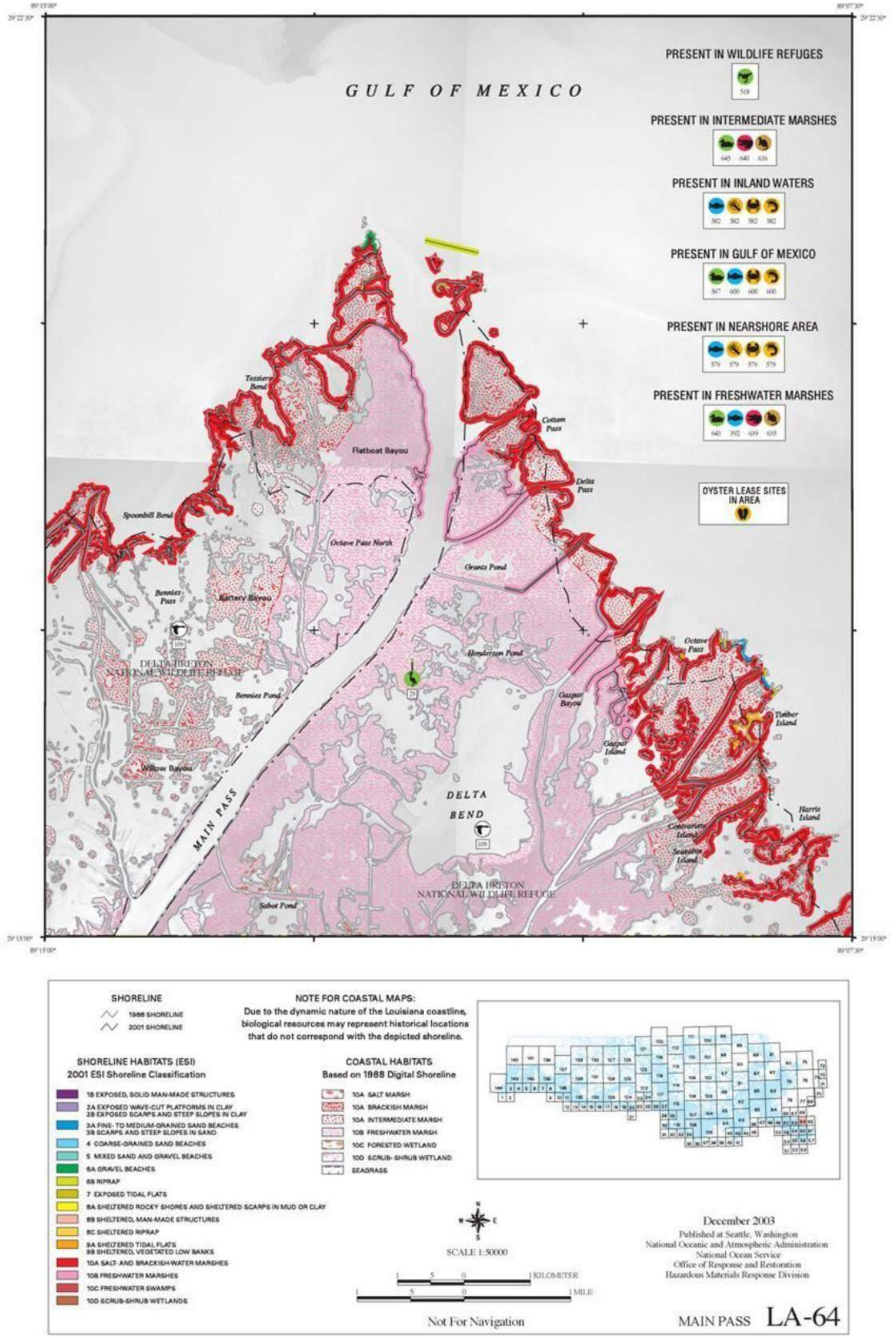


Figure 9.C.5 Main Pass ESI Map

Mississippi Canyon 812 Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

*- These components are additional operational requirements that must be procured in addition to the system identified.
** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment.

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours): Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
FRV Breton Island	CGA (888) 242-2007	Venice, LA	Lamor Brush Skimmer	2	12,342	249	Venice, LA	88	2	0	4	1	7
			36" Boom	64									
			95' Vessel	1									
			X Band Radar	1									
			Personnel	4									
FRV H.I. Rich	CGA (888) 242-2007	Leeville, LA	Lamor Brush Skimmer	2	12,342	249	Leeville, LA	102	2	0	4.5	1	8
			36" Boom	64									
			95' Vessel	1									
			X Band Radar	1									
			Personnel	4									
Louisiana Responder Transec 350	MSRC (800) OIL-SPIL	Fort Jackson, LA	Transrec (Backup: Stress I)	1	10,567	4,000	Fort Jackson, LA	97	2	1	7	1	11
			Operational 67" Boom	2640'									
			Additional 67" Boom	5280'									
			210' Vessel	1									
			Personnel	10-12									
			32' Support Boat	1									
			X Band Radar	1									
			Infrared Camera	1									
Deep Blue Responder LFF 100 Brush	MSRC (800) OIL-SPIL	Port Fourchon, LA	LFF 100 Brush Skimmer	1	18,086	4,000	Port Fourchon, LA	102	2	1	7.5	1	12
			Operational 67" Boom	2640'									
			Additional 67" Boom	4620'									
			210' Vessel	1									
			Personnel	10-12									
			32' Support Boat	1									
			X Band Radar	1									
			Infrared Camera	1									
FOILEX 250	MSRC (800) OIL-SPIL	Belle Chasse, LA	Offshore Skimmer	1	3,977	0	Venice, LA	88	4	1	6.5	1	13
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
FOILEX 200	MSRC (800) OIL-SPIL	Belle Chasse, LA	Offshore Skimmer	1	1,989	0	Venice, LA	88	4	1	6.5	1	13
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
GT-185	MSRC (800) OIL-SPIL	Belle Chasse, LA	Offshore Skimmer	1	1,371	0	Venice, LA	88	4	1	6.5	1	13
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
Walosep W-4	MSRC (800) OIL-SPIL	Belle Chasse, LA	Offshore Skimmer	1	3,017	0	Venice, LA	88	4	1	6.5	1	13
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
FRU 3.0 - Foilex 150 TDS	CGA (888) 242-2007	Harvey, LA	Weir Skimmer	1	1,131	0	Venice, LA	88	4	1	6.5	1	13
			Personnel	4									
			* Utility Boat (<100')	1									
			50 bbl Portable tank	1		50							
Stress 1	MSRC (800) OIL-SPIL	Belle Chasse, LA	Offshore Skimmer	1	15,840	0	Venice, LA	88	4	1	6.5	1	13
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							

Table 9.D.4 Offshore On-Water Recovery Storage Activation List

Mississippi Canyon 812 Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours): Staging ETA	Response Times (Hours): Loadout Time	Response Times (Hours): ETA to Site	Response Times (Hours): Deployment Time	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified. ** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment.													
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Harvey, LA	Foilex 250 Skimmer	1	4,251	100	Venice, LA	88	4	1	6.5	1	13
			Personnel	4									
			Utility Boat	1									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1		100							
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Venice, LA	Foilex 250 Skimmer	1	4,251	100	Venice, LA	88	4	1	6.5	1	13
			Personnel	4									
			Utility Boat	1									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1		100							
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Venice, LA	Foilex 250 Skimmer	1	4,251	100	Venice, LA	88	4	1	6.5	1	13
			Personnel	4									
			Utility Boat	1									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1		100							
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Leeville, LA	Foilex 250 Skimmer	1	4,251	100	Venice, LA	88	5.5	1	6.5	1	14
			Personnel	4									
			Utility Boat	1									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1		100							
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Leeville, LA	Foilex 250 Skimmer	1	4,251	100	Venice, LA	88	5.5	1	6.5	1	14
			Personnel	4									
			Utility Boat	1									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1		100							
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Morgan City, LA	Foilex 250 Skimmer	1	4,251	100	Venice, LA	88	5	1	6.5	1	14
			Personnel	4									
			Utility Boat	1									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1		100							
Stress 1	MSRC (800) OIL-SPIL	Pascagoula, MS	Offshore Skimmer	1	15,840	0	Venice, LA	88	5.5	1	6.5	1	14
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
Stress 2	MSRC (800) OIL-SPIL	Pascagoula, MS	Offshore Skimmer	1	3,017	0	Venice, LA	88	5.5	1	6.5	1	14
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
WP-1	MSRC (800) OIL-SPIL	Pascagoula, MS	Offshore Skimmer	1	3,017	0	Venice, LA	88	5.5	1	6.5	1	14
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
Stress 1	MSRC (800) OIL-SPIL	Port Fourchon, LA	Offshore Skimmer	1	15,840	0	Venice, LA	88	5.75	1	6.5	1	15
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
FRU 3.0 - Foilex 150 TDS	CGA (888) 242-2007	Lake Charles, LA	Weir Skimmer	1	1,131	0	Venice, LA	88	7	1	6.5	1	16
			Personnel	4									
			* Utility Boat (<100')	1									
			50 bbl Portable tank	1		50							

Table 9.D.4 Offshore On-Water Recovery Storage Activation List (continued)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours): Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
*- These components are additional operational requirements that must be procured in addition to the system identified. ** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment.													
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Lake Charles, LA	Foilex 250 Skimmer	1	4,251	100	Venice, LA	88	7	1	6.5	1	16
			Personnel	4									
			Utility Boat	1									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1		100							
Stress 1	MSRC (800) OIL-SPIL	Lake Charles, LA	Offshore Skimmer	1	15,840	0	Venice, LA	88	7	1	6.5	1	16
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
FOILEX 250	MSRC (800) OIL-SPIL	Lake Charles, LA	Offshore Skimmer	1	3,977	0	Venice, LA	88	7	1	6.5	1	16
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
DESMI OCEAN	MSRC (800) OIL-SPIL	Lake Charles, LA	Offshore Skimmer	1	3,017	0	Venice, LA	88	7	1	6.5	1	16
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
Mississippi Responder Transrec-350	MSRC (800) OIL-SPIL	Pascagoula, MS	Transrec Skimmer	1	10,567	4,000	Pascagoula, MS	160	2	1	11.5	1	16
			Backup- Stress 1 Skimmer	1									
			Operational 67" Boom	2640'									
			Additional 67" Boom	5280'									
			210' Vessel	1									
			Personnel	10-12									
			32' Support Boat	1									
			X Band Radar	1									
			Infrared Camera	1									
MSRC-452 Offshore Barge	MSRC (800) OIL-SPIL	Fort Jackson, LA	Offshore Barge	1	14,139	45,000	Fort Jackson, LA	97	4	1	11	1	17
			67" Offshore Boom	2640'									
			Crucial Disc Skimmer	1									
			Desmi Ocean	1									
			* Crew/Support Boat	1-2									
			Personnel	6-18									
			* Offshore Tug	2									
			X Band Radar	1									
			Infrared Camera	1									
GT-185	MSRC (800) OIL-SPIL	Port Arthur, TX	Offshore Skimmer	1	1,371	0	Venice, LA	88	8	1	6.5	1	17
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Galveston, TX	Foilex 250 Skimmer	1	4,251	100	Venice, LA	88	9.5	1	6.5	1	18
			Personnel	4									
			* 100-165' Utility Boat	1									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1		100							
PT 150 Aquaguard Skimmer (1)	CGA (888) 242-2007	Galveston, TX	Brush skimmer	1	22,780	0	Venice, LA	88	9.5	1	6.5	1	18
			Personnel	4									
			* Offshore Utility Boat	1									
			* Add'l Storage	1		500							
PT 150 Aquaguard Skimmer (2)	CGA (888) 242-2007	Galveston, TX	Brush skimmer	1	22,780	0	Venice, LA	88	9.5	1	6.5	1	18
			Personnel	4									
			* Offshore Utility Boat	1									
			* Add'l Storage	1		500							

Table 9.D.4 Offshore On-Water Recovery Storage Activation List (continued)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

** - These components are additional operational requirements that must be procured in addition to the system identified.*
*** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment.*

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours): Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
FRU 3.0 - Foilex 150 TDS	CGA (888) 242-2007	Galveston, TX	Weir Skimmer	1	1,131	0	Venice, LA	88	9.5	1	6.5	1	18
			Personnel	4									
			* Utility Boat (<100')	1									
			50 bbl Portable tank	1		50							
Walosep W-4	MSRC (800) OIL-SPIL	Galveston, TX	Offshore Skimmer	1	3,017	0	Venice, LA	88	9.5	1	6.5	1	18
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
FOILEX 250	MSRC (800) OIL-SPIL	Galveston, TX	Offshore Skimmer	1	3,977	0	Venice, LA	88	9.5	1	6.5	1	18
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
Stress 1	MSRC (800) OIL-SPIL	Galveston, TX	Offshore Skimmer	1	15,840	0	Venice, LA	88	9.5	1	6.5	1	18
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
GT-185	MSRC (800) OIL-SPIL	Galveston, TX	Offshore Skimmer	1	1,371	0	Venice, LA	88	9.5	1	6.5	1	18
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
FRV Galveston Island	CGA (888) 242-2007	Galveston, TX	Lamor Brush Skimmer	2	12,342	249	Galveston, TX	365	2	0	16.5	1	20
			36" Boom	64									
			95' Vessel	1									
			X Band Radar	1									
			Personnel	4									
Fast Response Unit "FRU" 1.0	CGA (888) 242-2007	Aransas Pass, TX	Foilex 250 Skimmer	1	4,251	100	Venice, LA	88	12.25	1	6.5	1	21
			Personnel	4									
			* 100-165' Utility Boat	1									
			** 67" Sea Sentry	440'									
			** Crew Boat	1									
			** Add'l Storage	1		100							
FOILEX 250	MSRC (800) OIL-SPIL	Ingleside, TX	Offshore Skimmer	1	3,977	0	Venice, LA	88	12.25	1	6.5	1	21
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
Stress 1	MSRC (800) OIL-SPIL	Ingleside, TX	Offshore Skimmer	1	15,840	0	Venice, LA	88	12.25	1	6.5	1	21
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
GT-185	MSRC (800) OIL-SPIL	Jacksonville, FL	Offshore Skimmer	1	1,371		Venice, LA	88	11.75	1	6.5	1	21
			67" Offshore Boom	330'									
			Personnel	4									
			* Crew Boat	1									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC (800) OIL-SPIL	Tampa, FL	Offshore Skimmer	1	1,371	0	Venice, LA	88	13	1	6.5	1	22
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							

Table 9.D.4 Offshore On-Water Recovery Storage Activation List (continued)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
									Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
*- These components are additional operational requirements that must be procured in addition to the system identified. ** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment.													
Stress 1	MSRC (800) OIL-SPIL	Tampa, FL	Offshore Skimmer	1	15,840	0	Venice, LA	88	13	1	6.5	1	22
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
CGA-200 HOSS Barge (OSRB)	CGA (888) 242-2007	Harvey, LA	Belt Skimmer	4	43,000	4,000	Harvey, LA	150	4	0	19	1	24
			67" Sea Sentry	2640'									
			Personnel	8									
			* Tug - 1,200 HP	2									
			X Band Radar	1									
			* Tug - 1,800 HP	1									
MSRC-402 Offshore Barge	MSRC (800) OIL-SPIL	Pascagoula, MS	Offshore Barge	1	22,244	40,300	Pascagoula, MS	160	4	1	18	1	24
			67" Offshore Boom	2640'									
			Crucial Disc Skimmer	2									
			* Crew/Support Boat	1-2									
			Personnel	6-18									
			* Offshore Tug	2									
			X Band Radar	1									
			Infrared Camera	1									
Stress 1	MSRC (800) OIL-SPIL	Miami, FL	Offshore Skimmer	1	15,840	0	Venice, LA	88	16	1	6.5	1	25
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
DESMI OCEAN	MSRC (800) OIL-SPIL	Miami, FL	Offshore Skimmer	1	3,017		Venice, LA	88	16	1	6.5	1	25
			67" Offshore Boom	330'									
			* Crew Boat	1									
			Personnel	4									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
Walosep W-4	MSRC (800) OIL-SPIL	Miami, FL	Offshore Skimmer	1	3,017		Venice, LA	88	16	1	6.5	1	25
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC (800) OIL-SPIL	Miami, FL	Offshore Skimmer	1	1,371		Venice, LA	88	16	1	6.5	1	25
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
Gulf Coast Responder Transrec-350	MSRC (800) OIL-SPIL	Lake Charles, LA	Transrec Skimmer	1	10,567	4,000	Lake Charles, LA	312	2	1	22.5	1	27
			Backup- Stress 1 Skimmer	1									
			Operational 67" Boom	2640'									
			Additional 67" Boom	5280'									
			210' Vessel	1									
			Personnel	10-12									
			32' Support Boat	1									
			X Band Radar	1									
			Infrared Camera	1									
GT-185	MSRC (800) OIL-SPIL	Virginia Beach, VA	Offshore Skimmer	1	1,371		Venice, LA	88	19.5	1	6.5	1	28
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							

Table 9.D.4 Offshore On-Water Recovery Storage Activation List (continued)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

** - These components are additional operational requirements that must be procured in addition to the system identified.*
*** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment.*

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				Total ETA
									Staging ETA	Loadout Time	ETA to Site	Deployment Time	
GT-185	MSRC (800) OIL-SPIL	Virginia Beach, VA	Offshore Skimmer	1	1,371		Venice, LA	88	19.5	1	6.5	1	28
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC (800) OIL-SPIL	Baltimore, MD	Offshore Skimmer	1	1,371		Venice, LA	88	20.25	1	6.5	1	29
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
Walosep W-4	MSRC (800) OIL-SPIL	Chesapeake City, MD	Offshore Skimmer	1	3,017		Venice, LA	88	21.25	1	6.5	1	30
			67" Offshore Boom	330'									
			Utility Boat	1									
			Personnel	4									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC (800) OIL-SPIL	Chesapeake City, MD	Offshore Skimmer	1	1,371		Venice, LA	88	21.25	1	6.5	1	30
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC (800) OIL-SPIL	Chesapeake City, MD	Offshore Skimmer	1	1,371		Venice, LA	88	21.25	1	6.5	1	30
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
Stress 1	MSRC (800) OIL-SPIL	Chesapeake City, MD	Offshore Skimmer	1	15,840	0	Venice, LA	88	21.25	1	6.5	1	30
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
Texas Responder Transrec-350	MSRC (800) OIL-SPIL	Galveston, TX	Transrec Skimmer	1	10,567	4,000	Galveston, TX	365	2	1	26	1	30
			Backup- Stress 1 Skimmer	1									
			Operational 67" Boom	2640'									
			Additional 67" Boom	5280'									
			210' Vessel	1									
			Personnel	10-12									
			32' Support Boat	1									
			X Band Radar	1									
			Infrared Camera	1									
Walosep W-4	MSRC (800) OIL-SPIL	Edison/Perth Amboy, NJ	Offshore Skimmer	1	3,017		Venice, LA	88	22.75	1	6.5	1	32
			67" Offshore Boom	330'									
			Utility Boat	1									
			Personnel	4									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
Desmi Ocean	MSRC (800) OIL-SPIL	Edison/Perth Amboy, NJ	Offshore Skimmer	1	3,017		Venice, LA	88	22.75	1	6.5	1	32
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC (800) OIL-SPIL	Edison/Perth Amboy, NJ	Offshore Skimmer	1	1,371		Venice, LA	88	22.75	1	6.5	1	32
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							

Table 9.D.4 Offshore On-Water Recovery Storage Activation List (continued)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours): Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified. ** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment.													
GT-185	MSRC (800) OIL-SPIL	Bayonne, NJ	Offshore Skimmer	1	1,371		Venice, LA	88	22.75	1	6.5	1	32
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
PSV-VOO Skimming System (Crucial Disc)	MSRC (800) OIL-SPIL	Lake Charles, LA	Crucial Disc Skimmer	1	18,086	0	Port Fourchon, LA	102	24	1	7.5	1	34
			67" Boom	1320'									
			* PSV-VOO	1									
			Personnel	3									
			* Support Vessel	1									
			* Marine Portable Tank	2		1,000							
PSV-VOO Skimming System (Crucial Disc)	MSRC (800) OIL-SPIL	Lake Charles, LA	Crucial Disc Skimmer	1	18,086	0	Port Fourchon, LA	102	24	1	7.5	1	34
			67" Boom	1320'									
			* PSV-VOO	1									
			Personnel	3									
			* Support Vessel	1									
			* Marine Portable Tank	2		1,000							
PSV-VOO Skimming System (Crucial Disc)	MSRC (800) OIL-SPIL	Lake Charles, LA	Crucial Disc Skimmer	1	18,086	0	Port Fourchon, LA	102	24	1	7.5	1	34
			67" Boom	1320'									
			* PSV-VOO	1									
			Personnel	3									
			* Support Vessel	1									
			* Marine Portable Tank	2		1,000							
PSV-VOO Skimming System (Crucial Disc)	MSRC (800) OIL-SPIL	Port Fourchon, LA	Crucial Disc Skimmer	1	18,086	0	Port Fourchon, LA	102	24	1	7.5	1	34
			67" Boom	1320'									
			* PSV-VOO	1									
			Personnel	3									
			* Support Vessel	1									
			* Marine Portable Tank	2		1,000							
GT-185	MSRC (800) OIL-SPIL	Providence, RI	Offshore Skimmer	1	1,371		Venice, LA	88	26	1	6.5	1	35
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
DESMI OCEAN	MSRC (800) OIL-SPIL	Everett, MA	Offshore Skimmer	1	3,017		Venice, LA	88	26	1	6.5	1	35
			67" Offshore Boom	330'									
			Utility Boat	1									
			Personnel	4									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
Koseq Skimming Arms (6)	CGA (888) 242-2007	Galliano, LA	15m rigid skimming arm	2	17,829	0	Port Fourchon, LA	102	4	24	7.5	1	37
			Personnel	4									
			* Offshore vessel (>200')	1									
			* 30T crane	1									
			* 500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (7)	CGA (888) 242-2007	Galliano, LA	15m rigid skimming arm	2	17,829	0	Port Fourchon, LA	102	4	24	7.5	1	37
			Personnel	4									
			* Offshore vessel (>200')	1									
			* 30T crane	1									
			* 500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (8)	CGA (888) 242-2007	Galliano, LA	15m rigid skimming arm	2	17,829	0	Port Fourchon, LA	102	4	24	7.5	1	37
			Personnel	4									
			* Offshore vessel (>200')	1									
			* 30T crane	1									
			* 500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (9)	CGA (888) 242-2007	Galliano, LA	15m rigid skimming arm	2	17,829	0	Port Fourchon, LA	102	4	24	7.5	1	37
			Personnel	4									
			* Offshore vessel (>200')	1									
			* 30T crane	1									
			* 500 bbl Portable tank	4		2,000							

Table 9.D.4 Offshore On-Water Recovery Storage Activation List (continued)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours): Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified. ** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment.													
Koseq Skimming Arms (10)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	2	17,829	0	Port Fourchon, LA	102	4	24	7.5	1	37
			Personnel	4									
			* Offshore vessel (>200')	1									
			* 30T crane	1									
			* 500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (11)	CGA (888) 242-2007	Harvey, LA	15m rigid skimming arm	2	17,829	0	Port Fourchon, LA	102	4	24	7.5	1	37
			Personnel	4									
			* Offshore vessel (>200')	1									
			* 30T crane	1									
			* 500 bbl Portable tank	4		2,000							
PSV-VOO Skimming System (Crucial Disc)	MSRC (800) OIL-SPIL	Port Fourchon, LA	Crucial Disc Skimmer	1	10,567	0	Port Fourchon, LA	102	24	1	7.5	1	34
			67" Boom	1320'									
			* PSV-VOO	1									
			Personnel	3									
			* Support Vessel	1									
			* Marine Portable Tank	2		1,000							
Saddle Back w/ Desmi 250	MSRC (800) OIL-SPIL	Portland, ME	Offshore Skimmer	1	2,112		Venice, LA	88	28	1	6.5	1	37
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC (800) OIL-SPIL	Portland, ME	Offshore Skimmer	1	1,371		Venice, LA	88	28	1	6.5	1	37
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
Stress 1	MSRC (800) OIL-SPIL	Portland, ME	Offshore Skimmer	1	15,840	0	Venice, LA	88	28	1	6.5	1	37
			67" Offshore Boom	110'									
			Personnel	4									
			* Crew/Support Boat	1									
			*Utility Boat	1									
			Temporary Storage	1		500							
Southern Responder Transrec-350	MSRC (800) OIL-SPIL	Ingleside, TX	Transrec Skimmer	1	10,567	4,000	Ingleside, TX	509	2	1	36.5	1	41
			Backup- Stress 1 Skimmer	1									
			Operational 67" Boom	2640'									
			Additional 67" Boom	4620'									
			210' Vessel	1									
			Personnel	10-12									
			32' Support Boat	1									
			X Band Radar	1									
			Infrared Camera	1									
Koseq Skimming Arms (5)	CGA (888) 242-2007	Galveston, TX	15m rigid skimming arm	2	17,829	0	Port Fourchon, LA	102	8.75	24	7.5	1	42
			Personnel	4									
			* Offshore vessel (>200')	1									
			* 30T crane	1									
			* 500 bbl Portable tank	4		2,000							
MSRC-570 Offshore Barge	MSRC (800) OIL-SPIL	Galveston, TX	Offshore Barge	1	22,244	56,900	Galveston, TX	365	4	1	40.5	1	47
			67" Offshore Boom	2640'									
			Crucial Disc Skimmer	2									
			* Crew/Support Boat	1-2									
			Personnel	6-18									
			* Offshore Tug	2									
			X Band Radar	1									
			Infrared Camera	1									
PSV-VOO Skimming System (Crucial Disc)	MSRC (800) OIL-SPIL	Port Fourchon, LA	Crucial Disc Skimmer	1	11,122	0	Lake Charles, LA	312	24	1	22.5	1	49
			67" Boom	1320'									
			* PSV-VOO	1									
			Personnel	3									
			* Support Vessel	1									
			* Marine Portable Tank	2		1,000							

Table 9.D.4 Offshore On-Water Recovery Storage Activation List (continued)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours): Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified. ** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment.													
PSV-VOO Skimming System (Crucial Disc)	MSRC (800) OIL-SPIL	Port Fourchon, LA	Crucial Disc Skimmer	1	11,122	0	Port Fourchon, LA	102	24	1	7.5	1	34
			67" Boom	1320'									
			* PSV-VOO	1									
			Personnel	3									
			* Support Vessel	1									
			* Marine Portable Tank	2		1,000							
Florida Responder Transrec-350	MSRC (800) OIL-SPIL	Miami, FL	Transrec Skimmer	1	10,567	4,000	Miami, FL	658	2	1	47	1	51
			Backup- Stress 1 Skimmer	1									
			Operational 67" Boom	2640'									
			Additional 67" Boom	4620'									
			210' Vessel	1									
			Personnel	10-12									
			32' Support Boat	1									
			X Band Radar	1									
			Infrared Camera	1									
MSRC Offshore Tank Barge 360	MSRC (800) OIL-SPIL	Tampa, FL	Offshore Barge	1	11,122	36,000	Tampa, FL	407	4	1	45.5	1	52
			67" Offshore Boom	2640'									
			Crucial Disc Skimmer	1									
			* Crew/Support Boat	1-2									
			Personnel	6-18									
			* Offshore Tug	2									
			X Band Radar	1									
			Infrared Camera	1									
Koseq Skimming Arms (1)	CGA (888) 242-2007	Galveston, TX	15m rigid skimming arm	2	17,829	0	Galveston, TX	365	4	24	26	1	55
			Personnel	4									
			* Offshore vessel (>200')	1									
			* 30T crane	1									
			* 500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (2)	CGA (888) 242-2007	Galveston, TX	15m rigid skimming arm	2	17,829	0	Galveston, TX	365	4	24	26	1	55
			Personnel	4									
			* Offshore vessel (>200')	1									
			* 30T crane	1									
			* 500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (3)	CGA (888) 242-2007	Galveston, TX	15m rigid skimming arm	2	17,829	0	Galveston, TX	365	4	24	26	1	55
			Personnel	4									
			* Offshore vessel (>200')	1									
			* 30T crane	1									
			* 500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (4)	CGA (888) 242-2007	Galveston, TX	15m rigid skimming arm	2	17,829	0	Galveston, TX	365	4	24	26	1	55
			Personnel	4									
			* Offshore vessel (>200')	1									
			* 30T crane	1									
			* 500 bbl Portable tank	4		2,000							
MSRC-403 Offshore Barge	MSRC (800) OIL-SPIL	Ingleside, TX	Offshore Barge	1	11,122	40,300	Ingleside, TX	509	4	1	56.5	1	63
			67" Offshore Boom	1320'									
			Crucial Disc Skimmer	1									
			* Crew/Support Boat	1-2									
			Personnel	6-18									
			* Offshore Tug	2									
			X Band Radar	1									
			Infrared Camera	1									
K-Sea DBL 134 Offshore Barge	CGA (888) 242-2007	Belle Chasse, LA	Offshore Barge	1	N/A	135,755	Houma, LA	157	24-72	0	20	1	45 to 93
			Personnel	10									
			* Offshore Tug	1									
K-Sea DBL 140 Offshore Barge	CGA (888) 242-2007	Belle Chasse, LA	Offshore Barge	1	N/A	143,068	Houma, LA	157	24-72	0	20	1	45 to 93
			Personnel	10									
			* Offshore Tug	1									

Table 9.D.4 Offshore On-Water Recovery Storage Activation List (continued)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours): Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified. ** - These components are additional operational requirements for the packages to be used in an enhanced skimming deployment.													
K-Sea DBL 155 Offshore Barge	CGA (888) 242-2007	Belle Chasse, LA	Offshore Barge Personnel * Offshore Tug	1 10 1	N/A	163,974	Houma, LA	157	24-72	0	20	1	45 to 93
Delaware Responder Transrec-350	MSRC (800) OIL-SPIL	Chesapeake City, MD	Transrec Skimmer 67" Boom 210' Vessel Personnel 32' Support Boat	1 2640' 1 12 1	10,567	4,000	Chesapeake City, MD	1755	2	1	125.5	1	130
New Jersey Responder Transrec-350	MSRC (800) OIL-SPIL	Edison/Perth Amboy, NJ	Transrec Skimmer 67" Boom 210' Vessel Personnel 32' Support Boat	1 2640' 1 12 1	10,567	4,000	Edison/Perth Amboy, NJ	1842	2	1	131.5	1	136
MSRC-350 Offshore Barge	MSRC (800) OIL-SPIL	Savannah, GA	Offshore Barge 67" Offshore Boom Transrec Skimmer Personnel Offshore Tug	1 660' 1 4 1	11,122	35,000	Savannah, GA	1179	4	1	131	1	137
MSRC Express OSRV	MSRC (800) OIL-SPIL	Savannah, GA	Crucial Belt Skimmer 24" Inflatable Boom Personnel	2 100' 3	21,500	249	Savannah, GA	1179	4	1	131	1	137
Maine Responder Transrec-350	MSRC (800) OIL-SPIL	Portland, ME	Transrec Skimmer 67" Boom 210' Vessel Personnel 32' Support Boat	1 2640' 1 12 1	10,567	4,000	Portland, ME	2117	2	1	151	1	155
MSRC-680 Offshore Barge	MSRC (800) OIL-SPIL	Virginia Beach, VA	Offshore Barge 67" Offshore Boom Cricial Disk Personnel Offshore Tug	1 2640' 2 4 1	22,244	68,000	Virginia Beach, VA	1537	4	1	171	1	177
MSRC-520 Offshore Barge	MSRC (800) OIL-SPIL	Edison/Perth Amboy, NJ	Offshore Barge 67" Offshore Boom Personnel Offshore Tug	1 660' 4 1		52,000	Edison/ Perth Amboy, NJ	1842	4	1	204.5	1	211
MSRC-620 Offshore Barge	MSRC (800) OIL-SPIL	Portland, ME	Offshore Barge 67" Offshore Boom Personnel Offshore Tug	1 220' 4 1		62,000	Portland, ME	2117	4	1	235	1	241
DERATED RECOVERY RATE (BBLS/DAY)													949,599
STORAGE CAPACITY INCLUDING SKIMMING VESSELS (BARRELS)													976,243

Table 9.D.4 Offshore On-Water Recovery Storage Activation List (continued)

Mississippi Canyon 812 Drilling> 10 Miles
Sample Nearshore On-Water Recovery Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Nearshore Environment (Miles)	Response Times (Hours): Staging ETA	Response Times (Hours): Loadout Time	Response Times (Hours): ETA to Nearshore Environment	Response Times (Hours): Deployment Time	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified.													
FRV M/V Grand Bay	CGA (888) 242-2007	Venice, LA	Lori Brush Skimmer 36" Boom 46' Vessel Personnel	2 46' 1 4	5,000	65	Venice, LA	88	2	0	4	1	7
SWS CGA-74 Trinity Shallow Water Skimmer	CGA (888) 242-2007	Venice, LA	Marco Belt Skimmer 36" Auto Boom Personnel 56' SWS Vessel * 14'-16' Alum. Flatboat	2 150' 5 1 2	21,500	249	Venice, LA	88	2	1	4	1	8
SWS CGA-73 Trinity Shallow Water Skimmer	CGA (888) 242-2007	Leeville, LA	Marco Belt Skimmer 36" Auto Boom Personnel 56' SWS Vessel * 14'-16' Alum. Flatboat	2 150' 5 1 2	21,500	249	Leeville, LA	112	2	1	5	1	9
FRV M/V RW Armstrong	CGA (888) 242-2007	Morgan City, LA	Lori Brush Skimmer 36" Boom 46' Vessel Personnel	2 46' 1 4	5,000	65	Morgan City, LA	198	2	0	9	1	12
SWS CGA-72 Trinity Shallow Water Skimmer	CGA (888) 242-2007	Morgan City, LA	Marco Belt Skimmer 36" Auto Boom Personnel 56' SWS Vessel * 14'-16' Alum. Flatboat	2 150' 5 1 2	21,500	249	Morgan City, LA	198	2	1	9	1	13
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Belle Chasse, LA	Offshore Skimmer 18" Boom Personnel * Push Boat	1 50' 4 1	905	400	Venice, LA	88	4	1	6.5	1	13
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Belle Chasse, LA	Marco I Skimmer Personnel 30' Shallow Water Vesse	1 4 1	3,588	24	Venice, LA	88	4	1	6.5	1	13
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Pascagoula, MS	Marco I Skimmer Personnel 30' Shallow Water Vesse	1 4 1	3,588	24	Venice, LA	88	5.5	1	6.5	1	14
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Pascagoula, MS	Skimmer 18" Boom Personnel * Push Boat	1 50' 4 1	905	400	Venice, LA	88	5.5	1	6.5	1	14
SBS w/ AardVAC	MSRC (800) OIL-SPIL	Pascagoula, MS	Skimmer 18" Boom Personnel Push Boat	1 50' 4 1	3,840	400	Venice, LA	88	5.5	1	6.5	1	14
GT-185	MSRC (800) OIL-SPIL	Pascagoula, MS	Skimmer 67" Boom Personnel * Crew/Utility Boat * Utility Boat Temporary Storage	1 110' 4 1 1 1	1,371		Venice, LA	88	6	1	6.5	1	14
SWS CGA-52 MARCO Shallow Water Skimmer	CGA (888) 242-2007	Venice, LA	Marco Belt Skimmer * 18" Boom (contractor) Personnel 36' Skimming Vessel Shallow Water Barge	1 100' 3 1 1	3,588	34 249	Venice, LA	88	4	1	10	1	16
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Lake Charles, LA	Skimmer 18" Boom Personnel * Push Boat	1 50' 4 1	905	400	Venice, LA	88	7	1	6.5	1	16
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Lake Charles, LA	Skimmer 18" Boom Personnel * Push Boat	1 50' 4 1	905	400	Venice, LA	88	7	1	6.5	1	16

Table 9.D.5 Nearshore On-Water Recovery Activation List

Mississippi Canyon 812 Drilling> 10 Miles
Sample Nearshore On-Water Recovery Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Nearshore Environment (Miles)	Response Times (Hours): Staging ETA	Response Times (Hours): Loadout Time	Response Times (Hours): ETA to Nearshore Environment	Response Times (Hours): Deployment Time	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified.													
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Lake Charles, LA	Offshore Skimmer	1	905	400	Venice, LA	88	7	1	6.5	1	16
			18" Boom	50'									
			Personnel	4									
			* Push Boat	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Lake Charles, LA	Skimmer	1	905	400	Venice, LA	88	7	1	6.5	1	16
			18" Boom	50'									
			Personnel	4									
			* Push Boat	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Lake Charles, LA	Offshore Skimmer	1	905	400	Venice, LA	88	7	1	6.5	1	16
			18" Boom	50'									
			Personnel	4									
			* Push Boat	1									
FRV M/V Bastian Bay	CGA (888) 242-2007	Lake Charles, LA	Lori Brush Skimmer	2	5,000	65	Lake Charles, LA	312	2	0	14	1	17
			36" Boom	46'									
			46' Vessel	1									
			Personnel	4									
SWS CGA-55 Egmopol Shallow Water Skimmer	CGA (888) 242-2007	Morgan City, LA	Belt Skimmer	1	3,000	90	Venice, LA	88	5	1	10	1	17
			* 18" Boom (contractor)	100'									
			Personnel	3									
			38' Skimming Vessel	1									
			Shallow Water Barge	1		249							
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Galveston, TX	Marco I Skimmer	1	3,588	24	Venice, LA	88	9.5	1	6.5	1	18
			Personnel	4									
			30' Shallow Water Vesse	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Galveston, TX	Skimmer	1	905	400	Venice, LA	88	9.5	1	6.5	1	18
			18" Boom	50'									
			Personnel	6									
			Push Boat	1									
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Galveston, TX	Offshore Skimmer	1	15,840	400	Venice, LA	88	9.5	1	6.5	1	18
			18" Boom	50'									
			Personnel	6									
			Non-self-propelled barge	1									
			Push Boat	1									
SWS CGA-53 MARCO Shallow Water Skimmer	CGA (888) 242-2007	Leeville, LA	Marco Belt Skimmer	1	3,588	34	Venice, LA	88	5.5	1	10	1	18
			* 18" Boom (contractor)	100'									
			Personnel	3									
			38' Skimming Vessel	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Walls, MS	Offshore Skimmer	1	905	400	Venice, LA	88	9.5	1	6.5	1	18
			18" Boom	50'									
			Personnel	4									
			* Push Boat	1									
SWS CGA-51 MARCO Shallow Water Skimmer	CGA (888) 242-2007	Lake Charles, LA	Marco Belt Skimmer	1	3,588	20	Venice, LA	88	7	1	10	1	19
			* 18" Boom (contractor)	100'									
			Personnel	3									
			34' Skimming Vessel	1									
			Shallow Water Barge	1		249							
FRV CGA 58 Timbalier Bay	CGA (888) 242-2007	Aransas Pass, TX	Lori Brush Skimmer	2	5,000	65	Galveston, TX	365	2	0	16.5	1	20
			36" Boom	46'									
			46' Vessel	1									
			Personnel	4									
SWS CGA-71 Trinity Shallow Water Skimmer	CGA (888) 242-2007	Galveston, TX	Marco Belt Skimmer	2	21,500	249	Galveston, TX	365	2	1	16.5	1	21
			36" Auto Boom	150'									
			Personnel	5									
			56' SWS Vessel	1									
			* 14'-16' Alum. Flatboat	2									
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Ingleside, TX	Marco I Skimmer	1	3,588	24	Venice, LA	88	12.25	1	6.5	1	21
			Personnel	4									
			30' Shallow Water Vesse	1									
SBS w/ GT-185 w/adapter	MSRC (800) OIL-SPIL	Ingleside, TX	Skimmer	1	1,371	400	Venice, LA	88	12.25	1	6.5	1	21
			18" Boom	50'									
			Personnel	4									
			Self-propelled barge	1									

Table 9.D.5 Nearshore On-Water Recovery Activation List (continued)

Mississippi Canyon 812 Drilling> 10 Miles
Sample Nearshore On-Water Recovery Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Nearshore Environment (Miles)	Response Times (Hours)				Total ETA
									Staging ETA	Loadout Time	ETA to Nearshore Environment	Deployment Time	
* - These components are additional operational requirements that must be procured in addition to the system identified.													
WP-1	MSRC (800) OIL-SPIL	Ingleside, TX	Skimmer 67" Boom Personnel * Crew/Utility Boat * Utility Boat	1 110' 4 1 1	3,017		Venice, LA	88	12.25	1	6.5	1	21
CGA-54 Egmopol Shallow Water Skimmer	CGA (888) 242-2007	Galveston, TX	Egmopol Belt Skimmer * 18" Boom (contractor) Personnel 34' Skimming Vessel Shallow Water Barge	1 100' 3 1 1	3,000	90 249	Venice, LA	88	10	1	10	1	22
WP-1	MSRC (800) OIL-SPIL	Tampa, FL	Offshore Skimmer 18" Boom Personnel * Crew Boat Towable Bladder	1 50' 4 1 1	3,017		Venice, LA	88	13	1	6.5	1	22
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Roxana, IL	Offshore Skimmer 18" Boom Personnel * Push Boat	1 50' 4 1	905	400	Venice, LA	88	14	1	6.5	1	23
WP-1	MSRC (800) OIL-SPIL	Miami, FL	Offshore Skimmer 20" Boom Personnel * Utility Boat Towable Bladder	1 50' 4 2 1	3,017	500	Venice, LA	88	16	1	6.5	1	25
Barge Boat w/ AARDVAC	MSRC (800) OIL-SPIL	Miami, FL	Offshore Skimmer 20" Boom Personnel * Barge Boat Towable Bladder	1 50' 4 1 1	3,840	500	Venice, LA	88	16	1	6.5	1	25
Barge Boat w/ AARDVAC	MSRC (800) OIL-SPIL	Miami, FL	Offshore Skimmer 20" Boom Personnel * Barge Boat Towable Bladder	1 50' 4 1 1	3,840	500	Venice, LA	88	16	1	6.5	1	25
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Whiting, IN	Offshore Skimmer 18" Boom Personnel * Push Boat	1 50' 4 1	905	400	Venice, LA	88	17.25	1	6.5	1	26
MSRC "Quick Strike"	MSRC (800) OIL-SPIL	Lake Charles, LA	LORI Brush Skimmer Personnel 47' Fast Response Boat	2 4 1	5,000	50	Lake Charles, LA	312	2	1	22.5	1	27
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Toledo, OH	Offshore Skimmer 18" Boom Personnel * Push Boat	1 50' 4 1	905	400	Venice, LA	88	18.5	1	6.5	1	27

Table 9.D.5 Nearshore On-Water Recovery Activation List (continued)

Mississippi Canyon 812 Drilling> 10 Miles
Sample Nearshore On-Water Recovery Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Effective Daily Recovery Capacity (EDRC in Bbls/Day)	Storage (Barrels)	Staging Area	Distance to Nearshore Environment (Miles)	Response Times (Hours): Staging ETA	Loadout Time	ETA to Nearshore Environment	Deployment Time	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified.													
SBS w/ AardVAC	MSRC (800) OIL-SPIL	Virginia Beach, VA	Offshore Skimmer	1	3,840	400	Venice, LA	88	20	1	6.5	1	28
			18" Boom	50'									
			Personnel	4									
			* Barge Boat	1									
			Towable Bladder	1		500							
SBS w/ Stress 1	MSRC (800) OIL-SPIL	Chesapeake City, MD	Offshore Skimmer	1	15,840	400	Venice, LA	88	21.25	1	6.5	1	30
			18" Boom	50'									
			Personnel	4									
			* Push Boat	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Chesapeake City, MD	Offshore Skimmer	1	905	400	Venice, LA	88	21	1	6.5	1	30
			18" Boom	50'									
			Personnel	4									
			* Push Boat	1									
SBS w/ Stress 1	MSRC (800) OIL-SPIL	Edison/Perth Amboy, NJ	Offshore Skimmer	1	15,840	400	Venice, LA	88	23	1	6.5	1	32
			18" Boom	50'									
			Personnel	4									
			* Barge Boat	1									
			Towable Bladder	1		500							
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Edison/Perth Amboy, NJ	Marco I Skimmer	1	3,588	24	Venice, LA	88	22.75	1	6.5	1	32
			Personnel	4									
			30' Shallow Water Vesse	1									
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Edison/Perth Amboy, NJ	Marco I Skimmer	1	3,588	24	Venice, LA	88	22.75	1	6.5	1	32
			Personnel	4									
			30' Shallow Water Vesse	1									
MSRC "Lightning"	MSRC (800) OIL-SPIL	Tampa, FL	LORI Brush Skimmer	2	5,000	50	Tampa, FL	407	2	1	29	1	33
			Personnel	4									
			47' Fast Response Boat	1									
SBS w/ Queensboro	MSRC (800) OIL-SPIL	Boston, MA	Offshore Skimmer	1	905	400	Venice, LA	88	26	1	6.5	1	35
			18" Boom	50'									
			Personnel	4									
			* Push Boat	1									
MSRC "Kvichak"	MSRC (800) OIL-SPIL	Portland, ME	Marco I Skimmer	1	3,588	24	Venice, LA	88	28	1	6.5	1	37
			Personnel	4									
			30' Shallow Water Vesse	1									
SBS w/ WP-1	MSRC (800) OIL-SPIL	Portland, ME	Offshore Skimmer	1	3,017	400	Venice, LA	88	28	1	6.5	1	37
			18" Boom	50'									
			* Utility Boat	1									
			Personnel	4									
			Towable Bladder	1		500							

DERATED RECOVERY RATE (BBLS/DAY)	248,240
SKIMMING VESSEL STORAGE CAPACITY (BARRELS)	14,188

Table 9.D.5 Nearshore On-Water Recovery Activation List (continued)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Aerial Surveillance Activation List

Aerial Surveillance System	Supplier & Phone	Airport/City, State	Aerial Surveillance Package	Quantity	Staging Location	Distance to Site from Staging (nautical miles)	Response Times (Hours)			
							Staging ETA	Loadout Time	ETA to Site	Total ETA
* - These components are additional operational requirements that must be procured in addition to the system identified.										
Twin Commander Air Speed - 260 Knots	Airborne Support (985) 851-6391	Houma, LA	Surveillance Aircraft	1	Houma, LA	141	1	0.25	0.47	1.75
			Spotter Personnel	2						
			Crew - Pilots	1						
Aztec Piper Air Speed - 150 Knots	Airborne Support (985) 851-6391	Houma, LA	Surveillance Aircraft	1	Houma, LA	141	1	0.25	0.82	2.10
			Spotter Personnel	2						
			Crew - Pilots	1						
Eurocopter EC-135 Helicopter Air Speed - 141 knots	PHI (985) 868-1705	Houma, LA	Surveillance Aircraft	1	Houma, LA	141	1	0.25	0.87	2.15
			Spotter Personnel	2						
			Crew - Pilots	1						
Sikorsky S-76 Helicopter Air Speed - 141 knots	PHI (985) 868-1705	Houma, LA	Surveillance Aircraft	1	Houma, LA	141	1	0.25	0.87	2.15
			Spotter Personnel	2						
			Crew - Pilots	1						

Table 9.D.6 Aerial Surveillance Activation List

Mississippi Canyon 812 Drilling > 10 Miles
Sample Offshore Aerial Dispersant Activation List

Aerial Dispersant System	Supplier & Phone	Airport/ City, State	Aerial Dispersant Package	Quantity	Staging Location	Distance to Site from Staging (Miles)	Response Times (Hours)				
							Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Twin Commander Air Speed - 300 MPH	CGA/Airborne Support (985) 851-6391	Houma, LA	Aero Commander	1	Houma, LA	141	2	0.4	0.47	0.2	3.10
			Spotter Personnel	2							
			Crew - Pilots	1							
BT-67 (DC-3 Turboprop) Aircraft Air Speed - 194 MPH	CGA/Airborne Support (985) 851-6391	Houma, LA	DC-3 Dispersant Aircraft	1	Houma, LA 1st Flight	141	2	0.5	0.73	0.3	3.55
			Dispersant - Gallons	2000							
			Spotter Aircraft	1							
			Spotter Personnel	2	Houma, LA 2nd Flight	141	0.73	0.5	0.73	0.3	2.30
			Crew - Pilots	2							
DC-3 Aircraft Air Speed - 150 MPH	CGA/Airborne Support (985) 851-6391	Houma, LA	DC-3 Dispersant Aircraft	1	Houma, LA 1st Flight	141	2	0.5	0.94	0.3	3.75
			Dispersant - Gallons	1200							
			Spotter Aircraft	1							
			Spotter Personnel	2	Houma, LA 2nd Flight	141	0.94	0.5	0.94	0.3	2.70
			Crew - Pilots	2							
DC-3 Aircraft Air Speed - 150 MPH	CGA/Airborne Support (985) 851-6391	Houma, LA	DC-3 Dispersant Aircraft	1	Houma, LA 1st Flight	141	2	0.5	0.94	0.3	3.75
			Dispersant - Gallons	1200							
			Spotter Aircraft	1							
			Spotter Personnel	2	Houma, LA 2nd Flight	141	0.94	0.5	0.94	0.3	2.70
			Crew - Pilots	2							
BE-90 King Air Aircraft Air Speed - 213 MPH	MSRC (800) OIL-SPIL	Kiln, MS	BE-90 Dispersant Aircraft	1	Stennis INTL., MS 1st Flight	154	3	0.00	0.72	0.20	3.95
			Dispersant - Gallons	250							
			* Spotter Aircraft	1							
			*Spotter Personnel	2	Stennis INTL., MS 2nd Flight	154	0.72	0.20	0.72	0.20	1.85
			Crew - Pilots	2							
C130-A Aircraft Air Speed - 342 MPH	MSRC (800) OIL-SPIL	Kiln, MS	C130-A Disp Aircraft	1	Stennis INTL., MS 1st Flight	154	3	0.0	0.45	0.5	4.00
			Dispersant - Gallons	3250							
			*Spotter Aircraft	1							
			*Spotter Personnel	2	Stennis INTL., MS 2nd Flight	154	0.50	0.3	0.45	0.5	1.80
			Crew - Pilots	2							
C130-A Aircraft Air Speed - 342 MPH	MSRC (800) OIL-SPIL	Mesa, AZ	C130-A Disp. Aircraft	1	Stennis INTL., MS 1st Flight	154	7	0.3	0.45	0.5	8.30
			Dispersant - Gallons	3250							
			*Spotter Aircraft	1							
			*Spotter Personnel	2	Stennis INTL., MS 2nd Flight	154	0.50	0.3	0.45	0.5	1.80
			Crew - Pilots	2							

Table 9.D.7 Offshore Aerial Dispersant Activation List

Mississippi Canyon 812 Drilling > 10 Miles
Sample Offshore Aerial Dispersant Activation List

BE-90 King Air Aircraft Air Speed - 213 MPH	MSRC (800) OIL-SPIL	Salisbury, MD	BE-90 Dispersant Aircraft	1	Stennis INTL., MS **1st Flight**	154	9	0.30	0.72	0.20	**10.25**
			Dispersant - Gallons	250							
			* Spotter Aircraft	1							
			*Spotter Personnel	2	Stennis INTL., MS **2nd Flight**	154	0.72	0.20	0.72	0.20	**1.85**
			Crew - Pilots	2							
BE-90 King Air Aircraft Air Speed - 213 MPH	MSRC (800) OIL-SPIL	San Juan, PR	BE-90 Dispersant Aircraft	1	Stennis INTL., MS **1st Flight**	154	14	0.30	0.72	0.20	**15.25**
			Dispersant - Gallons	250							
			* Spotter Aircraft	1							
			*Spotter Personnel	2	Stennis INTL., MS **2nd Flight**	154	0.72	0.20	0.72	0.20	**1.85**
			Crew - Pilots	2							
BE-90 King Air Aircraft Air Speed - 213 MPH	MSRC (800) OIL-SPIL	Concord, CA	BE-90 Dispersant Aircraft	1	Stennis INTL., MS **1st Flight**	154	15	0.30	0.72	0.20	**16.25**
			Dispersant - Gallons	250							
			* Spotter Aircraft	1							
			*Spotter Personnel	2	Stennis INTL., MS **2nd Flight**	154	0.72	0.20	0.72	0.20	**1.85**
			Crew - Pilots	2							
ADDS PACK Air Speed - 330 MPH	Oil Spill Response Ltd. +44 (0) 1224-72-6859	South Hampton, UK	L-382 Hercules Aircraft	1	Stennis INTL, MS **1st Flight**	154	6-24	2-4	0.47	0.5	**9 to 29**
			ADDS PACK	1							
			Dispersant - Gallons	5000							
			Spotter Aircraft	1	Stennis INTL, MS **2nd Flight**	154	0.47	0.3	0.47	0.5	**1.73**
			Spotter Personnel	2							
			Crew - Pilots	2							
ADDS PACK Air Speed - 330 MPH	Oil Spill Response Ltd. +44 (0) 1224-72-6859	Singapore, SG	L-382 Hercules Aircraft	1	Stennis INTL, MS **1st Flight**	154	6-24	2-4	0.47	0.5	**9 to 29**
			ADDS PACK	1							
			Dispersant - Gallons	5000							
			Spotter Aircraft	1	Stennis INTL, MS **2nd Flight**	154	0.47	0.3	0.47	0.5	**1.73**
			Spotter Personnel	2							
			Crew - Pilots	2							
ADDS PACK	Oil Spill Response Ltd. (954) 983-9880	Ft. Lauderdale, FL	C-130 Aircraft (contractor)	1	Clearwater, FL **1st Flight**	557	24-48	1	1.69	0.5	**27.2 to 51.2**
			ADDS PACK	1							
			Dispersant - Gallons	5000							
			Spotter Aircraft	1	Stennis INTL, MS **2nd Flight**	154	0.47	0.3	0.47	0.5	**1.73**
			Spotter Personnel	2							
			Crew - Pilots	2							

Table 9.D.7 Offshore Aerial Dispersant Activation List (cont.)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Offshore Boat Spray Dispersant Activation List

Boat Spray Dispersant System	Supplier & Phone	Warehouse	Boat Spray Dispersant Package	Quantity	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours): Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Vessel Based Dispersant Spray System	CGA (888) 242-2007	Harvey, LA	Dispersant Spray System	1	Venice, LA	88	4	0.5	6.5	1	12
			* Dispersant (Gallons)	330							
			Personnel	4							
			* Utility Boat	1							
Fire Monitor Induction Dispersant Spray System	AMPOL (800) 482-6765	Port Fourchon, LA	Dispersant Spray System	1	Venice, LA	88	5.75	0.5	6.5	1	13.75
			Dispersant (Gallons)	500							
			Personnel	4							
			* 110' Utility Boat	1							
			* Crew Boat	1							
USCG SMART Team	USCG	Mobile, AL	Personnel	4	Venice, LA	88	6	1	6.5	0.5	14
			* Crew Boat	1							
Fire Monitor Induction Dispersant Spray System	AMPOL (800) 482-6765	Cameron, LA	Dispersant Spray System	1	Venice, LA	88	7.75	0.5	6.5	1	15.75
			Dispersant (Gallons)	500							
			Personnel	4							
			* 110' Utility Boat	1							
			* Crew Boat	1							
Vessel Based Dispersant Spray System	CGA (888) 242-2007	Aransas Pass, TX	Dispersant Spray System	1	Venice, LA	88	12.25	0.5	6.5	1	20.25
			Dispersant (Gallons)	330							
			Personnel	4							
			* Utility Boat	1							

Table 9.D.8 Offshore Boat Spray Dispersant Activation List

Mississippi Canyon 812 Drilling > 10 Miles
Sample Subsea Dispersant Package Activation List

Containment System	Supplier & Phone	Warehouse	Package	Quantity	Staging Area	Distance to Site from Staging (Miles)	Response Times (Days): Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
* - Response time may vary depending on Drill Ship's operations and location at the time of deployment.											
Site Assessment and Surveillance	RP	Port Fourchon, LA	Multi-Service Vessel	1	Port Fourchon, LA	102	0	1.5	7.5	0.5	9.5
			ROV's	2							
Subsea Dispersant Application	RP / MWCC	Port Fourchon, LA	Multi-Service Vessel	1	Port Fourchon, LA	102	1.5	1.5	7.5	2	12.5
			ROV's	2							
			Coil Tubing Unit	1							
		Houston, TX	Dispersant	200,000 gal							
			Manifold	1							
			Subsea Dispersant Injection System	1							
Capping Stack	RP / MWCC	Port Fourchon, LA	Anchor Handling Tug Supply Vessel	1	Port Fourchon, LA	102	2*	1.5	7.5	3	14*
			ROV's	1							
		Houston, TX	Hydraulic System	1							
			Capping Stack	1							
"Top Hat" Unit	RP / MWCC	Port Fourchon, LA	Anchor Handling Tug Supply Vessel	1	Port Fourchon, LA	102	13*	1	7.5	3	25*
			ROV's	2							
			Multi-Purpose Supply Vessel	1							
			Drill Ship (Processing Vessel)	1							
		Houston, TX	"Top Hat"	1							
			Containment Chamber	1							
			Shuttle Barge	1							

Table 9.D.9 Subsea Control, Containment, and Subsea Dispersant Package Activation List

Mississippi Canyon 812 Drilling > 10 Miles
Sample In-Situ Burn Equipment Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
							Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Fire Team (In-Situ Burn Fire System)	CGA (888) 242-2007	Harvey, LA	Fire Boom (ft)	500	Venice, LA	88	4	1	6.5	1	**12.5**
			Guide Boom/Tow Line (ft)	400							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System)	CGA (888) 242-2007	Harvey, LA	Fire Boom (ft)	500	Venice, LA	88	4	1	6.5	1	**12.5**
			Guide Boom/Tow Line (ft)	400							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
ISB Fire-Fighting Team	TBD	TBD	* Offshore Firefighting Vessels	2	Venice, LA	88	4	1	6.5	1	**12.5**
			* Cranes	2							
			* Roll-off Boxes	2							
			Personnel	8							
			* Air Monitoring Equipment	2							
SMART In-Situ Burn Monitoring Team	USCG	Mobile, AL	* Air Monitoring Equipment	1	Venice, LA	88	4	1	6.5	1	**12.5**
			* Offshore Vessel	1							
			Personnel	4							
Safety Monitoring Team	TBD	TBD	* Air Monitoring Equipment	1	Venice, LA	88	4	1	6.5	1	**12.5**
			* Offshore Vessel	1							
			Personnel	4							
Wildlife Monitoring Team	TBD	TBD	* Air Monitoring Equipment	1	Venice, LA	88	4	1	6.5	1	**12.5**
			* Offshore Vessel	1							
			Personnel	4							
Aerial Spotting Team (per 2 ISB Task Forces)	TBD	TBD	Fixed Wing Aircraft	1	Venice, LA	88	4	1	6.5	1	**12.5**
			Trained ISB Spotter	2							
			ISB Documenter	1							
Fire Team (In-Situ Burn Fire System)	MSRC (800) OIL-SPIL	Port Fourchon, LA	Fire Boom (ft)	500	Venice, LA	88	5.75	1	6.5	1	**14.25**
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System)	MSRC (800) OIL-SPIL	Port Fourchon, LA	Fire Boom (ft)	500	Venice, LA	88	5.75	1	6.5	1	**14.25**
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System)	MSRC (800) OIL-SPIL	Port Fourchon, LA	Fire Boom (ft)	500	Venice, LA	88	5.75	1	6.5	1	**14.25**
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							

Table 9.D.10 In-Situ Burn Equipment Activation List

Mississippi Canyon 812 Drilling > 10 Miles
Sample In-Situ Burn Equipment Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
							Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Fire Team (In-Situ Burn Fire System)	MSRC (800) OIL-SPIL	Lake Charles, LA	Fire Boom (ft)	500	Venice, LA	88	7	1	6.5	1	**15.5**
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System)	MSRC (800) OIL-SPIL	Lake Charles, LA	Fire Boom (ft)	500	Venice, LA	88	7	1	6.5	1	**15.5**
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System)	MSRC (800) OIL-SPIL	Lake Charles, LA	Fire Boom (ft)	500	Venice, LA	88	7	1	6.5	1	**15.5**
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System)	MSRC (800) OIL-SPIL	Lake Charles, LA	Fire Boom (ft)	500	Venice, LA	88	7	1	6.5	1	**15.5**
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 1)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	**17.5**
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 2)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	**17.5**
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 3)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	**17.5**
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 4)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	**17.5**
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 5)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	**17.5**
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							

Table 9.D.10 In-Situ Burn Equipment Activation List (continued)

Mississippi Canyon 812 Drilling > 10 Miles
Sample In-Situ Burn Equipment Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours) Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Fire Team (In-Situ Burn Fire System 6)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 7)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 8)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 9)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 10)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 11)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 12)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 13)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 14)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							

Table 9.D.10 In-Situ Burn Equipment Activation List (continued)

Mississippi Canyon 812 Drilling > 10 Miles
Sample In-Situ Burn Equipment Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
							Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Fire Team (In-Situ Burn Fire System 15)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 16)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 17)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 18)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 19)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 20)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 21)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 22)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 23)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							

Table 9.D.10 In-Situ Burn Equipment Activation List (continued)

Mississippi Canyon 812 Drilling > 10 Miles
Sample In-Situ Burn Equipment Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Staging Area	Distance to Site from Staging (Miles)	Response Times (Hours)				
							Staging ETA	Loadout Time	ETA to Site	Deployment Time	Total ETA
Fire Team (In-Situ Burn Fire System 24)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 25)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 26)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 27)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 28)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 29)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 30)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 31)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 32)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
Fire Team (In-Situ Burn Fire System 33)	MSRC (800) OIL-SPIL	Houston, TX	Fire Boom (ft)	500	Venice, LA	88	9	1	6.5	1	17.5
			Tow Line (ft)	600							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
TOTAL FIRE BOOM AVAILABLE (FEET)									21,000		

Table 9.D.10 In-Situ Burn Equipment Activation List (continued)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Shoreline Protection & Wildlife Support List

Supplier & Phone	Warehouse	Equipment Listing	Quantity	Staging Area	Response Times (Hours): Staging ETA	Loadout Time	Deployment Time	Total ETA
AMPOL (800) 482-6765	Harvey, LA	Containment Boom - 18" to 24"	28,600'	Venice, LA	4	1	1	6
		Containment Boom - 6" to 10"	2,400'					
		Response Boats - 14' to 20'	1					
		Response Boats - 21' to 36'	2					
		Portable Skimmers	2					
		Shallow Water Skimmers	1					
		Response Personnel	18					
USES Environmental (888) 534-2744	Belle Chasse, LA	Containment Boom - 18" to 24"	600'	Venice, LA	4	1	1	6
USES Environmental (888) 534-2744	Meraux, LA	Containment Boom - 18" to 24"	6000'	Venice, LA	4	1	1	6
		Containment Boom - 6" to 10"	1000'					
		Response Boats - 14' to 20'	13					
		Response Boats - 21' to 36'	4					
		Portable Skimmers	3					
		Response Personnel	44					
OMI (800) 645-6671	Belle Chasse, LA	Containment Boom - 18" to 24"	21,000'	Venice, LA	4	1	1	6
		Containment Boom - 6" to 10"	500'					
		Response Boats - 14' to 20'	6					
		Response Boats - 21' to 36'	5					
		Portable Skimmers	23					
		Shallow Water Skimmers	1					
		Bird Scare Cannons	20					
		Response Personnel	18					
USES Environmental (888) 534-2744	Harvey, LA	Containment Boom - 18" to 24"	300'	Venice, LA	4	1	1	6
USES Environmental (888) 534-2744	Marrero, LA	Containment Boom - 18" to 24"	600'	Venice, LA	4	1	1	6
USES Environmental (888) 534-2744	Venice, LA	Containment Boom - 18" to 24"	10,000'	Venice, LA	4	1	1	6
		Response Boats - 14' to 20'	8					
		Response Boats - 21' to 36'	3					
		Portable Skimmers	2					
		Shallow Water Skimmers	1					
CGA (888) 242-2007	Harvey, LA	Wildlife Rehab Trailer	1	Venice, LA	4	1	1	6
		Wildlife Husbandry Trailer	1					
		Support Trailer	1					
		Contract Truck (Third Party)	3					
		Personnel (Responder/Mechanic)	4					
Wildlife Ctr. of Texas (713) 861-9453	Baton Rouge, LA	Wildlife Specialist - Personnel	6 to 20	Venice, LA	5	1	1	7
USES Environmental (888) 534-2744	Biloxi, MS	Containment Boom - 18" to 24"	2,000'	Venice, LA	5	1	1	7
		Response Boats - 14' to 20'	1					
		Portable Skimmers	2					
USES Environmental (888) 534-2744	Hahnville, LA	Containment Boom - 18" to 24"	500'	Venice, LA	4.25	1	1	7
USES Environmental (888) 534-2744	Amelia, LA	Containment Boom - 18" to 24"	1000'	Venice, LA	5	1	1	7

Table 9.D.11 Shoreline Protection and Wildlife Support List

Mississippi Canyon 812 Drilling > 10 Miles
Sample Shoreline Protection & Wildlife Support List

Supplier & Phone	Warehouse	Equipment Listing	Quantity	Staging Area	Response Times (Hours)			
					Staging ETA	Loadout Time	Deployment Time	Total ETA
USES Environmental (888) 534-2744	Lafitte, LA	Containment Boom - 18" to 24"	1000'	Venice, LA	4.25	1	1	7
		Response Boats - 14' to 20'	2					
USES Environmental (888) 534-2744	Geismar, LA	Containment Boom - 18" to 24"	1000'	Venice, LA	4.75	1	1	7
		Response Boats - 14' to 20'	3					
		Portable Skimmers	1					
		Response Personnel	9 to 18					
Clean Harbors (800) 645-8265	Baton Rouge, LA	Containment Boom - 18" to 24"	14,000'	Venice, LA	5	1	1	7
		Response Boats - 14' to 20'	1					
		Response Boats - 21' to 36'	2					
		Portable Skimmers	3					
		Response Personnel	10					
OMI (800) 645-6671	Port Allen, LA	Containment Boom - 18" to 24"	2500'	Venice, LA	5	1	1	7
		Containment Boom - 6" to 10"	500'					
		Response Boats - 14' to 20'	3					
		Response Boats - 21' to 36'	3					
		Portable Skimmers	3					
		Response Personnel	18					
ES&H Environmental (877) 437-2634	Houma, LA	Containment Boom - 18" to 24"	45,600'	Venice, LA	4.75	1	1	7
		Containment Boom - 6" to 10"	15,000'					
		Response Boats - 14' to 20'	38					
		Response Boats - 21' to 36'	13					
		Portable Skimmers	35					
		Shallow Water Skimmers	1					
		Bird Scare Cannons	200					
		Response Personnel	11					
OMI (800) 645-6671	Morgan City, LA	Containment Boom - 18" to 24"	1000'	Venice, LA	5	1	1	7
		Containment Boom - 6" to 10"	500'					
		Response Boats - 14' to 20'	1					
		Portable Skimmers	1					
		Response Personnel	8					
ES&H Environmental (877) 437-2634	Morgan City, LA	Containment Boom - 18" to 24"	2,000'	Venice, LA	5	1	1	7
		Containment Boom - 6" to 10"	1,200'					
		Response Boats - 14' to 20'	7					
		Response Boats - 21' to 36'	8					
		Portable Skimmers	6					
		Response Personnel	6					
Lawson Environmental Service (985) 876-0420	Houma, LA	Containment Boom - 18" to 24"	50,000'	Venice, LA	4.75	1	1	7
		Containment Boom - 6" to 10"	9,500'					
		Response Boats - 14' to 20'	38					
		Response Boats - 21' to 36'	21					
		Portable Skimmers	6					
		Shallow Water Skimmers	2					
OMI (800) 645-6671	New Iberia, LA	Containment Boom - 18" to 24"	3,500'	Venice, LA	6	1	1	8
		Containment Boom - 6" to 10"	500'					
		Response Boats - 14' to 20'	6					
		Response Boats - 21' to 36'	2					
		Portable Skimmers	6					
		Response Personnel	8					

Table 9.D.11 Shoreline Protection and Wildlife Support List (cont.)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Shoreline Protection & Wildlife Support List

Supplier & Phone	Warehouse	Equipment Listing	Quantity	Staging Area	Response Times (Hours) Staging ETA	Loadout Time	Deployment Time	Total ETA
AMPOL (800) 482-6765	New Iberia, LA	Containment Boom - 6" to 10"	750'	Venice, LA	6	1	1	8
		Containment Boom - 18" to 24"	4,3950'					
		Response Boats - 14' to 20'	3					
		Response Boats - 21' to 36'	10					
		Portable Skimmers	27					
		Shallow Water Skimmers	2					
		Bird Scare Cannons	7					
		Response Personnel	70					
USES Environmental (888) 534-2744	Mobile, AL	Containment Boom - 18" to 24"	5,000'	Venice, LA	6	1	1	8
		Containment Boom - 6" to 10"	800'					
		Response Boats - 14' to 20'	3					
		Response Boats - 21' to 36'	1					
		Portable Skimmers	3					
Clean Harbors (800) 645-8265	New Iberia, LA	Containment Boom - 18" to 24"	33,800'	Venice, LA	6	1	1	8
		Containment Boom - 6" to 10"	500'					
		Response Boats - 21' to 36'	4					
		Portable Skimmers	22					
		Shallow Water Skimmers	1					
		Response Personnel	10					
ES&H Environmental (877) 437-2634	Port Fourchon, LA	Containment Boom - 18" to 24"	1000'	Venice, LA	5.75	1	1	8
		Containment Boom - 6" to 10"	200'					
		Response Boats - 14' to 20'	3					
		Portable Skimmers	3					
		Response Personnel	2					
MSRC (800) OIL-SPIL	Lake Charles, LA	Wildlife Trailer	1	Venice, LA	7	1	1	9
		Contract Truck (Third Party)	1					
		Personnel (Responder/Mechanic)	1					
Clean Harbors (800) 645-8265	Lake Charles, LA	Containment Boom - 18" to 24"	3000'	Venice, LA	7	1	1	9
		Response Boats - 21' to 36'	4					
		Portable Skimmers	1					
		Response Personnel	18					
SWS Environmental (877) 742-4215	Pensacola, FL	Containment Boom - 18" to 24"	2,500'	Venice, LA	6.75	1	1	9
		Response Boats - 14' to 20'	3					
		Shallow Water Skimmers	2					
		Response Personnel	20					
NRC System 212 WD-107 (800) 899-4672	Sulphur, LA	Containment Boom - 18" to 24"	24,000'	Venice, LA	7	1	1	9
		Containment Boom - 6" to 10"	600'					
		Response Boats - 14' to 20'	7					
		Response Boats - 21' to 36'	2					
		Portable Skimmers	6					
		Shallow Water Skimmers	1					
		Response Personnel	49					
Clean Harbors (800) 645-8265	Port Arthur, TX	Containment Boom - 18" to 24"	3,000'	Venice, LA	8	1	1	10
		Response Boats - 14' to 20'	7					
		Response Boats - 21' to 36'	2					
		Portable Skimmers	3					
		Response Personnel	10					
OMI (800) 645-6671	Port Arthur, TX	Containment Boom - 18" to 24"	4000'	Venice, LA	8	1	1	10
		Response Boats - 14' to 20'	6					
		Response Boats - 21' to 36'	2					
		Portable Skimmers	5					
		Shallow Water Skimmers	1					
		Response Personnel	8					

Table 9.D.11 Shoreline Protection and Wildlife Support List (cont.)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Shoreline Protection & Wildlife Support List

Supplier & Phone	Warehouse	Equipment Listing	Quantity	Staging Area	Response Times (Hours) Staging ETA	Loadout Time	Deployment Time	Total ETA
Garner Environmental (800) 424-1716	Port Arthur, TX	Containment Boom - 6" to 10"	21,000'	Venice, LA	8	1	1	10
		Response Boats - 14' to 20'	7					
		Response Boats - 21' to 36'	1					
		Portable Skimmers	5					
		Bird Scare Cannons	7					
Miller Env. Services (361) 289-9800	Beaumont, TX	Containment Boom - 18" to 24"	14,000'	Venice, LA	7.75	1	1	10
		Response Boats - 14' to 20'	2					
		Response Boats - 21' to 36'	2					
		Portable Skimmers	1					
		Response Personnel	47					
OMI (800) 645-6671	Houston, TX	Containment Boom - 18" to 24"	4000'	Venice, LA	9	1	1	11
		Response Boats - 14' to 20'	4					
		Response Boats - 21' to 36'	2					
		Portable Skimmers	1					
Garner Environmental (800) 424-1716	Deer Park, TX	Containment Boom - 6" to 10"	24,900'	Venice, LA	8.75	1	1	11
		Response Boats - 14' to 20'	14					
		Response Boats - 21' to 36'	4					
		Portable Skimmers	18					
		Shallow Water Skimmers	3					
		Bird Scare Cannons	1					
Clean Harbors (800) 645-8265	Houston, TX	Containment Boom - 18" to 24"	4000'	Venice, LA	9	1	1	11
		Response Boats - 14' to 20'	2					
		Response Boats - 21' to 36'	5					
		Portable Skimmers	1					
		Shallow Water Skimmers	1					
		Response Personnel	18					
SWS Environmental (877) 742-4215	Panama City, FL	Containment Boom - 18" to 24"	12,000'	Venice, LA	8.75	1	1	11
		Response Boats - 14' to 20'	2					
		Response Boats - 21' to 36'	1					
		Portable Skimmers	3					
		Bird Scare Cannons	7					
		Response Personnel	20					
SWS Environmental (877) 742-4215	Houston, TX	Containment Boom - 18" to 24"	10,000'	Venice, LA	9	1	1	11
		Response Boats - 14' to 20'	2					
		Response Boats - 21' to 36'	1					
		Portable Skimmers	1					
		Response Personnel	20					
USES Environmental (888) 534-2744	Houston, TX	Containment Boom - 18" to 24"	5,000'	Venice, LA	9	1	1	11
		Containment Boom - 6" to 10"	500'					
		Response Boats - 14' to 20'	4					
		Response Boats - 21' to 36'	1					
		Portable Skimmers	1					
Anderson Pollution Control (866) 609-6208	Houston, TX	Containment Boom - 18" to 24"	28,600'	Venice, LA	9	1	1	11
		Containment Boom - 6" to 10"	400'					
		Response Boats - 14' to 20'	3					
		Response Boats - 21' to 36'	5					
		Portable Skimmers	11					
Wildlife Ctr. of Texas (713) 861-9453	Houston, TX	Wildlife Specialist - Personnel	6 to 20	Venice, LA	9	1	1	11

Table 9.D.11 Shoreline Protection and Wildlife Support List (cont.)

Mississippi Canyon 812 Drilling > 10 Miles
Sample Shoreline Protection & Wildlife Support List

Supplier & Phone	Warehouse	Equipment Listing	Quantity	Staging Area	Response Times (Hours) Staging ETA	Loadout Time	Deployment Time	Total ETA
Phoenix Pollution Control & Environmental Services (281) 838-3400	Baytown, TX	Containment Boom - 18" to 24"	17,000'	Venice, LA	8.75	1	1	11
		Containment Boom - 6" to 10"	1,150'					
		Response Boats - 14' to 20'	9					
		Response Boats - 21' to 36'	3					
		Portable Skimmers	24					
		Shallow Water Skimmers	2					
Miller Env. Services (361) 289-9800	Houston, TX	Containment Boom - 18" to 24"	14,000'	Venice, LA	9	1	1	11
T&T Marine (409) 744-1222 (281) 488-5757	Houston/ Galveston, TX	Containment Boom - 18" to 24"	50,000'	Venice, LA	9.5	1	1	12
		Containment Boom - 6" to 10"	1,000'					
		Response Boats - 14' to 20'	12					
		Portable Skimmers	17					
Garner Environmental (800) 424-1716	La Marque, TX	Containment Boom - 6" to 10"	10,800'	Venice, LA	9.25	1	1	12
		Response Boats - 14' to 20'	5					
		Response Boats - 21' to 36'	1					
		Portable Skimmers	4					
SWS Environmental (877) 742-4215	Tampa, FL	Containment Boom - 18" to 24"	1,700'	Venice, LA	13	1	1	15
		Response Boats - 21' to 36'	1					
		Portable Skimmers	2					
		Response Personnel	20					
Miller Env. Services (361) 289-9800	Corpus Christi, TX	Containment Boom - 18" to 24"	50,000'	Venice, LA	12.25	1	1	15
		Containment Boom - 6" to 10"	2,000'					
		Response Boats - 14' to 20'	10					
		Vikoma Fasflo Skimmer	3					
		4-Band Rope Mop Skim	1					
		Portable Skimmers	6					
		Shallow Water Skimmers	2					
		* 110' Utility Boat	142					
SWS Environmental (877) 742-4215	St. Petersburg, FL	Containment Boom - 18" to 24"	13,000'	Venice, LA	13.5	1	1	16
		Response Boats - 14' to 20'	1					
		Response Boats - 21' to 36'	1					
		Portable Skimmers	1					
		Response Personnel	20					
TRI-STATE (302) 737-9543	Newark, DE	Wildlife Specialist - Personnel	6 to 12	Venice, LA	21	1	1	23

Table 9.D.11 Shoreline Protection and Wildlife Support List (cont.)

SECTION 10: ENVIRONMENTAL MONITORING INFORMATION

A. Monitoring Systems

A rig based Acoustic Doppler Current Profiler (ADCP) is used to continuously monitor the current beneath the rig. Metocean conditions such as sea states, wind speed, ocean currents, etc. will also be continuously monitored. Shell will comply with NTL 2015-G04.

B. Incidental Takes

No incidental takes are anticipated. Although marine mammals may be seen in the area, Shell does not believe that its operations proposed under this EP will result Shell implements the mitigation measures and monitors for incidental takes of protected species according to the following notices to lessees and operators from the BOEM/BSEE:

NTL 2015-BSEE-G03	"Marine Trash and Debris Awareness and Elimination"
NTL 2012-Joint-G01	"Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"
NTL 2012-Joint-G02	"Implementation of Seismic Survey Mitigation Measures & Protected Species Observer Program"

C. Flower Garden Banks National Marine Sanctuary

The operations proposed in this EP will not be conducted within the Protective Zones of the Flower Garden Banks and Stetson Bank.

SECTION 11: LEASE STIPULATIONS INFORMATION

Mississippi Canyon Block 811:

Lease OCS-G 34460 was acquired in Lease Sale #222 held on June 20, 2012 and has an expected expiration date of September 30, 2019.

This lease is not part of a biological sensitive area, known chemosynthetic area, or shipping fairway. See Section 6 of this plan for site specific archeological information. The following stipulations are associated with this lease:

Stipulation No. 8 – Protected Species
This Stipulation is addressed in the following sections of this plan:
Section 6, Threatened or endangered species, critical habitat and marine mammal information
Section 10, Environmental Monitoring Information, Incidental takes
Section 12, Environmental Mitigation Measures Information, Incidental takes
Section 18, Environmental Impact Assessment

Mississippi Canyon Block 812:

Lease OCS-G 34461 was acquired in Lease Sale #222 held on June 20, 2012 and has an expected expiration date of September 30, 2019.

This lease is not part of a biological sensitive area, known chemosynthetic area, or shipping fairway. See Section 6 of this plan for site specific archeological information. The following stipulations are associated with this lease:

Stipulation No. 8 – Protected Species
This Stipulation is addressed in the following sections of this plan:
Section 6, Threatened or endangered species, critical habitat and marine mammal information
Section 10, Environmental Monitoring Information, Incidental takes
Section 12, Environmental Mitigation Measures Information, Incidental takes
Section 18, Environmental Impact Assessment

SECTION 12: ENVIRONMENTAL MITIGATION MEASURE INFORMATION

A. Impacts to Marine and coastal environments

The proposed action will implement mitigation measures required by laws and regulations, including all applicable Federal & State requirements concerning air emissions, discharges to water and solid waste disposal, as well as any additional permit requirements and Shell policies. Project activities will be conducted in accordance with the Regional OSRP. Section 18 of this plan discusses impacts and mitigation measures, including Coastal Habitats and Protected Areas.

B. Incidental Takes

We do not anticipate any incidental takes related to the proposed operations. Shell implements the mitigation measures and monitors for incidental takes of protected species according to the following notices to lessees and operators from the BOEM/BSEE:

NTL 2015-BSEE-G03	"Marine Trash and Debris Awareness and Elimination"
NTL 2012-Joint-G01	"Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"
NTL 2012-Joint-G02	"NTL 2012-Joint-G02 "Implementation of Seismic Survey Mitigation Measures & Protected Species Observer Program"

SECTION 13: RELATED FACILITIES AND OPERATIONS INFORMATION

Information regarding Related Facilities and Operations Information, transportation systems & produced liquid hydrocarbon transportation vessels are not included in this EP as such information is only necessary in the case of DOCDs.

SECTION 14: SUPPORT VESSELS AND AIRCRAFT INFORMATION

A. General

Type	Maximum Fuel Tank Storage Capacity (Gals)	Maximum No. In Area at Any Time	Trip Frequency or Duration
Crew Boats	8,000	1	Twice per week
Offshore Support Vessels	120,000	2	Twice per week
Helicopter	760	1	Once per day

B. Diesel Oil Supply Vessels

Size of Fuel Supply Vessel	Capacity of Fuel Supply Vessel	Frequency of Fuel Transfers	Route Fuel Supply Vessel Will Take
280 foot length	100,000 gals.	1 week	6 miles from Port Fourchon to the mouth of Bayou Lafourche, then to MC 812

C. Drilling Fluids Transportation

According to NTL 2008-G04, this information in only required when activities are proposed in the State of Florida.

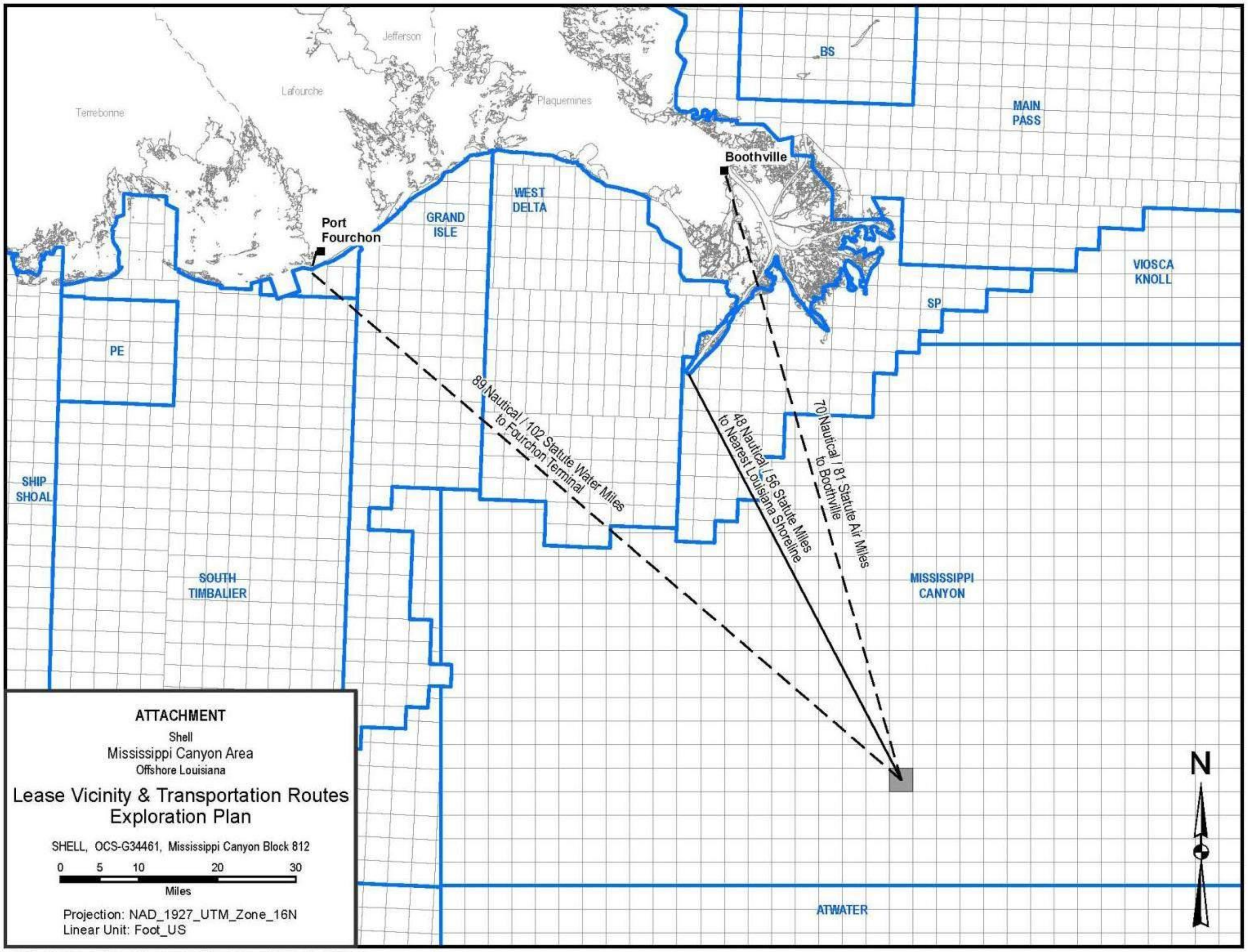
D. Solid and Liquid Wastes Transportation

See Section 7, Table 7B.

E. Vicinity Map

See Attachment 14A for Vicinity Map.

Attachment 14A – Vicinity Map



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SECTION 15: ONSHORE SUPPORT FACILITIES INFORMATION

A. General

Name	Location	Existing/New/Modified
Fourchon	Port Fourchon, LA	Existing
Boothville Heliport	Boothville, LA	Existing

The onshore support bases for water and air transportation will be the existing terminals in Boothville and Fourchon, Louisiana. The Fourchon boat facility is operated by Shell and is located on Bayou Lafourche, south of Leeville, LA approximately 3 miles from the Gulf of Mexico. The existing onshore air support base in Boothville, LA is located at 38963 Hwy. 23, Boothville, LA 70041.

B. Support Base Construction or Expansion

This does not apply to this EP as Shell does not plan to construct a new onshore support base or expand an existing one to accommodate the activities proposed in this EP.

C. Support Base Construction or Expansion Timetable

Since no onshore support base construction or expansion is planned for these activities, a timetable for land acquisition and construction or expansion is not applicable.

D. Waste Disposal

See Section 7, Tables 7A and 7B.

E. Air emissions

Not required by BOEM GOM.

F. Unusual solid and liquid wastes

Not required by BOEM GOM.

SECTION 16: SULPHUR OPERATIONS INFORMATION

Information regarding Sulphur Operations is not included in this EP as we are not proposing to conduct sulphur operations.

SECTION 17: COASTAL ZONE MANAGEMENT ACT (CZMA) INFORMATION

Shell obtained the State of Louisiana and the State of Mississippi CZM concurrence in plans N-9727 and N-9840 and their concurrence is not required for the activities proposed in this plan.

SECTION 18: ENVIRONMENTAL IMPACT ANALYSIS (EIA)

INITIAL EXPLORATION PLAN

Mississippi Canyon Block 812 (OCS-G 34461)
Offshore Louisiana

Note: This EIA was prepared for plan N-9727 (SEA was written by BOEM). The surface locations in this current plan are in MC 812 and in the vicinity of well E, which has not changed since this EIA; therefore, we have not updated this portion of the EP. Only changes made to EIA was to remove wells A, B and C (drilled), change start date to August 2016, and update NTL's. IPF's presented in this EIA remain as previously submitted.

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Introduction

Project Summary

Shell Offshore Inc. (Shell) is submitting an Initial Exploration Plan (EP) for Mississippi Canyon Block 812 (MC 812) for two (2) exploration wells to be drilled using either a dynamic positioned (DP) drillship or DP semisubmersible drilling rig. This Initial EP is for proposed well locations F and G (within 500' of well E). All surface hole locations will be in MC 812.

The lease area is 56 miles from the nearest shoreline, 119 miles (from the onshore support base at Port Fourchon, Louisiana, and 82 miles from the helicopter base at Boothville, Louisiana. All miles in this Environmental Impact Analysis (EIA) are statute miles. Water depths at the wellsites range from approximately 4,459 to 4,479 ft (1,359 to 1,365 m).

The following types of exploratory drilling rigs are available for this project:

- Noble *Don Taylor* or a similar drillship; and
- Noble *Jim Day* or a similar DP semisubmersible rig.

The average time to drill and complete a well will be approximately 150 days.

Purpose of the EIA

This EIA was prepared pursuant to the requirements of the Outer Continental Shelf Lands Act (OCSLA), 43 U.S.C. §§ 1331-1356, as well as regulations including 30 Code of Federal Regulations (CFR) 550.212(o) and 550.227. The EIA is a project- and site-specific analysis of Shell's planned activities under this EP. Shell understands that the BOEM will review this EIA and prepare a Site-Specific Environmental Assessment (SEA) for the project. This EIA complies with guidance provided in existing Notices to Lessees and Operators (NTLs) issued by the former Minerals Management Service (MMS) and Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), including NTL 2008-G04. Throughout this EIA, when existing guidance and general agency activities are referred to, "BOEM" is meant to subsume the former agencies and to represent the continuous regulatory entity now called BOEM. The former agency names (MMS and BOEMRE) are used when referring to particular historical documents published under those names. In addition, until NTLs are reissued under BOEM and/or Bureau of Safety and Environmental Enforcement (BSEE), the EIA will refer to the former BOEMRE as BOEM when addressing NTLs issued by BOEMRE or MMS.

The EIA presents data, analyses, and conclusions to support BOEM reviews as required by the National Environmental Policy Act (NEPA) and other relevant federal laws, including the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA). It also identifies some of the mitigation measures Shell will implement in connection with the planned activities.

The EIA is a project-specific analysis that focuses on the impacts of a specific plan. This EIA addresses the impact-producing factors (IPFs), resources, and impacts associated with the activities proposed in this EP. The EIA also analyzes the potential environmental impacts of the revised blowout scenario and worst case discharge (WCD) information.

The MMS and BOEM have performed numerous environmental evaluations of oil and gas activities on the Gulf of Mexico Outer Continental Shelf (OCS). Potential impacts were analyzed at a broader level in the Programmatic Environmental Impact Statements (EISs) for the OCS Oil and Gas Leasing Program (MMS, 2007a; BOEM 2012a) and in multi-lease-sale EISs for the Western and Central Gulf of Mexico Planning Areas (MMS, 2007b; BOEM, 2012b).

These studies generated critical data and advanced the large body of existing knowledge on the Gulf of Mexico OCS. They analyze potential impacts on the natural environment, the socioeconomic effects of exploration and development activities, and other regional resources. Numerous technical studies address the likely trajectory of spilled oil, the effects of underwater noise on threatened and endangered species, and other IPFs. The studies inform agency decision-making on lease offerings, mitigation measures and lease stipulations, operational requirements, and permit restrictions. This substantial body of work, which in part, forms the basis for the evaluation presented here, will allow the BOEM and other regulatory agencies to evaluate Shell's EP and ensure that oil and gas exploration and development activities are performed in an environmentally sound manner, with minimal impacts on the environment. Shell has incorporated these comprehensive environmental analyses by reference and built on them with project- and site-specific analyses, where applicable.

OCS Regulatory Framework

The regulatory framework for OCS activities in the Gulf of Mexico was summarized by MMS (2010), and post-Macondo regulatory changes were summarized by BOEM (2012b). Under the OCSLA, the U.S. Department of the Interior (USDOI) is responsible for the administration of mineral exploration and development of the OCS. Within the USDOI, the BOEM and BSEE are charged with the responsibility of managing and regulating the development of OCS oil and gas resources in accordance with the provisions of the OCSLA. The BSEE offshore regulations are in 30 CFR Parts 250, 251, 252, 254, 256, 270, and 282. The BOEM offshore regulations are in 30 CFR Parts 550, 551, 552, 556, 559, 560, 570, 580, 581, 582, and 585.

In implementing its responsibilities under the OCSLA and NEPA, the BOEM consults numerous federal departments and agencies that have authority to govern and maintain ocean resources pursuant to other federal laws. Among these are the U.S. Coast Guard (USCG), U.S. Environmental Protection Agency (USEPA), U.S. Fish and Wildlife Service (USFWS), and the National Oceanic and Atmospheric Administration (NOAA) through the National Marine Fisheries Service (NMFS). Federal regulations establish consultation and coordination processes with federal, state, and local agencies (e.g., the ESA, MMPA, Coastal Zone Management Act of 1972, and the Magnuson-Stevens Fishery Conservation and Management Act).

NTLs are formal documents issued by the BOEM and BSEE that provide clarification, description, or interpretation of a regulation or standard. **Table 1** lists and summarizes the NTLs applicable to this EIA.

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

NTL	Title	Summary
2013-G02	Extension of Prior Notices to Lessees	Extends the effective date of NTL 2008-G04 (and two other NTLs) until the end of the 2013 calendar year.
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 (WCD) scenarios to ensure capability to respond to oil discharges is both efficient and effective.
2012-JOINT-G01	Vessel Strike Avoidance and Injured/Dead Protected Species Reporting	Recommends protected species identification training; recommends that vessel operators and crews maintain a vigilant watch for marine mammals and slow down or stop their vessel to avoid striking protected species; and requires operators to report sightings of any injured or dead protected species.
2015-BSEE-G03	Marine Trash and Debris Awareness and Elimination	Instructs operators to exercise caution in the handling and disposal of small items and packaging materials; requires the posting of placards at prominent locations on offshore vessels and structures; and mandates a yearly marine trash and debris awareness training and certification process.
2011-JOINT-G01	Revisions to the List of OCS Blocks Requiring Archaeological Resource Surveys and Reports	Provides new information on which Outer Continental Shelf (OCS) blocks require archaeological surveys and reports and line spacing required in each block. This NTL augments NTL 2005-G07.
2010-N10	Statement of Compliance with Applicable Regulations and Evaluation of Information Demonstrating Adequate Spill Response and Well Containment Resources	Informs operators using subsea blowout preventers (BOPs) or surface BOPs on floating facilities that applications for well permits must include a statement signed by an authorized company official stating that the operator will conduct all activities in compliance with all applicable regulations, including the increased safety measures regulations (75 FR 63346). Informs operators that the BOEM will be evaluating whether each operator has submitted adequate information demonstrating that it has access to and can deploy containment resources to promptly respond to a blowout or other loss of well control.
2015-N01	Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the OCS	Rescinds the limitations set forth in NTL 2008-G04 regarding a blowout scenario and WCD scenario, and provides guidance regarding the information required in blowout scenario and WCD scenario descriptions.
2009-G40	Deepwater Benthic Communities	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 984 ft (300 m). Prescribes separation distances of 2,000 ft (610 m) from each mud and cuttings discharge location and 250 ft (76 m) from all other seafloor disturbances.
2009-G39	Biologically Sensitive Underwater Features and Areas	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 984 ft (300 m) in the Gulf of Mexico.
2008-G04	Information Requirements for Exploration Plans and Development Operations Coordination Documents	Guidance on the information requirements for OCS plans, including EIA requirements and information regarding compliance with the provisions of the Endangered Species Act and Marine Mammal Protection Act.
2005-G07	Archaeological Resource Surveys and Reports	Provides guidance on regulations regarding archaeological discoveries, specifies requirements for archaeological resource surveys and reports, and outlines options for protecting archaeological resources.

Oil Spill Prevention and Contingency Planning

Shell submitted an update to the Gulf of Mexico Regional Oil Spill Response Plan (OSRP) to the BSEE as a fundamental component of the planned drilling program that certifies Shell's capability to respond to the maximum extent practicable to a WCD (30 CFR 254.2) (see **EP Section 9**). The OSRP demonstrates Shell's capabilities to rapidly and effectively manage oil spills that may result from drilling operations. Despite the extremely low likelihood of a large oil spill occurring during the project, Shell has designed its response program based upon a regional capability of responding to a range of spill volumes that increase from small operational spills to a WCD from a well blowout. Shell's program is intended to meet the response planning requirements of the relevant coastal states and federal oil spill planning regulations. The OSRP includes information regarding Shell's regional oil spill organization and dedicated response assets, potential spill risks, and local environmental sensitivities. The OSRP presents specific information on the response program that includes a description of personnel and equipment mobilization, the incident management team organization, and the strategies and tactics used to implement effective and sustained spill containment and recovery operations.

EIA Organization

The EIA is organized into **Sections A** through **I** corresponding to the information required by NTL 2008-G04, which provides guidance regarding information required by 30 CFR Part 550 for EPs. The main impact-related discussions are in **Section A** (Impact-Producing Factors) and **Section C** (Impact Analysis).

A. Impact-Producing Factors

Table 2 is a matrix of IPFs and potentially affected environmental resources adapted from Form BOEM-142. 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 activity are listed below and briefly discussed in the following subsections:

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

A.1 Drilling Rig Presence (including noise and lights)

The wells will be drilled using a DP drillship or DP semisubmersible rig, which will be on site for an estimated 150 days per well. Offshore support vessels will be used during the drilling program, and there will likely be at least one vessel in the field at all times. The physical presence of a DP drillship or DP semisubmersible rig in the ocean can attract pelagic fishes and other marine life, as discussed in **Section C.5.1**.

DP drillships and DP semisubmersible rigs are self-propelled and maintain position over a well using computer-controlled thrusters. Drilling operations produce noise that includes strong tonal components at low frequencies, including infrasonic frequencies in at least some cases (MMS, 2000). DP drillships can be expected to produce noise from both drilling and maintenance operations.

Noise produced from drilling operations and vessel positioning may negatively affect threatened, endangered, and protected species, as discussed in **Section C.3**, and coastal and marine birds, as discussed in **Section C.4**. Drilling rigs and drillships also maintain exterior lighting for navigational and aviation safety in accordance with federal regulations. Artificial lighting may attract and directly or indirectly impact natural resources, as discussed in **Section C.4**.

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

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

Table 2 Footnotes and Applicability:

(1) *Activities that may affect a marine sanctuary or topographic feature. Specifically, if the well, platform site, or any anchors will be on the seafloor within the following:*
   (a) *4-mi zone of the Flower Garden Banks, or the 3-mi zone of Stetson Bank;*
   (b) *1,000-m, 1-mi, or 3-mi 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 500 ft from any no-activity zone; or*
   (d) *Proximity of any submarine bank (500-ft buffer zone) with relief greater than 2 m that is not protected by the Topographic Features Stipulation attached to an OCS lease.*
      - Not applicable. The lease is not within the given ranges (buffer zone) of any marine sanctuary, topographic feature, or no-activity zone. There are no submarine banks in the lease block.

(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 lease area.

(3) *Activities within any Eastern Gulf OCS block and portions of Pensacola and Destin Dome area blocks in the Central Planning Area 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 lease area.

(4) *Activities on blocks designated by the BOEM as being in water depths 300 m or greater.*
   - No impacts on high-density deepwater benthic communities are anticipated because no features indicative of high-density chemosynthetic communities or coral communities are located within 2,000 ft (610 m) of mud or cuttings discharge locations.

(5) *Exploration or production activities where H_2S concentrations greater than 500 ppm might be encountered.*
   - **EP Section 4** contains Shell's request for classification as an area absent of H_2S.

(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 on archaeological resources are expected. Though the lease area is on the list of archaeology survey blocks (BOEM, 2012c), the archaeological survey did not detect any potential submerged cultural resources within 2,000 ft (610 m) of the wellsites. The lease area is beyond the 60-m (197 ft) depth contour; therefore, prehistoric archaeological sites are not likely. A dynamic positioning drillship or semisubmersible rig will be used; therefore no seafloor disturbances due to anchoring will occur.

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

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

A.2 Physical Disturbance to the Seafloor

The wells will be drilled with a DP drillship or DP semisubmersible rig, which do not use anchors for holding or stabilization during drilling operations. There will be minimal disturbance to the seafloor and soft bottom communities during positioning of the wellbore and blowout preventers. Physical disturbance of the seafloor will be limited to the proximal area where the wellbore penetrates the substrate and where mud and drill cuttings will be deposited.

A.3 Air Pollutant Emissions

Estimates of air pollutant emissions are provided in **EP Section 8**. Offshore air pollutant emissions will result from operations of the drilling rig, as well as service vessels and helicopters. These emissions occur from internal combustion engines, most of which are driven by diesel fuel. The combustion of fuels occurs on diesel-powered generators, pumps, or motors and from lighter fuel motors. Primary air pollutants typically associated with OCS activities are suspended particulate matter (PM), sulfur oxides (SO_x), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and carbon monoxide (CO).

The Air Quality Emissions Report (see **EP Section 8**) prepared in accordance with BOEM requirements shows that the projected emissions from emission sources associated with the proposed activities meet the BOEM exemption criteria and are therefore exempt from further air quality review pursuant to 30 CFR 550.303(d). Based on calculated emissions and the wells' location relative to shore, it can be concluded that project emissions will not significantly affect onshore air quality for any of the criteria pollutants. No further analysis or control measures are required.

A.4 Effluent Discharges

Effluent discharges from the drilling rig are summarized in **EP Section 7**. Discharges from the drilling rig will be in compliance with and monitored as required by the National Pollutant Discharge Elimination System (NPDES) general permit for oil and gas activities in the western Gulf of Mexico (GMG 290000).

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

A synthetic-based mud (SBM) system will be used for drilling activities after the marine riser is installed that allows recirculation of the SBM fluids and cuttings. Unused or residual SBM will be collected and transported to Port Fourchon, Louisiana, for recycling. SBM cuttings will be discharged overboard via a downpipe below the water surface, after treatment that complies with the NPDES permit limits for SBM fluid retained on cuttings. The estimated volume of SBM cuttings to be discharged is provided in **EP Section 7**.

Other effluent discharges from the drilling rig and support vessel are expected to include non-contact cooling water, treated sanitary and domestic wastes, deck drainage, desalination unit brine, uncontaminated fire water, and ballast water. Drilling rig and support vessel discharges are expected to be in accordance with NPDES permit and USCG regulations, as applicable, and therefore are not expected to cause significant impacts on water quality.

A.5 Water Intake

Seawater will be drawn from several meters below the ocean surface for various services, including firewater and once-through non-contact cooling of machinery on the drilling rig (**EP Table 7a**).

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 NPDES General Permit No. GMG 290000 specifies requirements for new facilities for which construction commenced after July 17, 2006, with a cooling water intake structure having a design intake capacity of greater than 2 million gallons of water per day, of which at least 25% is used for cooling purposes.

The wells will be drilled using either the Noble *Globetrotter 1* or a similar DP drillship, or the Noble *Jim Day* or a similar DP semisubmersible rig. If the drilling vessel selected for this project meets the described requirements for new facilities, the vessel's water intakes are expected to be in compliance with the design, monitoring, and recordkeeping requirements of the NPDES permit.

A.6 Onshore Waste Disposal

Wastes generated during exploration activities are tabulated in **EP Section 7**. Non-hazardous trash and debris and non-recyclable waste will be transported to Republic/BFI landfill in Sorrento, Louisiana, or to the parish landfill in Avondale, Louisiana. Recyclable trash and debris will be recycled at Omega Waste Management in Patterson, Louisiana, or at ARC of New Iberia, Louisiana. Used oil will be sent to Omega Waste Management in Patterson, Louisiana, or to ARC of New Iberia, Louisiana. Hazardous waste will be sent to Safety Kleen in Denton, Texas. At the respective onshore facilities, wastes will be recycled or disposed of according to applicable regulations.

A.7 Marine Debris

Trash and debris released into the marine environment can harm marine animals through entanglement and ingestion. Shell will adhere to the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) Annex V requirements, USEPA and USCG regulations, and BSEE regulations and NTLs regarding solid wastes. BSEE regulations at 30 CFR 250.300(a) and (b)(6) prohibit operators from deliberately discharging containers and other similar materials (e.g., trash and debris) into the marine environment, and 30 CFR 250.300(c) requires durable identification markings on equipment, tools and containers (especially drums), and other material. USCG and USEPA regulations require operators to become proactive in avoiding accidental loss of solid waste items 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. Shell complies with NTL 2012-BSEE-G01, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process. Shell's compliance with applicable laws, regulations, and NTL 2012-BSEE-G01 will avoid significant impacts on the environment.

A.8 Support Vessel and Helicopter Traffic

Shell will use existing shore-based facilities at Port Fourchon and Boothville, Louisiana, for onshore support for water and air transportation, respectively. No terminal expansion or construction is planned at either location.

The supply base at Port Fourchon is operated by Shell and located on Bayou Lafourche, approximately 3 miles (5 km) from the Gulf of Mexico. There will likely be at least one support vessel in the field at all times during drilling activities. The supply vessels will normally move to the project area via the most direct route from the shorebase. Helicopters transporting personnel and small supplies will normally take the most direct route of travel between the helicopter base and the lease area when air traffic and weather conditions permit. Helicopters typically maintain a minimum altitude of 700 ft (213 m) while in transit offshore, 1,000 ft (305 m) over unpopulated areas or across coastlines, and 2,000 ft (610 m) over populated areas and sensitive habitats such as wildlife refuges and park properties. Additional guidelines and regulations specify that helicopters maintain an altitude of 1,000 ft (305 m) within 300 ft (91 m) of marine mammals (BOEM, 2012a).

Vessel noise is one of the main contributors to overall noise in the sea (National Research Council [NRC], 2003a; Jasny et al., 2005). Offshore supply and service vessels associated with the proposed project would contribute to the overall noise environment by transmitting noise through both air and water. Vessel noise is a combination of narrow-band (tonal) and broadband sound (Richardson et al., 1995). Tones typically dominate up to about 50 Hz, whereas broadband sounds may extend to 100 kHz. The primary sources of vessel noise are propeller cavitation, propeller singing, and propulsion; other sources include auxiliary engine noise, flow noise from water dragging along the hull, and bubbles breaking in the vessel's wake while moving through the water (Richardson et al., 1995). Propeller cavitation is usually the dominant underwater noise source. The intensity of noise from service vessels is roughly related to ship size and speed. Broadband source levels for smaller boats (a category that would include supply and other service vessels) are in the range of 150 to 170 dB re 1 µPa at 1 m (Richardson et al., 1995).

Helicopters used for offshore oil and gas operation support are a potential source of noise to the marine environment. Helicopter noise is generated from their jet turbine engines, airframe, and rotors. The dominant tones for helicopters are generally below 500 Hz (Richardson et al., 1995). Richardson et al. (1995) reported received sound pressure levels in water of 109 dB re 1 µPa from a Bell 212 helicopter flying at an altitude of 152 m (500 ft). Penetration of aircraft noise below the sea surface is greatest directly below the aircraft; at angles greater than 13 degrees from vertical, much of the sound is reflected from the sea surface and so does not penetrate 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).

A.9 Accidents

A.9.1 Types of Accidents Evaluated

The analysis in this EIA focuses on two types of potential accidents:

- a small fuel spill, which is the most likely type of spill during OCS exploration activities; and
- an oil spill resulting from an uncontrolled blowout. A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures detailed in **EP Section 2j**.

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

Previous lease sale EISs (MMS, 2007b; BOEM, 2012b,d) analyzed other types of accidents including chemical spills, vessel collisions, and loss of well control. These accidents are discussed briefly in **Section A.9.4**.

A.9.2 Small Fuel Spill

<u>Spill Size</u>. According to the analysis in BOEM (2012b), the most likely type of small spill (<1,000 barrels [bbl]) as a result of OCS activities is a minor diesel fuel spill. Historically, most diesel spills have been <1 bbl, and this size is predicted to be the most common in ongoing and future OCS activities in the Western and Central Gulf of Mexico Planning Areas (BOEM, 2012b). The median size for spills <1 bbl is <0.024 bbl, and the median size for spills of 1 to 10 bbl is 3 bbl (BOEM, 2012b). For this analysis, a small diesel fuel spill of 3 bbl is assumed. Operational experience suggests that the most likely cause of such a spill would be a hose rupture resulting in the loss of the contents of a fuel transfer hose, which is less than 3 bbl.

<u>Spill Fate</u>. The fate of a small fuel spill in the lease 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 lease area and the short duration of a small spill, the opportunity for impacts to occur would be very brief.

The water-soluble fractions of diesel are dominated by two- and three-ringed polycyclic aromatic hydrocarbons (PAHs), which are moderately volatile (NRC, 2003b). The constituents of these oils are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. Diesel density is such that it 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 (NRC, 2003b) and would not be expected to occur to any appreciable degree in offshore waters of the Gulf of Mexico. Diesel oil is readily and completely degraded by naturally occurring microbes (NOAA, 2006).

The fate of a small diesel fuel spill was estimated using NOAA's Automated Data Inquiry for Oil Spills 2 (ADIOS2) model. 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 more than 90% of a small diesel spill would be evaporated or naturally dispersed within 24 hours. 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.

The ADIOS2 results, coupled with spill trajectory information discussed in the next section for a large spill, indicate that a small fuel spill would not affect coastal or shoreline resources. The lease area is 56 miles (95 km) from the nearest shoreline (Louisiana). Modeling results indicate that a surface spill in the lease area would have an 8% probability of contacting the nearest Louisiana shorelines within 30 days after a spill. Slicks from 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, 2012b). Because of the distance of these potential spills on the OCS and their lack of persistence, it is unlikely that a spill would make landfall prior to dissipation (BOEM, 2012b).

Spill Response. In the unlikely event of a fuel spill, response equipment and trained personnel would be available to ensure that spill effects are localized and would result only in short-term, localized environmental consequences. **EP Section 9b** provides a detailed discussion of Shell's response to a spill.

A.9.3 Large Oil Spill

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures detailed in **EP Section 2j**. Blowouts are rare events and most do not result in oil spills (BOEM, 2012a).

Spill Size. Shell has calculated a WCD for this EP using the requirements prescribed by NTL 2015-N01. The WCD is a 30-day average of 432,000 barrels of oil per day (BOPD). The detailed analysis of this calculation can be found in **EP Section 2j**. The WCD scenario for this EP has a low probability of occurrence. Some of the factors that are likely to reduce rates and volumes, which are not included in the WCD calculation, include, but are not limited to, obstructions or equipment in the wellbore, well bridging, and early intervention such as containment.

Shell has a robust system in place to prevent blowouts. Included in **EP Sections 2j** and **9b** is Shell's response to NTL 2015-N01, which includes descriptions of measures to prevent a blowout, reduce the likelihood of a blowout, and conduct effective and early intervention in the event of a blowout. Shell will also comply with NTL 2015-N01 and the Final Drilling Safety Rule, which specify additional safety measures for OCS activities.

Spill Trajectory. The fate of a large oil spill in the lease 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 fate. The OSRA report by Ji et al. (2004) provides conditional contact probabilities for shoreline segments.

The results for Launch Area 58 (the launch area nearest to the lease area) are presented in **Table 3**. The model predicts no shoreline contact within 3 days. After 10 days, three parishes in Louisiana may be contacted, and after 30 days, 11 counties and parishes from Texas to Florida may be contacted. Plaquemines Parish, Louisiana, has the greatest probability of shoreline contact, with an 8% chance within 30 days. Other parishes and counties ranging from Texas to Florida have a 3% or less probability of shoreline contact within 30 days.

The OSRA model does not evaluate the fate of a spill over time periods longer than 30 days, nor does it predict the fate of a release that continues over a period of weeks or months. Also as noted by Ji et al. (2004), the OSRA model does not take into account the chemical composition or biological weathering of oil spills, the spreading and splitting of oil spills, or spill response activities. The model does not assume a particular spill size but has generally been used by BOEM to evaluate contact probabilities for spills greater than 1,000 bbl.

Table 3. Conditional probabilities of a spill in the lease area contacting shoreline segments (From: Ji et al., 2004). Values are conditional probabilities that a hypothetical spill in the lease area (represented by OSRA Launch Area 25) could contact shoreline segments within 3, 10, or 30 days.

Shoreline Segment	County or Parish, State	Conditional Probability of Contact[a] (%)		
		3 Days	10 Days	30 Days
C10	Galveston, TX	-	-	1
C12	Jefferson, TX	-	-	1
C13	Cameron, LA	-	-	3
C14	Vermilion, LA	-	-	2
C15	Iberia, LA	-	-	1
C17	Terrebonne, LA	-	1	3
C18	Lafourche, LA	-	2	3
C19	Jefferson, LA	-	-	1
C20	Plaquemines, LA	-	4	8
C21	St. Bernard, LA	-	-	1
C28	Okaloosa, FL	-	-	1

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

Weathering. Following an oil spill, several physical, chemical, and biological processes, collectively called weathering, interact to change the physical and chemical properties of the oil, 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 PM, and stranding on shore or sedimentation to the seafloor (NRC, 2003b).

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 the slick on the water surface. 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. Photooxidation attacks mainly the medium and high molecular weight PAHs in the oil on the water surface.

Spill Response. Shell is a founding member of the Marine Well Containment Company (MWCC) and has access to an integrated subsea well control and containment system that can be rapidly deployed through the MWCC. The MWCC is a non-profit organization that assists with the subsea containment system during a response. The near-term containment response capability will be specifically addressed in Shell's NTL 2010-N10 submission at the time an Application for Permit to Drill is submitted and will include equipment and services available to Shell through MWCC's development of near-term capability and other industry sources. Shell is a member of Clean Caribbean & Americas, Marine Spill Response Corporation, Clean Gulf Associates, and Oil Spill Response Limited, organizations that are committed to providing the resources necessary to respond to a spill as outlined in Shell's OSRP.

Mechanical recovery capabilities are addressed in the OSRP. The mechanical recovery response equipment that could be mobilized to the spill location in normal and adverse weather conditions is included in the Offshore On-Water Recovery Activation List in the OSRP.

Chemical dispersion capabilities are also readily available from resources identified in the OSRP. Available equipment for surface and subsea application of dispersants, response times, and support resources are identified in the OSRP.

Open-water *in situ* burning may also be used as a response strategy, depending on the circumstances of the release. If appropriate conditions exist and approval from the Unified Command is received, one or multiple *in situ* burning task forces could be deployed offshore.

See **EP Section 9b** for a detailed description of spill response measures.

A.9.4 Other Accidents Not Analyzed in Detail

The lease sale EIS (BOEM, 2012b) discusses four other types of accidents: chemical spills, pipeline failures, vessel collisions, and loss of well control. Three of these types of accidents considered relevant to this EP are briefly discussed in this section. No hydrogen sulfide (H_2S) is expected at this site, and no other site-specific issues have been identified for this EP. The analysis in the lease sale EIS for these topics is incorporated by reference.

Chemical Spill. Chemicals are used in drilling and producing operations to achieve technical goals in the drilling process, improve the efficiency and safety of drilling, and protect associated equipment. Chemicals used during drilling include surfactants, bentonite clays, olefins, inorganic salts, glycols, polymers, barite, and calcium carbonate. Supplies are renewed on a regular basis by transfer in containers from supply boats (Boehm et al., 2001). In addition to chemicals used in drilling fluids, the following chemicals are likely to be used on the rig: ethylene glycol (blowout prevention control fluid, used in closed cooling loops for crane and main engines and brake coolers), cement (used to cement casing in place), solvents (used in painting operations), hydraulic fluids (used in cranes and other hydraulic rig equipment), lubricating oil and grease (used in reciprocating and electrical equipment), and sodium hypochlorite (dilute, used as laundry bleach and disinfectant).

A study of environmental risks of chemical products used in OCS activities determined that only two chemicals could potentially affect the marine environment in the concentrations typically used: zinc bromide and ammonium chloride (Boehm et al., 2001). The project addressed by this EP does not anticipate the use of either zinc bromide or ammonium chloride. Most other chemicals are either nontoxic or used in small quantities (BOEM, 2012b). No significant impacts are expected from chemical spills.

Vessel Collisions. As summarized in MMS (2007b) and BOEM (2012b), vessel collisions occasionally occur during routine operations. Most collision mishaps are the result of service vessels colliding with platforms or vessel collisions with pipeline risers. About 10% of these collisions have caused spills of diesel fuel or chemicals (BOEM, 2012b). Shell will comply with USCG and BOEM-mandated safety requirements to minimize the potential for vessel collisions.

Loss of Well Control. A loss of well control is the uncontrolled flow of a reservoir fluid that may result in the release of gas, condensate, oil, drilling fluids, sand, or water. Loss of well control is a broad term that includes minor to serious well control incidents, while blowouts, discussed in **Section A.9.3**, are considered to be a more serious subset of loss of well control incidents with greater risk of oil spill or human injury (MMS, 2007b). Not all loss of well control events result in blowouts (BOEM, 2012b). In addition to the potential release of gas, condensate, oil, sand, or water, the loss of well control can also resuspend and disperse bottom sediments (BOEM, 2012b). BOEM (2012b) noted that most OCS blowouts have resulted in the release of gas.

Shell has a robust system in place to prevent loss of well control. Included in this EP is Shell's response to NTL 2015-N01, which includes descriptions of measures to prevent a blowout, reduce the likelihood of a blowout, and conduct effective and early intervention in the event of a blowout. Shell will also comply with NTL 2010-N10 and the Final Drilling Safety Rule, which specify additional safety measures for OCS activities. See **EP Sections 2j** and **9b** for further information.

H_2S Release. **EP Section 4** contains Shell's request for classification as an area absent of H_2S.

B. Affected Environment

The lease area is in the central Gulf of Mexico, 56 miles (95 km) from the nearest shoreline, 100 miles (161 km) from the onshore support base at Port Fourchon, Louisiana, and 135 miles (217 km) from the helicopter base at Boothville, Louisiana.

The proposed wellsites lie along the floor of an arcuate valley in water depths ranging from approximately 4,459 to 4,479 ft (1,359 to 1,365 m). The geologic, stratigraphic, and archaeological assessment detected no marine avoidance targets within 2,000 ft (610 m) of the proposed wellsites (Fugro Consultants, Inc. [Fugro], 2012; Geoscience Earth and Marine Services, Inc. [GEMS], 2013a,b). The proposed wellsites range from 540 to 1,610 ft from the nearest seafloor fault. There is no other evidence of slumping, amplitudes, or fluid expulsion features within 2,000 ft (610 m) of any of the proposed wellsites. There are no flowlines or umbilicals in the vicinity of the proposed wellsites (Fugro, 2012; GEMS, 2013a,b).

A detailed description of the regional affected environment is provided in MMS (2007b) and BOEM (2012b), 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. These regional descriptions are based on extensive literature reviews and are incorporated by reference. General background information is presented in the following sections, and brief descriptions of each potentially affected resource are presented in **Section C**, including site-specific and/or new information if available.

Shell's procedure "Waste Barrel Avoidance and Release Response in the Mississippi Canyon Area," which has been previously approved by MMS and BOEM[1], applies to operations that could cause a disturbance of a seafloor barrel. Shell's overarching policy is to avoid barrel contact. In the unlikely case that contact is suspected or has been made with any wastes from a barrel, the plan specifies actions to be taken for the topside safety of personnel handling the equipment. The plan also outlines barrel impact reporting procedures. According to the survey results, the proposed wellsite locations appear suitable for the planned activities.

The local environment in the lease area is not known to be unique with respect to physical/chemical, biological, or socioeconomic conditions. Baseline environmental conditions in the lease area are expected to be consistent with the regional description of continental slope locations evaluated in MMS (2007b) and BOEM (2012b).

C. Impact Analysis

This section analyzes the potential direct and indirect impacts of routine activities and accidents; cumulative impacts are discussed in **Section C.9**.

Impacts have been analyzed extensively in multi-lease-sale EISs for the Western and Central Gulf of Mexico Planning Areas (MMS, 2007b; BOEM, 2012b). Site-specific issues are addressed in this section as appropriate.

C.1 Physical/Chemical Environment

C.1.1 Air Quality

Due to the distance from shore-based pollution sources, offshore air quality 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 (MMS, 2007b).

In general, ambient air quality on coastal counties along the Gulf of Mexico is relatively good (BOEM, 2012a). As of December 14, 2012, Louisiana, Mississippi, Alabama, and Florida coastal counties and parishes are in attainment of the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants (USEPA, 2012). One coastal metropolitan area in Texas (Houston-Galveston-Brazoria) is a nonattainment area for 8-hour ozone. One coastal metropolitan area in Florida (Tampa) is a nonattainment area for lead based on the 2008 Standard.

Winds in the region are driven by the clockwise circulation around the Bermuda High (BOEM, 2012b). 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.

IPFs that could potentially affect air quality are air pollutant emissions and two types of accidents: a small fuel spill and a large oil spill.

[1]MMS approval of West Boreas Supplemental Exploration Plan, December 16, 2008, Control No. S-07273, Mississippi Canyon Area Block 762, Lease OCS-G 07957; Mississippi Canyon Area Block 806, Lease OCS-G 07962 and BOEM approval of the Supplement to the Conceptual Deepwater Operations Plan for Mars B project, August 12, 2010.

Impacts of Air Pollutant Emissions

Air pollutant emissions are the only routine IPF likely to affect air quality. Offshore air pollutant emissions will result from the operation of the drilling rig as well as helicopters and service vessels as described in **Section A.3**. These emissions occur mainly from combustion or burning of diesel fuel. Primary air pollutants typically associated with OCS activities are suspended PM, SO_x, NO_x, VOCs, and CO.

Due to the distance from shore, routine operations in the project area are not expected to impact air quality along the coast. As noted in the lease sale EISs (MMS, 2007b; BOEM, 2012b,d), emissions of air pollutants from routine activities in the Gulf of Mexico Central Planning Area are projected to have minimal impacts on 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 (see **EP Section 8**) prepared in accordance with BOEM requirements shows that the projected emissions from emission sources associated with the proposed activities meet the BOEM exemption criteria. This EP is therefore exempt from further air quality review pursuant to 30 CFR 550.303(d).

The Breton Wilderness Area, which is part of the Breton National Wildlife Refuge (NWR), is designated under the Clean Air Act as a Prevention of Significant Deterioration Class I air quality area. The BOEM coordinates with the National Park Service and the USFWS if emissions from proposed projects may affect the Breton Class I area. The lease area is approximately 91 miles (146 km) from the Breton Wilderness Area. Shell does not anticipate impact on the Class I area but will comply with emissions requirements as directed by the BOEM.

Carbon dioxide (CO_2) and methane (CH_4) emissions from the project would constitute a negligible contribution to greenhouse gas emissions from all OCS activities. According to programmatic and OCS lease sale EISs (BOEM, 2012a,b), estimated CO_2 emissions from OCS oil and gas sources are 0.4% of the U.S. total. All OCS activities contribute approximately 0.005% to total global CO_2 emissions. 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, 2007). 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 would not significantly alter any of the climate change impacts evaluated in the Programmatic EIS (BOEM, 2012a).

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 in MMS (2007b) and BOEM (2012b,d). The probability of a small spill would be minimized by Shell's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Given the open ocean location of the lease area, the extent and duration of air quality impacts from a small spill would not be significant.

A small fuel spill would likely affect air quality near the spill site by introducing VOCs through evaporation. The ADIOS2 model (see **Section A.9.2**) indicates that more than 90% of a small diesel spill would be evaporated or dispersed within 24 hours. 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.

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

Impacts of a Large Oil Spill

Potential impacts of a large oil spill on air quality are expected to be consistent with those analyzed and discussed in MMS (2007b) and BOEM (2012b,d).

A large oil spill would likely affect air quality by introducing VOCs 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. Additional air quality impacts could occur if response measures included *in situ* burning of the floating oil. Burning would generate a plume of black smoke and result in emissions of NO_x, SO_x, CO, and PM, as well as greenhouse gases.

Due to the lease area location (56 miles [95 km] from the nearest shoreline), most air quality impacts would occur in offshore waters. Depending on the spill trajectory and the effectiveness of spill response measures, coastal air quality could also be affected. Based on the OSRA modeling predictions (**Table 3**), Plaquemines Parish, Cameron Parish, Terrebonne Parish, and Lafourche Parish, Louisiana, are the coastal areas most likely to be affected.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on air quality are expected.

C.1.2 Water Quality

Deepwater areas in the Gulf of Mexico are relatively homogeneous with respect to temperature, salinity, and oxygen (MMS, 2007b). IPFs that could potentially affect water quality are effluent discharges and two types of accidents: a small fuel spill and a large oil spill.

Impacts of Effluent Discharges

Discharges of treated SBM cuttings will produce temporary, localized increases in suspended solids in the water column around the drilling rig. In general, turbid water can be expected to extend between a few hundred meters and several kilometers down current from the discharge point (NRC, 1983; Neff, 1987). NPDES permit limits and requirements will be met. After discharge, SBM retained on cuttings would be expected to adhere tightly to the cuttings particles and, consequently, would not produce much turbidity as the cuttings sink through the water column (Neff et al., 2000). Recent EISs have concluded that the discharge of treated SBM cuttings will not cause persistent impacts on water quality in the lease area (BOEM 2012b,d).

Treated sanitary and domestic wastes may have a slight transient effect on water quality in the immediate vicinity of these discharges. NPDES permit limits and requirements will be met, and little or no impact on water quality is anticipated.

Deck drainage includes effluents resulting from rain, deck washings, and runoff from curbs, gutters, and drains, including drip pans in work areas. Rainwater that falls on uncontaminated areas of the drilling rig will flow overboard without treatment. However, rainwater that falls on the drilling rig deck and other areas such as chemical storage areas and places where equipment is exposed will be collected and oil and water separated to meet NPDES permit requirements. Negligible impact on water quality is anticipated.

Other discharges from the proposed drilling rig will be in accordance with the NPDES permit. Discharges include desalination unit brine and uncontaminated cooling water, fire water, and ballast water and are expected to be diluted rapidly and have little or no impact on water quality.

Support vessels will discharge treated sanitary and domestic wastes. These will have a slight effect on water quality in the immediate vicinity of the discharges. Support vessel discharges are subject to USCG regulations 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 in MMS (2007b) and BOEM (2012b,d). The probability of a small spill would be minimized by Shell's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Given the open ocean location of the lease area, the extent and duration of water quality impacts from a small spill would not be significant.

A small fuel spill in offshore waters would 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. However, it is estimated that more than 90% of a small diesel spill would be evaporated or dispersed within 24 hours (see **Section A.9.2**). 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.

The water-soluble fractions of diesel are dominated by two- and three-ringed PAHs, which are moderately volatile (NRC, 2003b). The constituents of these oils are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. Diesel's density is such that it will not sink and pool on 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 (NRC, 2003b) and would not be expected to occur to any appreciable degree in offshore waters of the Gulf of Mexico. Diesel oil is readily and completely degraded by naturally occurring microbes (NOAA, 2006).

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

Impacts of a Large Oil Spill

Potential impacts of a large oil spill on water quality are expected to be consistent with those analyzed and discussed in MMS (2007b) and BOEM (2012b,d). A large spill would likely affect water quality by producing a slick on the water surface and increasing 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. Most of the oil would be expected to form a slick at the surface, although observations following the Macondo spill indicate that plumes of submerged oil droplets can be produced when subsea dispersants are applied at the wellhead (Camilli et al., 2010; Hazen et al., 2010; Joint Analysis Group, 2010a,b,c). Recent analyses of the full set of samples associated with the Macondo spill have confirmed that the application of subsurface dispersants resulted in subsurface hydrocarbon plumes (Spier et al., 2013). A report by Kujawinski et al. (2011) indicates that chemical components of subsea dispersants used during the Macondo spill persisted for up to 2 months and were detectable up to 186 miles (300 km) from the wellsite at a water depth of 3,280 to 3,937 ft (1,000 to 1,200 m). While dispersants were detectable in 353 of the 4,114 total water samples, concentrations in the samples were significantly below the chronic screening level for dispersants (BOEM, 2012d).

Once oil enters the ocean, a variety of physical, chemical, and biological processes act to disperse the oil slick. These processes include spreading, evaporation of the more volatile constituents, dissolution into the water column, emulsification of small droplets, agglomeration sinking, microbial modification, photochemical modification, and biological ingestion and excretion (NRC, 2003b). Marine water quality would be temporarily affected by the dissolved components and small oil droplets that do not rise to the surface or are mixed down by surface turbulence. Dispersion by currents and microbial degradation removes the oil from the water column or dilutes the constituents to background levels.

A large oil spill could result in a release of gaseous hydrocarbons that could affect water quality. During the Macondo spill, large volumes of CH_4 were released, causing localized oxygen depletion as methanotrophic bacteria rapidly metabolized the hydrocarbons (Joye et al., 2011; Kessler et al., 2011). However, a broader study of the deepwater Gulf of Mexico found that although some stations showed slight depression of dissolved oxygen concentrations relative to climatological background values, the findings were not indicative of hypoxia (<2.0 mg/L) (Operational Science Advisory Team [OSAT], 2010). Stations revisited around the Macondo wellhead in October 2010 showed no measurable oxygen depressions (OSAT, 2010).

Due to the lease area location (56 miles [95 km] from the nearest shoreline), most water quality impacts would occur in offshore waters. Depending on the spill trajectory and the effectiveness of spill response measures, coastal water quality could be affected. Based on the OSRA modeling predictions (**Table 3**), nearshore waters and embayments of Plaquemines Parish, Cameron Parish, Terrebonne Parish, and Lafourche Parish, Louisiana, are the coastal areas most likely to be affected.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on water quality are expected.

C.2 Seafloor Habitats and Biota

Water depths at the proposed well surface locations range from approximately 4,459 to 4,479 ft (1,359 to 1,365 m). See **EP Section 6a** for further information.

According to the BOEM (2012b), existing information for the deepwater Gulf of Mexico indicates that the seafloor is composed primarily of soft sediments; hard bottom communities are rare. MC 812 is within deepwater Grid 16 where remotely operated vehicle coverage of the seafloor is considered adequate to characterize the area (BOEM, 2011).

C.2.1 Soft Bottom Benthic Communities

Data from the Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology study (Wei, 2006; Rowe and Kennicutt, 2009) can be used to describe typical benthic communities in the area. **Table 4** summarizes data from two nearby stations in similar water depths. Sediments at these two stations were similar, predominantly clay (45.5% at MT4 and 52.9% at C4) and silt (45.5% at MT4 and 36.3% at C4) (Rowe and Kennicutt, 2009).

Table 4. Benthic community data from stations nearest to the lease area in similar water depths sampled during the Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology Study (From: Wei, 2006; Rowe and Kennicutt, 2009).

Station	Location Relative to Lease Area	Water Depth (m)	Abundance		
			Meiofauna (individuals/m^2)	Macroinfauna (individuals/m^2)	Megafauna (individuals/ha)
MT-4	26 mi SSW	1,403	246,058	3,262	1,548
C4	69 mi SSW	1,463	273,585	3,045	743

Meiofaunal and megafaunal abundance from Rowe and Kennicutt (2009); macroinfaunal abundance from Wei (2006).

Meiofauna (animals passing through a 0.5-mm sieve but retained on a 0.062-mm sieve) densities in water depths representative of the lease area typically range from about 200,000 to 350,000 individuals/m^2 (Rowe and Kennicutt, 2009). Nematodes, nauplii, and harpacticoid copepods were the three dominant groups in the meiofauna, accounting for about 90% of total abundance.

The benthic macroinfauna is characterized by small mean individual sizes and low densities, both of which are a reflection of the meager primary production in Gulf of Mexico surface waters (Wei, 2006). Densities decrease exponentially with water depth. Based on an equation presented by Wei (2006), macroinfaunal densities in the water depth of the wellsites are expected to be about 2,481 individuals/m^2, lower than the values in **Table 4**.

Polychaetes are typically the most abundant macroinfaunal group on the northern Gulf of Mexico continental slope, followed by amphipods, tanaids, bivalves, and isopods. Wei (2006) recognized four depth-dependent faunal zones (1 through 4), two of which are divided horizontally. The lease area is in Zone 2E, which consists of stations ranging in depth from 2,831 to 5,315 ft (625 to 1,828 m), covering mid Texas-Louisiana Slope, the west flank of the Mississippi Fan, the mid Mississippi Canyon, the head of De Soto Canyon, and the mid West Florida Terrace. The five most abundant species in Zone 2E were the polychaetes *Aricidea suecica, Exogone* sp. A., *Paralacydonia paradoxa,* and *Tharyx annulosus*.

Megafaunal density from nearby station MT-4 was 1,548 individuals/ha (**Table 4**). Densities of 195 to 2,941 individuals/ha were reported from other stations in a similar depth range. Common megafauna included motile groups such as decapods, ophiuroids, holothurians, and demersal fishes, as well as sessile groups such as sponges and anemones.

Bacteria are the foundation of deep-sea chemosynthetic communities (Ross et al., 2012) and are an important component in terms of biomass and cycling of organic carbon (Cruz-Kaegi, 1998). Bacterial biomass at the depth range of the lease area typically is about 1 to 2 grams of carbon per square meter (g C m^{-2}) in the top 6 in. (15 cm) of sediments (Rowe and Kennicutt, 2009).

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

Impacts of Physical Disturbance to the Seafloor

In water depths such as those that are encountered in the lease area, DP drillships or DP semisubmersible rigs disturb the seafloor only around the wellbore (surface hole location) where the bottom template and blowout preventer are located. Depending upon the specific well configuration, this area is generally about 0.62 ac (0.25 ha) (BOEM, 2012b).

The areal extent of these impacts from the drilling rig will be small compared to the lease area itself. Soft bottom communities are ubiquitous along the northern Gulf of Mexico continental slope (Gallaway et al., 2003; Rowe and Kennicutt, 2009). Physical disturbance to the seafloor during this project will have no significant impact on soft bottom benthic communities on a regional basis.

Impacts of Effluent Discharges

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

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

The areal extent of impacts from drilling discharges will be small; the typical effect radius is 1,640 ft (500 m) around each wellsite. For the five surface locations in this exploration-drilling program, the total impact area would be 971 ac (393 ha). In light of the proximity of the proposed wells to each other, the overall impact area could be reduced. Soft bottom communities are ubiquitous along the northern Gulf of Mexico continental slope (Gallaway, 1988; Gallaway et al., 2003; Rowe and Kennicutt, 2009). Impacts from drilling discharges during this project will have no significant impact on soft bottom benthic communities on a regional basis.

Impacts of a Large Oil Spill

Potential impacts of a large oil spill on the benthic community are expected to be consistent with those analyzed and discussed in MMS (2007b) and BOEM (2012b,d). Likely impacts from a subsea blowout include smothering and exposure to toxic hydrocarbons from oiled sediment settling to the seafloor. The most likely effects of a subsea blowout on benthic communities would be within a few hundred meters of the wellsites. The MMS (2007b) estimates that a severe subsurface blowout could resuspend and disperse sediments within a 984-ft (300-m) radius. While coarse sediments (sands) would probably settle at a rapid rate within 1,312 ft (400 m) from the blowout site, fine sediments (silts and clays) could be resuspended for more than 30 days and dispersed over a much wider area. Previous studies characterized surface sediments in the vicinity of the site as about 50% clay and 41% silt (Rowe and Kennicutt, 2009).

Previous analyses (MMS, 2007a, 2008) concluded that oil spills would be unlikely to affect benthic communities beyond the immediate vicinity of the wellhead (i.e., due to physical impacts of a blowout) because the oil would rise quickly to the sea surface directly over the spill location. However, during the Macondo spill, subsurface plumes were reported at a water depth of about 3,600 ft (1,100 m), extending at least 22 miles (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010). The subsurface plumes apparently resulted from the use of dispersants at the wellhead (Joint Analysis Group, 2010c; Spier et al., 2013). Chemical components of subsea dispersants used during the Macondo spill persisted for up to two months and were detected up to 186 miles (300 km) from the wellsite at a water depth of 3,280 to 3,937 ft (1,000 to 1,200 m) (Kujawinski et al., 2011). However, estimated dispersant concentrations in the subsea plume were below levels known to be toxic to marine life. While the behavior and impacts of subsurface plumes are not well known, a subsurface plume could contact the seafloor and affect benthic communities beyond the 984-ft (300-m) radius estimated by MMS (2007a, 2008), depending on its extent, trajectory, and persistence (Spier et al., 2013). This contact could result in smothering and/or toxicity to benthic organisms. The affected area would be recolonized by benthic organisms over a period of months to years (NRC, 2003b).

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on soft bottom communities are expected.

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, high-density deepwater corals, or other associated high-density hard bottom 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, Inc., 2007). These communities occur almost exclusively on authigenic carbonates created by chemosynthetic communities, and on shipwrecks. The nearest known high-density deepwater benthic community site is located approximately 8 miles (13 km) north of the lease area in MC 943 (Brooks et al., 2009).

The site clearance surveys by Fugro (2012) and GEMS (2013a,b) did not identify any features that could support high-density deepwater benthic communities within 2,000 ft (610 m) of the proposed drilling mud/cuttings discharge locations.

IPFs that could potentially affect high-density deepwater benthic communities are effluent discharges (drilling mud and cuttings), and a large oil spill from a well blowout at the seafloor. A small fuel spill would not affect benthic communities because the diesel fuel would float and dissipate on the sea surface.

Impacts of Effluent Discharges

The site clearance assessments included in this EP, based on the reports by Fugro (2012) and GEMS (2013a,b), did not identify features that could support high-density deepwater benthic communities within 2,000 ft (610 m) of the proposed drilling mud/cuttings discharge locations.

Monitoring programs on the Gulf of Mexico continental slope have shown that benthic impacts from drilling discharges typically are concentrated within about 1,640 ft (500 m) of the wellsites, although detectable deposits may extend beyond this distance (Continental Shelf Associates, Inc., 2004, 2006; Neff et al., 2005). If high-density deepwater communities are associated with the more distant expulsion features and mud volcanoes identified in the hazards survey, significant impacts on these communities will be avoided because of the distance from the discharge location.

Impacts of a Large Oil Spill

The BOEM (2012a) concluded that oil spills would be unlikely to affect benthic communities beyond the immediate vicinity of the wellhead (i.e., due to physical impacts of a blowout) because the oil would rise quickly to the sea surface directly over the spill location. However, during the Macondo spill, subsurface plumes were reported at a water depth of about 3,600 ft (1,100 m), extending at least 22 miles (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010). The subsurface plumes apparently resulted from the use of dispersants at the wellhead (Joint Analysis Group, 2010c). Chemical components of subsea dispersants used during the Macondo spill persisted for up to two months and were detectable up to 186 miles (300 km) from the wellsite at a water depth of 3,280 to 3,937 ft (1,000 to 1,200 m) (Kujawinski et al., 2011). However, estimated dispersant concentrations in the subsea plume were below levels known to be toxic to marine life. While the behavior and impacts of subsurface plumes are not well known, a subsurface plume could have the potential to contact high-density deepwater benthic communities beyond the 984-ft (300-m) radius estimated by BOEM (2012a), depending on its extent, trajectory, and persistence. Oil plumes that contact sensitive benthic communities before degrading could potentially impact the resource (BOEM, 2012b). Potential impacts on sensitive resources would be an integral part of the decision and approval process for the use of dispersants. The site clearance assessments by Fugro (2012) and GEMS (2013a,b) did not identify high-density deepwater benthic communities within 2,000 ft (610 m) of the proposed drilling mud/cuttings discharge locations. Potential impacts of oil on high-density deepwater benthic communities are discussed in MMS (2007b) and BOEM (2012b).

Although chemosynthetic communities live among hydrocarbon seeps, natural seepage occurs at a relatively constant low rate compared with the potential rates of oil release from a blowout. In addition, seep organisms require unrestricted access to oxygenated water at the same time as exposure to hydrocarbon energy sources (MacDonald, 2002). Oil droplets or oiled sediment particles could come into contact with chemosynthetic organisms or deepwater corals. As discussed by MMS (2007b), 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. Sublethal effects could be long lasting and affect the resilience of coral colonies to natural disturbances (e.g., elevated water temperature and diseases) (BOEM 2012d).

The potential for a spill to affect deepwater corals was observed during an October 2010 survey of deepwater coral habitats in water depths of 4,600 ft (1,400 m) approximately 7 miles (11 km) southwest of the Macondo wellhead. Much of the soft coral observed in a location measuring about 50 by 130 ft (15 by 40 m) was covered by a brown flocculent material (BOEMRE, 2010) with signs of stress, including varying degrees of tissue loss and excess mucous production (White et al., 2012). Researchers concluded, based on hopanoid petroleum biomarker analysis of the flocculent material, that it contained oil from the Macondo spill. The injured and dead corals were in an area where a subsea plume of oil had been documented during the spill in June 2010. The deepwater coral at this location showed signs of tissue damage that was not observed elsewhere during these surveys or in previous deepwater coral studies in the Gulf of Mexico. The team of researchers concluded that the observed coral injuries likely resulted from exposure to the subsurface oil plume (White et al., 2012). The study location is about 53 miles (85 km) northeast of the activities discussed in this EIA. There would not likely be cumulative impacts to those corals even in the unlikely event of a large spill associated with the activities discussed in this EIA.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Potential impacts on sensitive resources would be an integral part of the decision and approval process for the use of dispersants. Therefore, no significant spill impacts on deepwater benthic communities are expected.

C.2.3 Designated Topographic Features

The 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 Sackett Bank in West Delta Block 147, located 47 miles (75 km) northwest of the lease area.

There are no IPFs associated with either routine operations or accidents that could cause impacts to designated topographic features due to the distance from the lease area.

C.2.4 Pinnacle Trend Area Live Bottoms

The lease area is not covered by the Live Bottom (Pinnacle Trend) Stipulation. As defined by NTL 2009-G39, the nearest pinnacle trend blocks are located about 81 miles (130 km) north-northeast of the lease area in Main Pass Block 290.

There are no IPFs associated with either routine operations or accidents that could cause impacts to pinnacle trend area live bottoms due to the distance from the lease area.

C.2.5 Eastern Gulf Live Bottoms

The lease area is not covered by the Live Bottom (Low-Relief) Stipulation, which pertains to seagrass communities and low-relief hard-bottom reef within the Gulf of Mexico Eastern Planning Area blocks in water depths of 328 ft (100 m) or less and portions of Pensacola and Destin Dome Area Blocks in the Central Planning Area. The nearest blocks covered by the live bottom stipulation, as defined by NTL 2009-G39, are about 113 miles (181 km) northeast of the project area.

There are no IPFs associated with either routine operations or accidents that could cause impacts to eastern Gulf of Mexico live bottom areas due to the distance from the lease area.

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

This section discusses species listed as endangered or threatened under the ESA. In addition, it includes all marine mammal species in the region, which are protected under the MMPA.

Endangered or threatened species that may occur in the project area and/or along the northern Gulf Coast are listed in **Table 5**. The table also indicates the location of designated critical habitat in the Gulf of Mexico. Critical habitat is defined as (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. The NMFS has jurisdiction over ESA-listed cetaceans and fishes in the Gulf of Mexico. The USFWS has jurisdiction over ESA-listed birds and the Florida manatee. These two agencies share federal jurisdiction over sea turtles, with NMFS having lead responsibility at sea and USFWS on nesting beaches.

Table 5. Federally listed endangered and threatened species in the lease area and along the northern Gulf Coast.

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Lease Area	Coastal	
Marine Mammals					
Sperm whale	*Physeter macrocephalus*	E	X	--	None
Florida manatee	*Trichechus manatus latirostris*	E	--	X	Florida (Peninsular)
Blue whale	*Balaenoptera musculus*	E	X[a]	--	None
Fin whale	*Balaenoptera physalus*	E	X[a]	--	None
Humpback whale	*Megaptera novaeangliae*	E	X[a]	--	None
North Atlantic right whale	*Eubalaena glacialis*	E	X[a]	--	None
Sei whale	*Balaenoptera borealis*	E	X[a]	--	None
Sea Turtles					
Loggerhead turtle	*Caretta caretta*	T, E[b]	X	X	None
Green turtle	*Chelonia mydas*	T, E[c]	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					
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T	--	X	Coastal Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Terrestrial Mammals					
Beach mouse (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus*	E	--	X	Alabama and Florida (Panhandle) beaches

Abbreviations: E = Endangered; T = Threatened.

a The blue, fin, humpback, North Atlantic right, and sei whales are rare or extralimital in the Gulf of Mexico and are unlikely to be present in the lease area.

b The loggerhead turtle is composed of nine distinct population segments (DPS) that are considered "species." The only DPS that may occur in the project area (Northwest Atlantic DPS) is listed as threatened (76 FR 58868; September 22, 2011).

c The green sea turtle is threatened, except for the Florida breeding population, which is listed as endangered.

The sperm whale and five species of sea turtles are the only endangered or threatened species likely to occur at or near the lease area. No critical habitat has been designated for these species in the Gulf of Mexico.

Five endangered mysticete whales (blue whale, fin whale, humpback whale, North Atlantic right whale, and sei whale) have also been reported from the Gulf of Mexico but are considered rare or extralimital there (Würsig et al., 2000). No critical habitat has been designated for these species in the Gulf of Mexico.

Coastal endangered or threatened species include the Florida manatee, Piping Plover, Whooping Crane, Gulf sturgeon, and four subspecies of beach mouse. Critical habitat has been designated for all of these species as indicated in **Table 5** and discussed in individual sections.

Two other coastal species (Bald Eagle and Brown Pelican) discussed in MMS (2007b) and BOEM (2012b) are no longer federally listed as endangered or threatened; these species are discussed in **Section C.4.2**, **Shorebirds and Coastal Nesting Birds**.

There are no other endangered animals or plants in the Gulf of Mexico that are reasonably likely to be affected by either routine or accidental events. Other species occurring at certain locations in the Gulf of Mexico such as the smalltooth sawfish (*Pristis pectinata*), elkhorn coral (*Acropora palmata*), staghorn coral (*Acropora cervicornis*), and Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*) are remote from the lease area and highly unlikely to be affected.

C.3.1 Sperm Whale (Endangered)

The only endangered marine mammal likely to be present at or near the project area is the sperm whale (*Physeter macrocephalus*). Resident populations of sperm whales occur within the Gulf of Mexico. A species description is presented in MMS (2007b). 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 NMFS (Waring et al., 2013). No critical habitat for the sperm whale has been designated in the Gulf of Mexico.

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 there throughout the year (Davis et al., 2000). Results of a multi-year tracking study show female sperm whales typically concentrated along the upper continental slope between the 656- and 3,280-ft (200- and 1,000-m) depth contours (Jochens et al., 2008). Male sperm whales were more variable in their movements and were documented in water depths greater than 9,843 ft (3,000 m). Generally, groups of sperm whales sighted in the Gulf of Mexico during the MMS-funded Sperm Whale Seismic Study consisted of mixed-sex groups comprising adult females and immatures, and groups of bachelor males. Typical group size for mixed groups was 10 individuals (Jochens et al., 2008). A review of sighting reports from seismic mitigation surveys in the Gulf of Mexico conducted over a 6-year period found a mean group size for sperm whales of 2.5 individuals (Barkaszi et al., 2012).

In these mitigation surveys, sperm whales were the most common cetacean encountered (Barkaszi et al., 2012). Results of the Sperm Whale Seismic Study showed that sperm whales transit through the vicinity of the lease area. Movements of satellite-tracked individuals suggest that this area of the Gulf continental slope is within the home range of the Gulf of Mexico population (within the 95% utilization distribution) (Jochens et al., 2008).

Current threats to sperm whale populations worldwide are discussed in a final recovery plan for the sperm whale published by NOAA (NMFS, 2010a). Threats are defined as "any factor that could represent an impediment to recovery," and include fisheries interactions, anthropogenic noise, 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 (BOEMRE, 2011; BOEM, 2012c).

IPFs that could potentially affect sperm whales include drilling rig presence, noise, and lights; support vessel and helicopter traffic noise; support vessel strikes; and two types of accidents - a small fuel spill and a large oil spill. Effluent discharges are likely to have negligible impacts on sperm whales due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of these marine mammals. Compliance with NTL 2012-BSEE-G01 will minimize the potential for marine debris-related impacts on sperm whales.

Impacts of Drilling Rig Presence, Noise, and Lights

Noise generated from the drilling rig(s) and from routine drilling activities has the potential to disturb sperm whales. Some sounds produced by the drilling rig may be emitted at levels that could potentially disturb individual whales or mask the sounds animals would normally produce or hear. Noise associated with drilling is relatively weak in intensity, and an individual animal's noise exposure would be transient. As discussed in **Section A.1**, the bandwidth of sounds generated by the drilling rig is approximately 10 to 500 Hz.

Sperm whales appear to have good low-frequency hearing, with variable responses to anthropogenic noise (Jochens et al., 2008). Southall et al. (2007) list sperm whales in the same hearing group (i.e., mid-frequency cetaceans) as dolphins, toothed whales, beaked whales, and bottlenose whales (estimated hearing range from 150 Hz to 160 kHz). Generally, most of the acoustic energy from sperm whales is present at frequencies below 4 kHz, although diffuse energy up to and past 20 kHz has been reported, with source levels up to 236 dB re 1 µPa at 1 m. Most 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).

Sounds produced during drilling operations are generally constant (rather than pulsed or intermittent) and at levels that may be louder than, and of a similar frequency to, the auditory signal received by sperm whales. Animals can determine the direction from which a sound arrives based on cues, such as difference in arrival times, sound levels, and phases at the two ears. Thus, an animal's directional hearing capabilities have a bearing on its vulnerability to masking (NRC, 2003a). Behavioral changes for marine mammals such as the sperm whale to auditory masking sounds may include producing more calls, longer calls, or shifting the frequency of the calls (NMFS, 2009a; Holt et al., 2009).

In addition, there are other OCS facilities and activities near the lease area, and the region as a whole has a large number of similar sound sources. Drilling-related noise associated with this project will contribute to increases in the ambient noise environment of the Gulf of Mexico, but it is not expected in amplitudes sufficient enough to cause either hearing or behavioral effects to sperm whales.

The drilling rig used during the proposed activity will be located within a deepwater, open ocean environment and will remain stationary during drilling operations. Sounds generated by the rig and by drilling operations will be generally continuous with some variability in sound level. This analysis assumes that the continuous nature of sounds produced by the drilling rig will provide individual whales with cues relative to the direction and relative distance (sound intensity) of the sound source, and the fixed position of the drilling rig will provide multiple options for active avoidance of potential physical impacts.

NMFS analyzed the potential for impacts of drilling-related noise on sperm whales in its Biological Opinion for the Five-Year Oil and Gas Leasing Program in the Central and Western Planning Areas of the Gulf of Mexico (NMFS, 2007). The analysis noted that drilling rigs show low sound source levels and concluded that drilling is not expected to produce amplitudes sufficient to cause hearing or behavioral effects in sperm whales; therefore, these effects are insignificant (NMFS, 2007). In other areas, such as the Beaufort Sea, NMFS (2009a) stated that marine mammals that show behavioral avoidance to noise related to drilling activities are especially unlikely to incur auditory impairment or other physical effects (Federal Register, Vol. 75, No. 88; Friday, May 7, 2010/Notices).

Although offshore lighting and presence of drilling rigs and OCS vessels were considered potential factors affecting sperm whales, NMFS's 2007 Biological Opinion and lease sale EISs (MMS, 2007b; BOEM, 2012b,d) did not identify these as IPFs for sperm whales. Therefore, no significant impacts are expected.

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb sperm whales. There is also a risk of vessel strikes, which are identified as a threat in the recovery plan for this species (NMFS, 2010a). Data concerning the frequency of vessel strikes are presented in the lease sale EIS (MMS, 2007b). To reduce the potential for vessel strikes, the BOEM has issued NTL 2012-JOINT-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. When whales are sighted, vessel operators and crews are required to attempt to maintain a distance of 300 ft (91 m) or greater whenever possible. Vessel operators are required to reduce vessel speed to 10 knots or less, when safety permits, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel. Compliance with this NTL will minimize the likelihood of vessel strikes as well as reduce the chance for disturbing sperm whales.

NMFS (2007) analyzed the potential for vessel strikes and harassment of sperm whales in its Biological Opinion for the Five-Year Oil and Gas Leasing Program in the Central and Western Planning Areas of the Gulf of Mexico (NMFS, 2007). With implementation of the mitigation measures in NTL 2012-JOINT-G01, NMFS concluded that the likelihood of collisions between vessels and sperm whales would be reduced to insignificant levels. 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 implementation of the vessel strike avoidance measures requirement to maintain a distance of 295 ft (90 m) from sperm whales, NMFS concluded that the potential for harassment of sperm whales would be reduced to discountable levels.

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 800 ft (245 m). A reaction to the initial pass of the aircraft was observed during 3 (12%) of 24 sightings. All three reactions consisted of a hasty dive and occurred at less than 1,180 ft (360 m) 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 probably of no long-term biological significance.

Helicopters maintain altitudes above 700 ft (213 m) during transit to and from the offshore working area. In the event that a whale is seen during transit, the helicopter will not approach or circle the animal(s). In addition, guidelines and regulations specify that helicopters maintain an altitude of 1,000 ft (305 m) within 300 ft (91 m) of marine mammals (BOEM, 2012a,b). Although whales may respond to helicopters (Smultea et al., 2008), NMFS (2007) and BOEM (2012a) 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 in MMS (2007b) and BOEM (2012b,d) and the Biological Opinion for the Five-Year Oil and Gas Leasing Program in the Central and Western Planning Areas of the Gulf of Mexico (NMFS, 2007). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

The probability of a fuel spill will be minimized by Shell's preventative measures during routine operations including fuel transfer. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the potential for impacts on sperm whales. **EP Section 9b** provides detail on spill response measures. Given the open ocean location of the lease area and the duration of a small spill, the opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.2** discusses the likely fate of a small fuel spill and indicates that more than 90% would be evaporated or dispersed naturally within 24 hours. The area of diesel fuel on the sea surface would range from 1.2 to 12 ac (0.5 to 5 ha), depending on sea state and weather conditions.

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

Impacts of a Large Oil Spill

Potential spill impacts on marine mammals including sperm whales are discussed in MMS (2007b), BOEM (2012a,b,d), and in NMFS (2007). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

Impacts of oil spills on sperm whales can include direct impacts from oil exposure, as well as indirect impacts due to response activities and materials (e.g., vessel traffic, noise, 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 noise of response vessels and aircraft. The level of impact of oil exposure depends on the amount, frequency, and duration of exposure; route of exposure; and type or condition of petroleum compounds or chemical dispersants (Waring et al., 2013). 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). Ackleh et al. (2012) hypothesized that sperm whales may have temporarily relocated away from areas near the Macondo spill in 2010.

In the event of a large spill, the level of vessel and aircraft activity associated with spill response could disturb sperm whales and potentially result in vessel strikes, entanglement, or other injury or stress. Response vessels would operate in accordance with NTL 2012-JOINT-G01 to reduce the potential for striking or disturbing these animals.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on sperm whales are expected.

C.3.2 Florida Manatee (Endangered)

Most of the Gulf of Mexico manatee population is located in peninsular Florida (USFWS, 2001). Manatees regularly migrate farther west of Florida in the warmer months (Wilson, 2003) into Alabama and Louisiana coastal environs, with some individuals traveling as far west as Texas (Fertl et al., 2005). A species description is presented in MMS (2007b) and in the recovery plan for this species (USFWS, 2001).

IPFs that could potentially affect manatees include support vessel and helicopter traffic and a large oil spill. A small fuel spill in the lease area would be unlikely to affect manatees, as the lease area is approximately 56 miles (95 km) from the nearest shoreline (Louisiana). As explained in **Section A.9.2**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to breaking up. Compliance with NTL 2012-BSEE-G01 will minimize the potential for marine debris-related impacts on manatees. Consistent with the analysis in BOEM (2012a), impacts of routine project-related activities on the manatee would be negligible.

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb manatees, and there is also a risk of vessel strikes, which are identified as a threat in the recovery plan for this species (USFWS, 2001). To reduce the potential for vessel strikes, the BOEM has issued NTL 2012-JOINT-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. Compliance with NTL 2012-JOINT-G01 will minimize the likelihood of vessel strikes, and no significant impacts on manatees are expected.

Helicopter traffic, if present, 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 66 to 525 ft (20 to 160 m). Helicopters used in support operations maintain a minimum altitude of 700 ft (213 m) while in transit offshore, 1,000 ft (305 m) over unpopulated areas or across coastlines, and 2,000 ft (610 m) 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 1,000 ft (305 m) within 300 ft (91 m) of marine mammals (BOEM, 2012a,b). This mitigation measure will minimize the potential for disturbing manatees, and no significant impacts are expected.

Impacts of a Large Oil Spill

The OSRA results summarized in **Table 3** predict that some Texas, Louisiana, and Florida shorelines could be contacted by a large oil spill within 30 days. There is no critical habitat designated in these areas, and the number of manatees potentially present is a small fraction of the population in peninsular Florida.

In the event that manatees were exposed to oil, effects could include direct impacts from oil exposure, as well as indirect impacts due to response activities and materials (e.g., vessel traffic, noise, 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 (or contaminated vegetation, in the case of manatees); and stress from the activities and noise of response vessels and aircraft. Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals from prime habitat, disruption of social structure, changing prey availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event that a large spill reached coastal waters where manatees were present, the level of vessel and aircraft activity associated with spill response could disturb manatees and potentially result in vessel strikes, entanglement, or other injury or stress. Response vessels would operate in accordance with NTL 2012-JOINT-G01 to reduce the potential for striking or disturbing these animals, and therefore no significant impacts are expected.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on manatees are expected.

C.3.3 Endangered Mysticete Whales

Five endangered mysticete whales (blue whale, fin whale, humpback whale, North Atlantic right whale, and sei whale) have also been reported from the Gulf of Mexico, but are considered rare or extralimital there (Würsig et al., 2000). No critical habitat has been designated for these species in the Gulf of Mexico.

Due to the rare occurrence of these whales in the Gulf of Mexico, it is unlikely that any endangered mysticete would come into contact with any project activities, either routine operations or accidents.

Mysticete whales were not included as affected species in the Biological Opinion for the Five-Year Oil and Gas Leasing Program in the Central and Western Planning Areas of the Gulf of Mexico (NMFS, 2007). Potential impacts analyzed in MMS (2007b) and BOEM (2012a,b,d) are incorporated by reference. If any of these whales were present in the area, potential impacts would be the same as those discussed in **Section C.3.4**.

C.3.4 Non-Endangered Marine Mammals (Protected)

In addition to the seven endangered species that have been cited previously, 22 additional species of marine mammals may be found in the Gulf of Mexico, including 2 species of mysticete whales, the dwarf and pygmy sperm whales, 4 species of beaked whales, and 14 species of delphinids (see **EP Section 6h**). All marine mammals are protected species under the MMPA. The most common non-endangered cetaceans in the deepwater environment are odontocetes such as the pantropical spotted dolphin, spinner dolphin, and Clymene dolphin. A brief summary is presented in this section, and additional information on these groups is presented in MMS (2007b).

<u>Mysticete whales</u>. Two species of non-endangered mysticete whales are known from the Gulf of Mexico: the Bryde's whale (*Balaenoptera edeni*) and minke whale (*Balaenoptera acutorostrata*). The Bryde's whale (*Balaenoptera edeni*) has been sighted most frequently along the 328-ft (100-m) isobath (Davis and Fargion, 1996; Davis et al., 2000). Most sightings have been made in the DeSoto Canyon region and off western Florida, although there have been some in the west-central portion of the northeastern Gulf. The minke whale is considered rare in the Gulf of Mexico, with the only confirmed records coming from strandings (Würsig et al., 2000). Based on the available data, it is possible that Bryde's whales could occur in the lease area.

<u>Dwarf and pygmy sperm whales</u>. 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., 2013). Either species could occur in the lease area.

<u>Beaked whales</u>. Four species of beaked whales are known from the Gulf of Mexico. They are Blainville's beaked whale (*Mesoplodon densirostris*), Cuvier's beaked whale (*Ziphius cavirostris*), Sowerby's beaked whale (*Mesoplodon bidens*), and Gervais' beaked whale (*Mesoplodon europaeus*). Stranding records in the Gulf of Mexico suggest that Gervais' beaked whale is the most common, and Sowerby's beaked whale is extralimital. 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 complex (*Mesoplodon* spp. and *Ziphius* spp.). In the northern Gulf of Mexico, they are broadly distributed in waters greater than 3,281 ft (1,000 m) over lower slope and abyssal landscapes (Davis et al., 2000). Any of these species could occur in the lease area (Waring et al., 2013).

<u>Delphinids</u>. 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*). The most common non-endangered cetaceans in the deepwater environment are the pantropical spotted dolphin, spinner dolphin, and Clymene dolphin. However, any of these species could occur in the lease area (Waring et al., 2013).

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., 2013). The offshore form of the bottlenose dolphin may occur within the lease area. Inshore populations of coastal bottlenose dolphins in the northern Gulf of Mexico are separated by the NMFS into 37 geographically distinct population units, or stocks, for management purposes (Waring et al., 2013). NMFS (2013) has proposed to classify the Gulf of Mexico Northern Coastal Stock, Western Coastal Stock, and all 32 of the Bay, Sound, and Estuarine Stocks as strategic stocks. A "strategic" stock is defined by the MMPA as a marine mammal stock

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

The strategic stock designation in this case was based primarily on the occurrence of an "Unusual Mortality Event" (UME) of unprecedented size and duration that has affected these stock areas. This UME began in February 2010 and, as of early 2012, the event was still considered to be ongoing (Waring et al., 2013). Carmichael et al. (2012) hypothesized that the unusual number of bottlenose dolphin strandings in the northern Gulf of Mexico during this time may have been associated with environmental perturbations, including sustained cold weather and the Macondo spill in 2010, as well as large volumes of cold freshwater discharge in the early months of 2011.

IPFs that could potentially affect non-endangered marine mammals include drilling rig presence, noise, and lights; support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges are likely to have negligible impacts on marine mammals due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of marine mammals. Compliance with NTL 2012-BSEE-G01 will minimize the potential for marine debris-related impacts on marine mammals.

Impacts of Drilling Rig Presence, Noise, and Lights

Noise from routine drilling activities has the potential to disturb marine mammals. Most odontocetes (toothed whales and dolphins) use higher frequency sounds than those produced by OCS drilling activities (Richardson et al., 1995). Noise associated with drilling is relatively weak in intensity, and an individual animal's noise exposure would be transient. Stronger noise levels will occur during thruster use in dynamic positioning. Thruster noise impacts would be expected at greater distances than vessel noise alone (LGL Ecological Research Associates, Ltd., 2006) but are dependent on variables relating to thruster type and usage. It is expected that marine mammals within or near the lease area would be able to detect the presence of the drilling rig and avoid exposure to higher energy sounds, particularly within an open ocean environment.

Some odontocetes have shown increased feeding activity around lighted platforms at night (Todd et al., 2009). Even temporary drilling rigs present an attraction to pelagic food sources that may attract cetaceans (and sea turtles). Therefore, prey congregation could pose an attraction to protected species that exposes them to higher levels or longer durations of noise that might otherwise be avoided.

There are other OCS facilities and activities near the lease area, and the region as a whole has a large number of similar sources. Due to the limited scope, timing, and geographic extent of drilling activities, this project would represent a small temporary contribution to the overall noise regime, and any short-term impacts are not expected to be biologically significant to marine mammal populations.

Drilling rig lighting and presence are not identified as IPFs for marine mammals in MMS (2007b) or BOEM (2012 a, b, d). Therefore, no significant impacts are expected.

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb marine mammals, and there is also a risk of vessel strikes. Data concerning the frequency of vessel strikes are presented in the lease sale EIS (MMS, 2007b). To reduce the potential for vessel strikes, the BOEM and BSEE have issued NTL 2012-JOINT-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. Vessel operators and crews are required to attempt to maintain a distance of 300 ft (91 m) or greater when whales are sighted and 150 ft (45 m) when small cetaceans are sighted. When cetaceans are sighted while a vessel is underway, vessels must attempt to remain parallel to the animal's course and avoid excessive speed or abrupt changes in direction until the cetacean has left the area. Vessel operators are required to reduce vessel speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. Compliance with this

NTL will minimize the likelihood of vessel strikes as well as reduce the chance for disturbing marine mammals, and therefore no significant impacts are expected.

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

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals are discussed MMS (2007b) and BOEM (2012a,b,d), and oil impacts on marine mammals in general are discussed by Geraci and St. Aubin (1990). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

The probability of a fuel spill will be minimized by Shell's preventative measures, including fuel transfer. In the unlikely event of a spill, implementation of Shell's OSRP is expected to mitigate and reduce the potential for impacts on marine mammals. **EP Section 9b** provides detail on spill response measures. Given the open ocean location of the lease area and the duration of a small spill, the opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.2** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours. The area of diesel fuel on the sea surface would range from 1.2 to 12 ac (0.5 to 5 ha), depending on sea state and weather conditions.

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

Impacts of a Large Oil Spill

Potential spill impacts on marine mammals are discussed in MMS (2007b), BOEM (2012a,b,d), and by Geraci and St. Aubin (1990). For this EP, there are no unique site-specific issues.

Impacts of oil spills on marine mammals can include direct impacts from oil exposure, as well as indirect impacts due to response activities and materials (e.g., vessel traffic, noise, 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 (or contaminated vegetation, in the case of manatees); and stress from the activities and noise of response vessels and aircraft. Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death.

Behavioral responses can include displacement of animals from prime habitat; disruption of social structure; changing prey availability and foraging distribution and/or patterns; changing reproductive behavior/productivity; and changing movement patterns or migration (MMC, 2011).

In the event of a large spill, the level of vessel and aircraft activity associated with spill response could disturb marine mammals and potentially result in vessel strikes, entanglement, or other injury or stress. Response vessels would operate in accordance with NTL 2012-JOINT-G01 to reduce the potential for striking or disturbing these animals, and therefore no significant impacts are expected. A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on marine mammals are expected.

C.3.5 Sea Turtles (Endangered/Threatened)

As listed in **EP Section 6h**, five species of endangered or threatened sea turtles may be found near the lease area. Endangered species are the leatherback (*Dermochelys coriacea*), Kemp's ridley (*Lepidochelys kempii*), and hawksbill (*Eretmochelys imbricata*) turtles. The distinct population segment (DPS) of loggerhead turtle (*Caretta caretta*) that occurs in the Gulf of Mexico is listed as threatened, although other DPSs are endangered. The green turtle (*Chelonia mydas*) is listed as threatened, except for the Florida breeding population, which is listed as endangered. Species descriptions are presented in MMS (2007b).

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

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

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

- Loggerhead turtles – Loggerhead turtles nest in significant numbers along the Florida Panhandle and, to a lesser extent, from Texas through Alabama (MMS, 2007b). The nearest significant nesting area of loggerhead turtles is found in Louisiana, on beaches within the Breton NWR;
- Green and leatherback turtles – Green and leatherback turtles infrequently nest on Florida Panhandle beaches (Florida Fish and Wildlife Conservation Commission, 2011);
- Kemp's ridley turtles – The main nesting site of the Kemp's ridley turtle is Rancho Nuevo beach, Tamaulipas, Mexico (NMFS et al., 2011). Approximately 200 Kemp's ridley turtles nested on Texas beaches in 2009 (Sea Turtle Restoration Project, 2011). Kemp's ridley

turtles typically do not nest anywhere near the project area, although there have been occasional reports of nesting in Alabama (Share the Beach, 2010); and

- Hawksbill turtles – Hawksbill turtles typically do not nest anywhere near the project area.

IPFs that could potentially affect sea turtles include drilling rig presence, noise, and lights; support vessel and helicopter traffic; and two types of accidents - a small fuel spill and a large oil spill. Effluent discharges are likely to have negligible impacts on sea turtles due to rapid dispersion, the small area of ocean affected, and the intermittent nature of the discharges. Compliance with NTL 2012-BSEE-G01 will minimize the potential for marine debris-related impacts on sea turtles.

Impacts of Drilling Rig Presence, Noise, and Lights

Offshore drilling activities produce a broad array of sounds at frequencies and intensities that may be detected by sea turtles (Geraci and St. Aubin, 1987). Potential impacts may include behavioral disruption and temporary or permanent displacement from the area near the sound source. Certain sea turtles, especially loggerheads, may be attracted to offshore structures (Lohoefener et al., 1990) and, thus, may be more susceptible to impacts from sounds produced during routine operations. Helicopters and service vessels may also affect sea turtles due to machinery noise and/or visual disturbances. The most likely impacts would be short-term behavioral changes such as diving and evasive swimming, disruption of activities, or departure from the area. Due to the limited scope, timing, and geographic extent of drilling activities, these short-term impacts are not expected to be biologically significant to sea turtle populations.

Artificial lighting can disrupt the nocturnal orientation of sea turtle hatchlings (Witherington, 1997; Tuxbury and Salmon, 2005). However, hatchlings may rely less on light cues when they are offshore than when they are emerging on the beach (Salmon and Wyneken, 1990). NMFS (2007) concluded that the effects of lighting from offshore structures on sea turtles are insignificant. 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 strikes. Data show that vessel traffic is one cause of sea turtle mortality in the Gulf of Mexico (Lutcavage et al., 1997). While adult sea turtles are visible at the surface during the day and in clear weather, they can be difficult to spot from a moving vessel when resting below the water surface, during nighttime, or during periods of inclement weather. To reduce the potential for vessel strikes, the BOEM and BSEE have issued NTL 2012-JOINT-G01, which recommends protected species identification training and that vessel operators and crews maintain a vigilant watch for sea turtles and slow down or stop their vessel to avoid striking protected species, and requires operators to report sightings of any injured or dead protected species. When sea turtles are sighted, vessel operators and crews are required to attempt to maintain a distance of 150 ft (45 m) or greater whenever possible. Compliance with this NTL will minimize the likelihood of vessel strikes as well as reduce the chance for disturbing sea turtles (NMFS, 2007). Therefore, no significant impacts are expected.

Helicopter traffic also has the potential to disturb sea turtles. However, while flying offshore, helicopters maintain altitudes above 700 ft (213 m) during transit to and from the working area.

This altitude will minimize the potential for disturbing sea turtles, and no significant impacts are expected.

Impacts of a Small Fuel Spill

Potential spill impacts on sea turtles are discussed in MMS (2007b), BOEM (2012b,d), and in NMFS (2007) in its Biological Opinion for the Five-Year Oil and Gas Leasing Program in the Central and Western Planning Areas of the Gulf of Mexico. For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

The probability of a fuel spill will be minimized by Shell's preventative measures, including fuel transfer. In the unlikely event of a spill, implementation of Shell's OSRP is expected to mitigate and reduce the potential for impacts on sea turtles. **EP Section 9b** provides detail on spill response measures. Given the open ocean location of the lease area, the duration of a small spill and opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.2** discusses the likely fate of a small fuel spill and indicates that more than 90% would be evaporated or dispersed naturally within 24 hours. The area of diesel fuel on the sea surface would range from 1.2 to 12 ac (0.5 to 5 ha), depending on sea state and weather conditions.

Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and noise of response vessels and aircraft (MMS, 2007b; NMFS, 2010b; BOEM, 2012b,d). However, due to the limited areal extent and short duration of water quality impacts from a small fuel spill, no significant impacts would be expected.

A small fuel spill in the lease area would be unlikely to affect sea turtle nesting beaches because the lease area is 192 miles (309 km) from the nearest shoreline (Louisiana). As explained in **Section A.9.2**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to breaking up.

Impacts of a Large Oil Spill

Impacts of oil spills on sea turtles can include direct impacts from oil exposure, as well as indirect impacts due to response activities and materials (e.g., vessel traffic, noise, dispersants, and beach cleanup activities). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes and smoke (e.g., from *in situ* burning of oil); ingestion of oil (and dispersants) directly or via contaminated food; and stress from the activities and noise of response vessels and aircraft. Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals from prime habitat, disruption of social structure, changing food availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMS, 2007b; NMFS, 2010c). In the unlikely event of a spill, implementation of Shell's OSRP is expected to mitigate and reduce the potential for these types of impacts on sea turtles. **EP Section 9b** provides detail on spill response measures.

Studies of oil effects on loggerheads in a controlled setting (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).

The OSRA results summarized in **Table 3** predict that some shorelines that support sea turtle nesting could be contacted within 30 days. The nearest significant nesting area of loggerhead turtles is found on beaches within the Breton NWR. Spilled oil reaching sea turtle nesting beaches could have effects on nesting sea turtles and egg development (NMFS, 2007). An oiled beach could affect nest site selection or result in no nesting at all (e.g., false crawls). Upon hatching and successfully reaching the water, hatchlings are subject to the same types of oil spill exposure hazards as adults. Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects, from acute toxicity to impaired movement and normal bodily functions (NMFS, 2007).

In the event of a large spill, the level of vessel and aircraft activity associated with spill response could disturb sea turtles and potentially result in vessel strikes, entanglement, or other injury or stress. Response vessels would operate in accordance with NTL 2012-JOINT-G01 to reduce the potential for striking or disturbing these animals.

NOAA's Office of Response and Restoration prepared guidelines in 2007 to minimize impacts to nesting activities and existing nests due to beach cleanup activities (Shigenaka et al., 2010). Oil spill cleanup activities on the beach (e.g., raking, shoveling, use of mechanical equipment) may adversely affect sea turtle nesting activity or existing beach nests. Response workers and vehicles may crush eggs and compact beach sand, making it difficult or impossible for hatchlings to emerge or for females to use for nesting (Shigenaka et al., 2010). Nighttime human activity can prevent sea turtles from coming ashore, may cause females to stop nesting and return to the ocean, disorient or impede emerging hatchlings, and crush hatchlings attempting to reach the ocean. Locating and marking turtle nests with a 10-ft (3-m) buffer zone to aid in avoiding and minimizing impacts is recommended during beach cleanup activities; mechanical equipment and hand tools should not be used within the buffer area (USFWS, n.d.).

Impacts to sea turtles from a large oil spill and associated cleanup activities would be dependent upon 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. A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP would mitigate and reduce direct and indirect impacts to turtles from oil exposure and response activities and materials. **EP Section 9b** provides detail on spill response measures. Adherence to the requirements of NTL 2012-JOINT-G01 and general guidance regarding beach cleanup activities (Shigenaka et al., 2010; USFWS, n.d.) is expected to minimize potential impacts to sea turtles both at sea and on shore.

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 is in decline as a result of hunting, habitat loss and modification, predation, and disease (USFWS, 2003). Critical overwintering habitat has been designated, including beaches in Texas, Louisiana, Mississippi, Alabama, and Florida (**Figure 2**). Piping Plovers inhabit coastal sandy beaches and mudflats, feeding by probing for invertebrates at or just below the surface. They use beaches adjacent to foraging areas for roosting and preening (USFWS, 2010a). A species description is presented in MMS (2007b).

A large oil spill is the only IPF that could potentially affect Piping Plovers. There are no IPFs associated with routine project activities that could affect these birds. A small fuel spill in the lease area would be unlikely to affect Piping Plovers because a small fuel spill would not be expected to make landfall or reach coastal waters prior to breaking up (see explanation in **Section A.9.2**).

Impacts of a Large Oil Spill

The lease area is 56 miles (94 km) from the nearest shoreline inhabited by Piping Plovers. The OSRA results summarized in **Table 3** predict that Texas and Louisiana shorelines designated as critical habitats for the wintering Piping Plover could be contacted by a spill within 30 days. Plaquemines Parish, Louisiana, which has the highest probability of contact for the 30-day interval (8%), includes critical habitat of Piping Plovers.

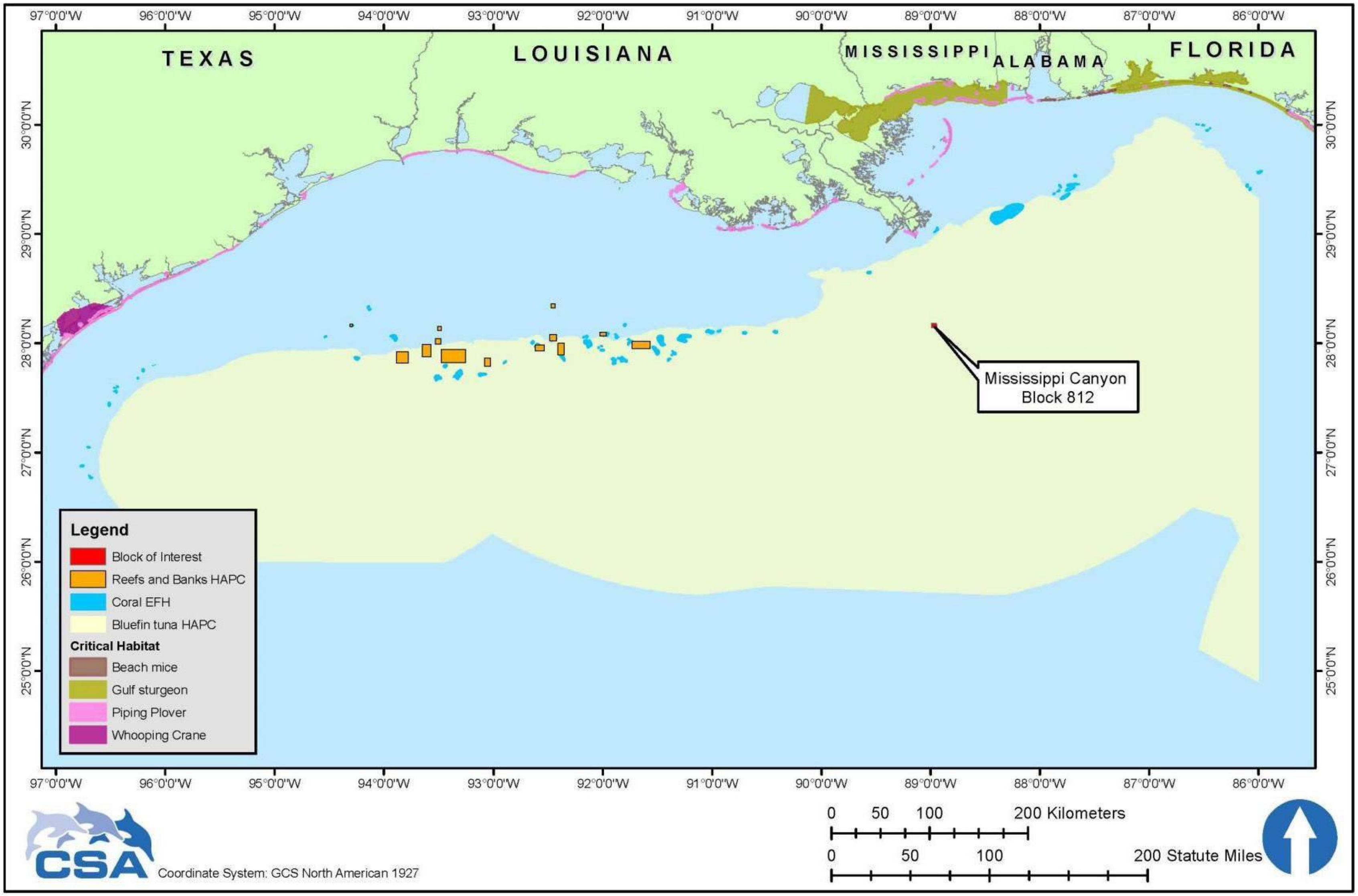

Figure 2. Location of selected environmental features in relation to the lease area.

Plovers could become externally oiled while foraging on oiled shores or be exposed internally through ingestion of oiled intertidal sediments and prey (MMS, 2007b). Plovers congregate and feed along tidally exposed banks and shorelines, following the tide out 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. Shell has extensive resources available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the OSRP.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on Piping Plovers are expected.

C.3.7 Whooping Crane (Endangered)

The Whooping Crane (*Grus americana*) is an omnivorous wading bird and an endangered species. There are three wild populations in North America (National Wildlife Federation, 2012). One population winters along the Texas coast at Aransas NWR and summers at Wood Buffalo National Park in Canada. This population represents the majority of the world's population of free-ranging Whooping Cranes and reached a record population of 278 at Aransas/Wood Buffalo National Park in August 2011 (Whooping Crane Eastern Partnership, 2012). A non-migrating population has been reintroduced in central Florida, and another reintroduced population summers in Wisconsin and migrates to the southeastern U.S. for the winter. Whooping Cranes breed, migrate, winter, and forage in a variety of habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields (USFWS, 2007). About 22,240 ac (9,000 ha) of salt flats on Aransas NWR and adjacent islands comprise the principal wintering grounds of the Whooping Crane. Aransas NWR is designated as critical habitat for the species (**Figure 2**). A species description is presented in MMS (2007b) and BOEM (2012b,d).

A large oil spill is the only IPF that could potentially affect Whooping Cranes due to the distance from Aransas NWR.

Impacts of a Large Oil Spill

A large oil spill has a low probability of affecting Whooping Cranes because the lease area is approximately 456 miles (734 km) from its critical habitat (Aransas NWR, Texas) and the likelihood of contact with the habitat is extremely low (BOEM, 2012b).

In the event of oil exposure, Whooping Cranes could become externally oiled while foraging in oiled areas or internally exposed to oil through ingestion of contaminated shellfish, frogs, and fishes. It is possible that some death of Whooping Cranes could occur. Shell has extensive resources available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the OSRP.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on Whooping Cranes are expected.

C.3.8 Gulf Sturgeon (Threatened)

The Gulf sturgeon (*Acipenser oxyrinchus desotoi*) is a threatened fish species that inhabits major rivers and inner shelf waters from the Mississippi River to the Suwannee River, Florida (Barkuloo, 1988; Wakeford, 2001). An anadromous fish that migrates from the sea upstream into coastal rivers to spawn in freshwater, it historically ranged from the Mississippi River to Charlotte Harbor, Florida (Wakeford, 2001). Today, 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). Critical habitat in the Gulf extends from Lake Borgne, Louisiana (St. Bernard Parish), to Suwannee Sound, Florida (Levy County) (NMFS, 2010d) (**Figure 2**). A species description is presented in MMS (2007b) and in the recovery plan for this species (USFWS and Gulf States Marine Fisheries Commission, 1995).

A large oil spill is the only IPF that could potentially affect Gulf sturgeon. There are no IPFs associated with routine project activities that could affect this species. A small fuel spill in the lease area would be unlikely to affect Gulf sturgeon, because a small fuel spill would not be expected to make landfall or reach coastal waters prior to breaking up (see explanation in **Section A.9.2**).

Impacts of a Large Oil Spill

Potential spill impacts on Gulf sturgeon are discussed in MMS (2007b), BOEM (2012b,d), and in NMFS (2007) in its Biological Opinion for the Five-Year Oil and Gas Leasing Program in the Central and Western Planning Areas of the Gulf of Mexico. For this EP, there are no unique site-specific issues with respect to this species.

The lease area is about 124 miles (199 km) from the nearest Gulf sturgeon critical habitat. OSRA modeling (**Table 3**) predicts that a spill in the lease area would have a 1% chance of contacting Gulf sturgeon critical habitat in coastal areas of Okaloosa County, Florida, within 30 days. In the event of oil reaching Gulf sturgeon habitat, the fish could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Based on the life history of this species, subadult and adult Gulf sturgeon would be most vulnerable to a marine oil spill, and would be vulnerable only during winter months (from September 1 through April 30) when this species is foraging in estuarine and marine habitats (NMFS, 2007).

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. Shell has extensive resources available to protect coastal and estuarine wildlife and habitats in the event of a spill reaching the shoreline, as detailed in the OSRP.

EP Section 9b provides detail on spill response measures. Therefore, no significant spill impacts on Gulf sturgeon are expected.

C.3.9 Beach Mice (Endangered)

Four subspecies of endangered beach mouse (*Peromyscus polionotus*) occur on the barrier islands of Alabama and the Florida Panhandle. They are the Alabama, Choctawhatchee, Perdido Key, and St. Andrew beach mouse. Critical habitat has been designated for all four subspecies; **Figure 2** shows the critical habitat combined for all four subspecies. Species descriptions are provided in MMS (2007b).

A large oil spill is the only IPF that could potentially affect subspecies of beach mouse. There are no IPFs associated with routine project activities that could affect these animals due to the distance from shore and the lack of onshore support activities near their habitat.

Impacts of a Large Oil Spill

Potential spill impacts on beach mice are discussed in MMS (2007b) and BOEM (2012b,d). For this EP, there are no unique site-specific issues with respect to these species.

The lease area is about 153 miles (247 km) from the nearest beach mouse critical habitat. OSRA modeling predicts that a spill in the lease area would have a 1% chance of contacting beach mouse critical habitat in Okaloosa County, Florida, within 30 days. In the event of oil contacting these beaches, beach mice could experience several types of direct and indirect impacts. Contact with spilled oil could cause skin and eye irritation and subsequent infection; matting of fur; irritation of sweat glands, ear tissues, and throat tissues; disruption of sight and hearing; asphyxiation from inhalation of fumes; and toxicity from ingestion of oil and contaminated food. Indirect impacts could include reduction of food supply, destruction of habitat, and fouling of nests. Impacts could also occur from vehicular traffic and other activities associated with spill cleanup.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on beach mice are expected.

C.4 Coastal and Marine Birds

C.4.1 Marine and Pelagic Birds

A variety of seabirds may occur in the pelagic environment of the project areas (Clapp et al., 1982a,b, 1983; Peake, 1996; Hess and Ribic, 2000). Seabirds spend much of their lives offshore over the open ocean, except during breeding season when they nest along the coast. 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. Hess and Ribic (2000) reported that terns, storm-petrels, shearwaters, and jaegers were the most frequently sighted seabirds in the deepwater area. From these surveys, four ecological categories of seabirds were documented in the deepwater areas of the Gulf: summer migrants (shearwaters, storm petrels, boobies); summer residents that breed in the Gulf (Sooty Tern, Least Tern, Sandwich Tern, Magnificent Frigatebird); winter residents (gannets, gulls, jaegers); and permanent resident species (Laughing Gull, Royal Tern, Bridled Tern) (Hess and Ribic, 2000).

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

Relationships with hydrographic features were found for several seabird species, possibly due to effects of hydrography on nutrient levels and productivity of surface waters where birds forage. GulfCet II did not estimate bird densities; however, Powers (1987) indicates that seabird densities over the open ocean typically are <10 birds/km^2.

Trans-Gulf migrant birds including shorebirds, wading birds, and terrestrial birds may also be present in the lease area. Migrant birds may use offshore structures and platforms for resting, feeding, or as temporary shelter from inclement weather (Russell, 2005). Some birds may be attracted to offshore structures because of the lights and the fish populations that aggregate around these structures.

IPFs that could potentially affect marine and pelagic birds include drilling rig presence, noise, and lights; support vessel and helicopter traffic; and two types of accidents – a small fuel spill and a large oil spill. Effluent discharges permitted under the NPDES general permit 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 2012-BSEE-G01 will minimize the potential for marine debris-related impacts on birds.

Impacts of Drilling Rig Presence, Noise, and Lights

Birds that frequent platforms may be exposed to contaminants including air pollutants and routine discharges, but significant impacts are unlikely due to rapid dispersion of effluents and air pollutants. Birds migrating over water have been known to strike offshore structures, resulting in death or injury (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 platform collisions appear to be similar. In some cases, migrants simply do not see a part of the platform until it is too late. In other cases, navigation may be disrupted by noise (Russell, 2005). On the other hand, offshore structures are suitable stopover habitats for most trans-Gulf migrant species, and most of the migrants that stop over on platforms probably benefit from their stay, particularly in spring (Russell, 2005).

A study in the North Sea indicated that platform 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 (Poot et al., 2008). The numbers varied greatly, from none at all to some tens of thousands of birds per night per platform, with an apparent effect radius of up to 3 miles (5 km).

The OSPAR workshop (OSPAR Commission, 2012) noted that the circling of migrating birds in the vicinity of offshore structures and facilities increases the risk of collisions, leading to traumas and deaths and may interrupt their migration. 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.

Overall, potential negative impacts to birds from drilling rig lighting, potential collisions, or other adverse effects are highly localized, relatively short term and temporary in nature, and may be expected to affect only individual birds during migration periods. Therefore, these potential impacts are not expected to affect birds at the population or species level and are not significant (BOEM, 2012b).

Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters are unlikely to significantly disturb pelagic birds in open, offshore waters. It is likely that individual birds would experience, at most, only short-term behavioral disruption, and the impact would not be significant.

Impacts of a Small Fuel Spill

Potential spill impacts on marine birds are discussed in MMS (2007b) and BOEM (2012b,d). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

The probability of a fuel spill will be minimized by Shell's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the potential for impacts on marine and pelagic birds. **EP Section 9b** provides detail on spill response measures. Given the open ocean location of the lease area and the short duration of a small spill, the potential exposure for pelagic marine birds would be brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.2** discusses the likely fate of a small fuel spill and indicates that more than 90% would be evaporated or dispersed naturally within 24 hours. 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.

Birds exposed to oil on the sea surface could experience direct physical and physiological effects including skin irritation; chemical burns of skin, eyes, and mucous membranes; and inhalation of VOCs. Because of 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 marine and pelagic birds would be expected.

Impacts of a Large Oil Spill

Potential spill impacts on marine and pelagic birds are discussed in MMS (2007b) and BOEM (2012b,d). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

Pelagic seabirds could be exposed to oil from a spill at the project area. Hess and Ribic (2000) reported that terns, storm-petrels, shearwaters, and jaegers were the most frequently sighted seabirds in the deepwater Gulf of Mexico (>656 ft [>200 m]). Powers (1987) indicates that seabird densities over the open ocean typically are <10 birds/km^2. The number of pelagic birds that could be affected in open, offshore waters would depend on the extent and persistence of the oil slick.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on marine and pelagic birds are expected.

C.4.2 Shorebirds and Coastal Nesting Birds

Threatened and endangered bird species (Piping Plover and Whooping Crane) have been discussed previously in **Section C.3**. 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 grounds and nesting habitats. Species that nest on beaches, flats, dunes, bars, barrier islands, and similar coastal and nearshore habitats include the Sandwich Tern, Wilson's Plover, Black Skimmer, Forster's Tern, Gull-Billed Tern, Laughing Gull, Least Tern, and Royal Tern (USFWS, 2010b). Additional information is presented in MMS (2007b) and BOEM (2012b).

The Brown Pelican (*Pelecanus occidentalis*) was delisted from federal endangered status in 2009 (USFWS, 2010c). However, this species remains listed as endangered by the State of Louisiana (State of Louisiana Department of Wildlife and Fisheries, 2013), is listed as a species of greatest conservation need by the State of Mississippi (Mississippi Department of Wildlife, Fisheries and Parks, 2005), and is designated as a species of special concern by the State of Florida (Florida Fish and Wildlife Conservation Commission, 2011). 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 over deep offshore waters (Fritts and Reynolds, 1981; Peake, 1996; Hess and Ribic, 2000). Nearly half the southeastern population of Brown Pelicans lives in the northern Gulf Coast, generally nesting on protected islands (USFWS, 2010b).

IPFs that could potentially affect shorebirds and coastal nesting birds include support vessel and helicopter traffic and a large oil spill. As explained in **Section A.9.2**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to breaking up. Compliance with NTL 2012-BSEE-G01 will 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 Boothville, Louisiana, where shorebirds and coastal nesting birds may be found. These activities could periodically disturb individuals or groups of birds within sensitive 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 individuals (Rodgers and Schwikert, 2002). The disturbances will be limited to flushing birds away from vessel pathways; known distances are from 65 to 160 ft (20 to 49 m) for personal watercraft and 75 to 190 ft (23 to 58 m) for outboard-powered boats (Rodgers and Schwikert, 2002). Flushing distances may be similar or less for the support vessels to be used for Shell's project, and some species such as gulls are attracted to boats. Support vessels will not approach nesting or breeding areas on the shoreline, so nesting birds, eggs, and chicks will not be disturbed. Vessel operators will use designated navigation channels and comply with posted speed and wake restrictions while transiting sensitive inland waterways. Due to the limited scope, timing, and geographic extent of drilling activities, any short-term impacts are not expected to be significant to coastal bird populations.

Aircraft traffic can cause some disturbance to birds onshore and offshore. Responses are highly dependent on the type of aircraft, the bird species, the activities that animals were previously engaged in, and previous exposures to overflights (Efroymson et al., 2000). Helicopters seem to cause the most intense responses over other human disturbances (Bélanger and Bédard, 1989). The Federal Aviation Administration recommends (Advisory Circular No. 91-36D) that pilots maintain a minimum altitude of 2,000 ft (610 m) when flying over noise-sensitive areas such as parks, forest, primitive areas, wilderness areas, national seashores, or national wildlife refuges, and maintain flight paths to reduce aircraft noise in these noise-sensitive areas. The minimum altitude 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 are not expected to be significant to bird populations or species in the project area.

Impacts of Large Oil Spill

The OSRA results summarized in **Table 3** predict that shorelines of Texas, Louisiana, and Florida that include habitat for shorebirds and coastal nesting birds could be affected by a large oil spill within 30 days.

Coastal birds can be exposed to oil as they float on the water surface, dive during foraging, or wade in oiled coastal waters. Oiled birds can lose the ability to fly, dive for food, or float on the water, which could lead to drowning (USFWS, 2010d). Oil interferes with the water repellency of feathers and can cause hypothermia in the right conditions. As birds groom themselves, they can ingest and inhale the oil on their bodies. Scavengers such as Bald Eagles and gulls can be exposed to oil by feeding on carcasses of contaminated fish and wildlife. While ingestion can kill animals immediately, more often it results in lung, liver, and kidney damage, which can eventually lead to death. Bird eggs may be damaged if an oiled adult sits on the nest.

Studies concerning the Macondo spill provide additional information regarding impacts on shorebirds and coastal nesting birds that may be affected in the event that a large oil spill reaches coastal habitats. Impacts to birds from the Macondo spill are being studied as part of the Natural Resource Damage Assessment, but results have not yet been released. Although the Macondo spill had direct and indirect impacts to coastal and marine birds, it is premature to conclude impacts over a long period (BOEM, 2012b).

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on shorebirds and coastal nesting birds are expected.

C.5 Fisheries Resources

C.5.1 Pelagic Communities and Ichthyoplankton

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

Most fishes inhabiting shelf or oceanic waters of the Gulf of Mexico have planktonic eggs and larvae (Ditty, 1986; Ditty et al., 1988; Richards et al., 1989, 1993). Pelagic eggs and larvae become part of the planktonic community for various lengths of time (10 to 100 days, depending on the species) (MMS, 2007b). A study by Ross et al. (2012) on mid-water 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 could potentially affect pelagic communities and ichthyoplankton include drilling rig presence, noise, and lights; effluent discharges; water intakes; and two types of accidents – a small fuel spill and a large oil spill.

Impacts of Drilling Rig Presence, Noise, and Lights

The drilling rig, as a floating structure in the deepwater environment, will act as a fish-attracting 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 et al., 1990; Higashi, 1994; Relini et al., 1994). This FAD effect could possibly enhance the feeding of epipelagic predators by attracting and concentrating smaller fish species. Because the drilling rig is a single, temporary structure, impacts on fish populations, whether beneficial or adverse, are considered minor.

Impacts of Effluent Discharges

Discharges of treated SBM cuttings will produce temporary, localized increases in suspended solids in the water column around the drilling rig. In general, turbid water can be expected to extend between a few hundred meters and several kilometers down current from the discharge point (NRC, 1983; Neff, 1987). NPDES permit limits and requirements will be met.

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 will 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 will be diluted rapidly to undetectable levels within tens to hundreds of meters from the source. Minimal impacts on water quality, plankton, and nekton are anticipated.

Other discharges in accordance with the NPDES permit, such as desalination unit brine and uncontaminated cooling water, fire water, and ballast water, are expected to be diluted rapidly and have little or no impact on water column biota.

Impacts of Water Intakes

Seawater will be drawn from several meters below the ocean surface for various services including firewater and once-through non-contact cooling of machinery on the drilling rig (**EP Table 7a**). 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 current general NPDES Permit No. GMG 290000 specifies requirements for new facilities for which construction commenced after July 17, 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. As discussed previously, since the drilling vessel selected for this project will meet the described requirements for new facilities, the vessel's water intakes are expected to be in compliance with the design, monitoring, and recordkeeping requirements of the NPDES permit.

Because of the limited scope and short duration of drilling activities and compliance with the NPDES permit to minimize adverse environmental impact from impingement and entrainment of aquatic organisms, any short-term impacts of entrainment are not expected to be biologically significant to plankton or ichthyoplankton populations.

Impacts of a Small Fuel Spill

Potential spill impacts on fisheries resources are discussed in MMS (2007b) and BOEM (2012a,b,d). For this EP, there are no unique site-specific issues with respect to spill impacts.

The probability of a fuel spill will be minimized by Shell's preventative measures during routine operations including fuel transfer. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the potential for impacts on pelagic communities, including ichthyoplankton. **EP Section 9b** provides detail on spill response measures. Given the open ocean location of the lease area, the duration of a small spill and opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.2** discusses the likely fate of a small fuel spill and indicates that more than 90% would be evaporated or dispersed naturally within 24 hours. 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.

A small fuel spill could have localized impacts on phytoplankton, zooplankton, ichthyoplankton, 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.

Impacts of a Large Oil Spill

Potential spill impacts on pelagic communities and ichthyoplankton are discussed in BOEM (2012a,b,d). For this EP, there are no unique site-specific issues.

A large oil spill could affect water column biota including phytoplankton, zooplankton, ichthyoplankton, and nekton. A large spill that persisted for weeks or months would be more likely to affect these communities. While adult and juvenile fishes may actively avoid a large spill, planktonic eggs and larvae would be unable to avoid contact. Eggs and larvae of fishes in the upper layers of the water column are especially vulnerable to oiling; certain toxic fractions of spilled oil may be lethal to these life stages. Impacts would be potentially greater if local scale currents retained planktonic larval assemblages (and the floating oil slick) within the same water mass.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on pelagic communities and ichthyoplankton are expected.

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, stone crab, 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 600 ft (183 m). 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, the nearest of which is located 48 miles (77 km) north-northwest of the lease area.

EFH has been identified in the deepwater Gulf of Mexico for highly migratory pelagic fishes, which occur as transients in the lease area. Species in this group, including tunas, swordfishes, billfishes, and sharks, are managed by NMFS. Highly migratory species with EFH at or near the lease area include the following (NMFS, 2009b):

- Atlantic bigeye tuna (adults, juveniles)
- Atlantic bluefin tuna (spawning, eggs, larvae, adults)
- Atlantic sailfish (adults
- Atlantic skipjack tuna (spawning, adults)
- Atlantic swordfish (larvae, juveniles, adults)
- Atlantic yellowfin tuna (spawning, juveniles, adults)
- Bigeye thresher shark (all)
- Common thresher shark (all) Longbill spearfish (adults, juveniles)
- Longfin mako shark (all)
- Oceanic whitetip shark (all)
- Silky shark (all)
- White marlin (juveniles, adults)

Research indicates the central and western Gulf of Mexico may be important spawning habitat for Atlantic bluefin tuna, and NMFS (2009b) has designated a Habitat Area of Particular Concern (HAPC) for this species. The HAPC covers much of the deepwater Gulf of Mexico, including the lease area (**Figure 2**). The areal extent of the HAPC is approximately 15,000 mi^2 (300,000 km^2). The prevailing assumption is that Atlantic bluefin tuna follow an annual cycle of foraging in June through March off the eastern United States and Canadian coasts, followed by migration to the Gulf of Mexico to spawn in April, May, and June (NMFS, 2009b).

Other HAPCs have been identified in the Gulf of Mexico 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 (**Figure 2**). The nearest of these is Jakkula Bank, located 158 miles (254 km) west of the lease area.

Routine IPFs that could potentially affect EFH and fisheries resources include drilling rig presence, noise, and lights; effluent discharges; and water intakes. In addition, two types of accidents – a small fuel spill and a large oil spill may potentially affect EFH and fisheries resources.

Impacts of Drilling Rig Presence, Noise, and Lights

The drilling rig, as a floating structure in the deepwater environment, will act as an FAD. In oceanic waters, the FAD effect would be most pronounced for epipelagic fishes such as tunas, dolphin, billfishes, and jacks, which are commonly attracted to fixed and drifting surface structures (Holland et al., 1990; Higashi, 1994; Relini et al., 1994). This FAD effect would possibly enhance feeding of epipelagic predators by attracting and concentrating smaller fish species. Any impacts on EFH for highly migratory pelagic fishes are considered minor.

Impacts of Effluent Discharges

Other effluent discharges affecting EFH by diminishing ambient water quality include drilling mud and cuttings, treated sanitary and domestic wastes, deck drainage, and miscellaneous discharges such as desalination unit brine and uncontaminated cooling water, fire water, and ballast water. Impacts on EFH from effluent discharges are anticipated to be similar to those described in **Section C.5.1** for pelagic communities. No significant impacts on EFH for highly migratory pelagic fishes are expected from these discharges.

Impacts of Water Intakes

As noted previously, cooling water intake will cause entrainment and impingement of plankton, including fish eggs and larvae (ichthyoplankton). Due to the limited scope, timing, and geographic extent of drilling activities, any short-term impacts on EFH for highly migratory pelagic fishes are not expected to be biologically significant.

Impacts of a Small Fuel Spill

Potential spill impacts on EFH are discussed in MMS (2007b) and BOEM (2012a,b,d). For this EP, there are no unique site-specific issues with respect to spill impacts.

The probability of a fuel spill will be minimized by Shell's preventative measures during routine operations including fuel transfer. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the potential for impacts on EFH. **EP Section 9b** provides detail on spill response measures. Given the open ocean location of the lease area, the duration of a small spill and opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.2** discusses the likely fate of a small fuel spill and indicates that more than 90% would be evaporated or dispersed naturally within 24 hours. 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.

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 lease area. A spill would also produce short-term impact on water quality in the HAPC for spawning Atlantic bluefin tuna, which covers much of the deepwater Gulf of Mexico. The affected area would represent a negligible portion of the HAPC, which covers 114,793 mi^2 (297,312 km^2) of the Gulf of Mexico. Therefore, no significant spill impacts on EFH for highly migratory pelagic fishes are expected.

A small fuel spill would not affect EFH for corals and coral reefs; the nearest coral EFH is located 48 miles (77 km) north-northwest of the lease area. A small fuel spill would float and dissipate on the sea surface and would not contact these features. Therefore, no significant spill impacts on EFH for corals and coral reefs are expected.

Impacts of a Large Oil Spill

Potential spill impacts on EFH are discussed in MMS (2007b) and BOEM (2012a,b,d). For this EP, there are no unique site-specific issues with respect to EFH.

An oil spill in offshore waters would temporarily increase hydrocarbon concentrations on the water surface and potentially the subsurface as well. Given the extent of EFH designations in the Gulf of Mexico (GMFMC, 2005; NMFS, 2009b), some impact on EFH would be unavoidable.

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

The lease area is within the HAPC for spawning Atlantic bluefin tuna (NMFS, 2009b). A large spill could temporarily degrade the HAPC due to increased hydrocarbon concentrations in the water column, with the potential for lethal or sublethal impacts on spawning tuna and their offspring. Potential impacts would depend in part on the timing of a spill, as this species migrates to the Gulf of Mexico to spawn in April, May, and June (NMFS, 2009b).

The nearest feature designated as EFH for corals is located 48 miles (77 km) north-northwest of the lease area. An accidental spill would be unlikely to reach or affect this feature. Near-bottom currents in the region are expected to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume up onto the continental shelf edge.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on EFH are expected.

C.6 Archaeological Resources

C.6.1 Shipwreck Sites

MC 812 is on the list of archaeological survey blocks determined to have a high potential for containing archaeological properties. (BOEM, 2012c). A geologic, stratigraphic, and archaeological assessment detected no marine avoidance targets within 2,000 ft (610 m) of the proposed wellsites (Fugro, 2012; GEMS, 2013a,b).

Because there are no historic shipwreck sites in the lease area (see **EP Section 6**), there are no routine IPFs that are likely to affect these resources. A small fuel spill would not affect shipwrecks in adjoining blocks because the oil would float and dissipate on the sea surface. The impact of a large oil spill that could contact shipwrecks in other areas is considered below a level of concern.

Impacts of a Large Oil Spill

There are no known historic shipwrecks in the lease area and a large oil spill would not result in any impact on archaeological resources. A spill entering shallow coastal waters could conceivably contaminate an undiscovered or known historic shipwreck site. The OSRA modeling summarized in **Table 3** predicts that Texas, Louisiana, and Florida shorelines could be contacted by a spill within 30 days.

Previous analyses (MMS, 2007a, 2008) concluded that oil spills would be unlikely to affect archaeological sites beyond the immediate vicinity of the wellhead (i.e., due to physical impacts of a blowout) because the oil would rise quickly to the sea surface directly over the spill location. However, during the Macondo spill, subsurface plumes were reported at a water depth of about 3,600 ft (1,100 m), extending at least 22 miles (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010). The subsurface plumes apparently resulted from the use of dispersants at the wellhead (Joint Analysis Group, 2010c). While the behavior and impacts of subsurface plumes are not well known, a subsurface plume could contact shipwreck sites beyond the 984-ft (300-m) radius estimated by MMS (2007a, 2008), depending on its extent, trajectory, and persistence.

BOEM (2012b) reexamined the analyses for archaeological resources presented in MMS (2007a, 2008) based on additional information available since the publication of these two documents and in consideration of the Macondo oil spill. Substantial new information that alters the initial impact conclusion for archaeological resources has come to light as a result of BOEM-sponsored studies and industry surveys. Specifically, evidence of damage to significant cultural resources (i.e., historic shipwrecks) has been shown to have occurred because of an incomplete knowledge of seafloor conditions in lease areas >200 m (>656 ft) deep that have been exempted from high-resolution surveys. Since significant historic shipwrecks recently have been discovered outside the previously designated high-probability areas (some of which show evidence of impacts from permitted activities prior to their discovery), a survey is now required for exploration and development projects.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on historic shipwrecks are expected. Also as noted by MMS (2007b), should an oil spill contact a coastal historic site, such as a fort or a lighthouse, the major impact would be a temporary, reversible visual impact from oil contact and contamination of the site and its environment. However, more recent studies suggest that the impacts could be longer term and not easily reversible (BOEM, 2012b,d).

C.6.2 Prehistoric Archaeological Sites

With water depths ranging from approximately 4,459 to 4,479 ft (1,359 to 1,365 m), the wellsites are well beyond the 60-m (197-ft) depth contour used by the BOEM as the seaward extent for prehistoric archaeological site potential in the Gulf of Mexico. A geologic, stratigraphic, and archaeological assessment detected no marine avoidance targets within 2,000 ft (610 m) of the proposed wellsites (Fugro, 2012; GEMS, 2013a,b). Because prehistoric archaeological sites are not found in the lease area, the only relevant IPF is a large oil spill that would reach coastal waters within the 60-m (197-ft) depth contour.

Impacts of a Large Oil Spill

Because prehistoric archaeological sites are not found in the lease area, they would not be affected by the physical effects of a subsea blowout. MMS (2007b) estimates that a severe subsurface blowout could resuspend and disperse sediments within a 984-ft (300-m) radius.

Along the northern Gulf Coast, prehistoric sites occur frequently along the barrier islands and mainland coast and along the margins of bays and bayous (MMS, 2007b). The OSRA modeling summarized in **Table 3** predicts that Texas, Louisiana, and Florida shorelines could be contacted by a spill within 30 days. A spill reaching a prehistoric site along these shorelines 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). BOEM (2012b) notes that some unavoidable direct and indirect impacts on coastal historic resources could occur, resulting in the loss of information.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on archaeological resources are expected.

C.7 Coastal Habitats and Protected Areas

Coastal habitats in the northern Gulf of Mexico that may be affected by oil and gas activities are described in previous EISs (MMS, 2007b; BOEM, 2012a,b,d) and in a literature review by Collard and Way (1997). Sensitive coastal habitats are also tabulated in the OSRP. Coastal habitats inshore of the project area include barrier beaches and dunes, wetlands, and submerged seagrass beds. Generally, most of the northern Gulf is fringed by barrier beaches, with wetlands and/or submerged seagrass beds occurring in sheltered areas behind the barrier islands and in estuaries.

Due to the distance from shore, there are no IPFs associated with routine activities occurring in the lease area that are likely to affect beaches and dunes, wetlands, seagrass beds, coastal wildlife refuges, wilderness areas, or any other managed or protected coastal area. The support bases at Port Fourchon and Boothville, Louisiana, are not located in a wildlife refuge or a wilderness area. Potential impacts of support vessel traffic are briefly addressed in this section.

A small fuel spill in the lease area would be unlikely to affect coastal habitats, because it would not be expected to make landfall or reach coastal waters prior to breaking up (see explanation in **Section A.9.2**).

Impacts of Support Vessel Traffic

For OCS activities in general, support operations, including the crew boat and supply boats, may have a minor incremental impact on coastal habitats. Over time with a large number of vessel trips, vessel wakes can erode shorelines along inlets, channels, and harbors. Support operations, including the crew boat and supply boats as detailed in **EP Section 14**, may have a minor incremental impact on coastal habitats or protected areas. Impacts will be minimized by following the speed and wake restrictions in harbors and channels.

Impacts of a Large Oil Spill

Potential spill impacts on coastal habitats are discussed in MMS (2007b) and BOEM (2012a,b,d). Coastal habitats inshore of the project area include barrier beaches and dunes, wetlands, and submerged seagrass beds. For this EP, there are no unique site-specific issues with respect to coastal habitats.

The OSRA results summarized in **Table 3** predict that shorelines of Texas, Louisiana, and Florida could be affected within 30 days. Nearshore waters and embayments of Plaquemines Parish, Cameron Parish, Terrebonne Parish, and Lafourche Parish, Louisiana, have the highest probability on contact within 30 days. After 30 days, 11 counties or parishes may be contacted from Texas to Florida.

The shorelines within the geographic range predicted by the OSRA modeling include extensive barrier beaches and wetlands, 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 the lease sale EISs (MMS, 2007b; BOEM, 2012b) and Shell's OSRP. Coastal wildlife refuges, wilderness areas, and state and national parks within the geographic range of the potential shoreline contacts after 30 days include the following:

- Anahuac NWR
- Apalachicola Bay Aquatic Preserve Outstanding Florida Water
- Apalachicola National Estuarine Research Reserve
- Apalachicola River and Bay SWIM Area
- Apalachicola River Wildlife and Environmental Area
- Apffel Park
- Aransas NWR
- Atchafalaya Delta WMA
- Atkinson Island WMA
- Atkinson Island WMA
- Bayou Portage Coastal Preserve
- Bayou Sauvage NWR
- Bayou Teche NWR
- Bellefontaine Point Coastal Reserve
- Big Boggy NWR
- Big Branch Marsh NWR
- Big Lagoon State Recreation Area
- Biloxi Marshes Coastal Preserve
- Biloxi River Coastal Reserve
- Biloxi WMA
- Bon Secour NWR
- Brazoria NWR
- Breton NWR
- Buccaneer State Park
- Cameron Prairie NWR
- Candy Abshier WMA
- Choctawatchee Bay SWIM Area
- Christmas Bay Coastal Preserve
- Christmas Bay State Park
- Cypremort Point State Park
- Davis Bayou Coastal Preserve
- Deer Island Coastal Preserve
- Deer Lake State Park
- Delta NWR
- Fort Pickens State Park Aquatic Preserve
- Ft. Anahuac Park
- Galveston Island State Park
- Goose Island State Park
- Grand Bay National Estuarine Research Reserve
- Grand Bay NWR
- Grand Bay NWR
- Grand Bay Savannah Coastal Preserve
- Grand Bayou Coastal Preserve
- Grand Isle State Park
- Grayton Beach State Park Outstanding Florida Water
- Guadalupe Delta Wildlife Management Area (WMA)
- Gulf Islands National Seashore
- Gulf State Park

- Hanock County Marsh Coastal Reserve
- Henderson State Park
- Isla Blanca Park
- Isles Dernieres Barrier Islands Refuge
- J.D. Murphree WMA
- Jean Lafitte National Historical Park and Preserve
- Jourdan River Coastal Reserve
- LaCassine NWR
- Lafitte Woods NA
- Laguna Madre Estuarine And Coastal Marine Area
- Lake Corpus Christi State Park
- Lillian Swamp Mitigation Area
- Little Pecan Island Preserve
- Lower Neches WMA
- Mad Island WMA
- Mandalay NWR
- Marsh Island WMA
- Matagorda Island State Park
- McFaddin NWR
- Meaher State Park
- Mission-Aransas National Estuarine Research Reserve
- Mississippi Sandhill Crane NWR
- Mustang Island State Park
- Old Fort Bayou Coastal Reserve
- Old Fort Travis Park
- Padre Island National Seashore
- Pascagoula River Coastal Reserve
- Pass Au Loutre WMA
- Paul J. Rainey WMA
- Peach Point WMA
- Pearl River NWR
- Penalver State Park
- Pensacola Bay SWIM Area
- Perdido Key State Recreation Area
- Peveto Woods Sanctuary
- Point Au Chein WMA
- Point Washington Outstanding Florida Water
- Port Aransas Park
- Rockefeller State Wildlife Refuge and Game Preserve
- Sabine NWR
- Salvador WMA
- San Bernard NWR
- Sea Rim State Park
- Seawolf Park
- Shell Keys NWR
- St. Andrew Bay Watershed SWIM Area
- St. Andrews Bay Surface Water Improvement and Management (SWIM) Area
- St. Andrews State Park

- St. Andrews State Park Aquatic Preserve
- St. George Island State Park
- St. Joseph Bay State Buffer Preserve
- St. Joseph Peninsula State Park
- St. Vincent NWR
- Tarklin Bayou State Preserve
- Texas Point NWR
- The Grand Bay Savanna Tract
- W.L. Holland WMA
- Weeks Bay National Estuarine Research Reserve
- Welder Flats Coastal Preserve
- Winser WMA
- Wolf River Coastal Reserve
- Yellow River WMA

The OSRA results in **Table 3** include only shoreline segments with contact probabilities greater than 0.5% within 30 days; other coastal areas could be affected at lower contact probabilities within 30 days, or from a spill persisting for more than 30 days. Additional NWRs and managed wildlife areas occur along the Gulf Coast. These areas include habitats such as barrier beach and dune systems, wetlands, and submerged seagrass beds that support diverse wildlife, including endangered or threatened species.

The level of impacts from oil spills on coastal habitats depends on many factors, including the oil characteristics, the geographic location of the landfall, and the weather and oceanographic conditions at the time (MMS, 2007b). Oil that makes it to beaches may be either liquid weathered oil, an oil-and-water mousse, or tarballs (MMS, 2007b). Oil is generally deposited on beaches in lines defined by wave action at the time of landfall. Oil that remains on the beach will thicken as its volatile components are lost. Thickened oil may form tarballs or aggregations that incorporate sand, shell, and other materials into its mass. Tar may be buried to varying depths under the sand. On warm days, both exposed and buried tarballs may liquefy and ooze. Oozing may also serve to expand the size of a mass as it incorporates beach materials. Oil on beaches may be cleaned up manually, mechanically, or both. Some oil can remain on the beach at varying depths and may persist for several years as it slowly biodegrades and volatilizes.

Coastal wetlands are highly sensitive to oiling and can be significantly impacted because of the inherent toxicity of hydrocarbon and non-hydrocarbon components of the spilled substances (Mendelssohn, 2012). The MMS (2007b) predicted that for every 50 bbl of oil contacting wetlands, approximately 6.7 ac (2.7 ha) of wetland vegetation will experience dieback. Thirty percent of these damaged wetlands are assumed to recover within 4 years, and 85% within 10 years. About 15% of the contacted wetlands are expected to be converted permanently to open-water habitat. The critical concentration of oil is that concentration above which impacts to wetlands will be long term and recovery will take longer than two growing seasons, and which causes plant mortality and some permanent wetland loss. Critical concentrations of various oils are expected to vary broadly for wetland types and wetland plant species. Louisiana wetlands are assumed to be more sensitive to oil contact than elsewhere in the Gulf because of high cumulative stress (MMS, 2007b). In addition to the direct impacts of oil, cleanup activities in marshes may accelerate rates of erosion and retard recovery rates (MMS, 2007b).

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section**

2j. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on coastal habitats are expected.

C.8 Socioeconomic and Other Resources

C.8.1 Recreational and Commercial Fishing

BOEM has reexamined the analysis for recreational and commercial fishing presented in MMS (2007b, 2008) based on additional information and in consideration of the Macondo spill. No new information was found that would alter the potential impacts on commercial fishing (BOEMRE, 2011; BOEM, 2012c). 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, Inc., 2002). Pelagic longlining has occurred historically in the project area, primarily during spring and summer.

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 820 to 1,804 ft (250 to 550 m). Tilefishes (primarily *Lophalotilus chamaeleonticeps*) are caught by bottom longlining in water depths from about 540 to 1,476 ft (165 to 450 m) (Continental Shelf Associates, Inc., 2002). The proposed project is in 4,637 to 4,722 ft (1,413 to 1,439 m) of water. No conflict with commercial fishing activity other than longlining is expected to occur.

Most recreational fishing activity in the region occurs in water depths less than 656 ft (200 m) (Continental Shelf Associates, Inc., 1997, 2002). In deeper water, the main attraction to recreational fishers would be petroleum platforms in offshore waters of Texas and Louisiana. The proposed project is 56 miles (95 km) from the nearest shoreline. Due to the distance from shore, it is unlikely that any recreational fishing activity is occurring in the project area.

The only routine IPF that could potentially affect fisheries is drilling rig presence (including noise and lights). Two types of potential accidents are also addressed in this section – a small fuel spill and a large oil spill.

Impacts of Drilling Rig Presence

There is a slight possibility of pelagic longlines becoming entangled in the drilling rig. For example, in January 1999 a portion of a pelagic longline snagged on the acoustic Doppler current profiler of a drillship working in the Gulf of Mexico (Continental Shelf Associates, Inc., 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.

No adverse impacts on fishing activities 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 will be minimized by Shell's preventative measures during routine operations including fuel transfer. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the potential for impacts. **EP Section 9b** provides detail on spill response measures. Given the open ocean location of the lease area, the duration of a small spill and opportunity for impacts to occur would be very brief.

Pelagic longlining activities in the lease area, if any, could be interrupted in the event of a small fuel spill. 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. Fishing activities could be interrupted due to the activities of response vessels operating in the lease area. A small fuel spill would not affect coastal water quality because the spill would not be expected to make landfall or reach coastal waters prior to breaking up (see **Section A.9.2**).

Impacts of a Large Oil Spill

Potential spill impacts on fishing activities are discussed in MMS (2007b) and BOEM (2012b,d). For this EP, there are no unique site-specific issues with respect to this activity.

Pelagic longlining activities in the lease area and other fishing activities in the northern Gulf of Mexico could be interrupted in the event of a large oil spill. A spill may or may not result in fishery closures, depending on the duration of the spill, the oceanographic and meteorological conditions at the time, and the effectiveness of spill response measures. A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on fishing activities are expected.

C.8.2 Public Health and Safety

There are no IPFs associated with routine operations that are expected to affect public health and safety. Impacts of a small fuel spill and a large oil spill are addressed in this section.

Impacts of a Small Fuel Spill

The probability of a fuel spill will be minimized by Shell's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the potential for impacts. **EP Section 9b** provides detail on spill response measures.

A small fuel spill would not have impacts on public health and safety because it would likely affect only a small area of the open ocean 56 miles (95 km) from the nearest shoreline and nearly all of the diesel fuel would evaporate or disperse naturally within 24 hours. Response crews would be equipped with appropriate safety equipment to avoid injury and health effects. A small fuel spill would not be expected to make landfall or reach coastal waters prior to breaking up (**see Section A.9.2**).

Impacts of a Large Oil Spill

In the event of a large spill from a blowout, the main safety and health concerns are those of the offshore personnel involved in the incident and those responding to the spill. The proposed activities will be covered by the OSRP, and, in addition, the drilling rig maintains a Shipboard Oil Pollution Emergency Plan as required under MARPOL 73/78.

Depending on the spill rate and duration, the physical/chemical characteristics of the oil, the meteorological and oceanographic conditions at the time, and the effectiveness of spill response measures, the public could be exposed to oil on the water and along the shoreline, through skin contact or inhalation of VOCs. Crude oil is a highly flammable material, and any smoke or vapors from a crude oil fire can cause irritation. Exposure to large quantities of crude oil may pose a health hazard.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on public health and safety are expected.

C.8.3 Employment and Infrastructure

There are no IPFs associated with routine operations that are expected to affect employment and infrastructure. The project involves drilling with support from existing shore-based 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 small fuel spill and a large oil spill are addressed in this section.

Impacts of a Small Fuel Spill

The probability of a fuel spill will be minimized by Shell's preventative measures during routine operations including fuel transfer. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the potential for impacts. **EP Section** and **9b** provides detail on spill response measures. Given the open ocean location of the lease area and the duration of a small spill, the opportunity for impacts to occur would be very brief.

A small fuel spill that is dissipated within a few days would have little or no economic impact, as the spill response would use existing facilities, resources, and personnel.

Impacts of a Large Oil Spill

Potential socioeconomic impacts of an oil spill are discussed MMS (2007b) and BOEM (2012b,d). For this EP, there are no unique site-specific issues with respect to employment and coastal infrastructure. A large spill could cause several types of economic impacts: extensive fishery closures could put fishermen out of work; temporary employment could increase as part of the response effort; adverse publicity could reduce employment in coastal recreation and tourism industries; and OCS drilling activities, including service and support operations that are an important part of local economies, could be suspended.

The lease area is 56 miles (95 km) from the nearest shoreline. Based on the OSRA modeling predictions (**Table 3**), Texas, Louisiana, and Florida coastal areas are the most likely to be contacted by a spill.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on employment and infrastructure are expected.

C.8.4 Recreation and Tourism

BOEM has reexamined the analyses for recreation and tourism presented in MMS (2007b, 2008) based on additional information and in consideration of the Macondo oil spill event. No new information was found that would alter the potential impacts on recreation and tourism (BOEMRE, 2011; BOEM, 2012c).

There are no known recreational uses of the lease area. Recreational resources and tourism in coastal areas would not be affected by routine activities due to the distance from shore. Compliance with NTL 2012-BSEE-G01 will minimize the chance of trash or debris being lost overboard from the drilling rig and subsequently washing up on beaches.

Impacts of a Small Fuel Spill

The probability of a fuel spill will be minimized by Shell's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the potential for impacts. **EP Section 9b** provides detail on spill response measures. Given the open ocean location of the lease area, the duration of a small spill and opportunity for impacts to occur would be very brief.

A small fuel spill in the lease area would be unlikely to affect recreation and tourism. There are no known recreational or tourism activities occurring in the lease area, and as explained in **Section A.9.2**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to breaking up.

Impacts of a Large Oil Spill

Potential impacts of an oil spill on recreation and tourism are discussed in MMS (2007b) and BOEM (2012a,b,d). For this EP, there are no unique site-specific issues with respect to these impacts.

Impacts on recreation and tourism would vary depending on the duration of the spill and its fate including the effectiveness of response measures. A large spill that reached coastal waters and shorelines could adversely affect recreation and tourism by contaminating beaches and wetlands, resulting in negative publicity that encourages people to stay away. The OSRA results summarized in **Table 3** predict that shorelines of Texas, Louisiana, and Florida could be affected within 30 days. Nearshore waters and embayments of Plaquemines Parish, Cameron Parish, Terrebonne Parish, and Lafourche Parish, Louisiana, have the highest probability of contact within 30 days. The shorelines along Galveston, Texas, which include popular beaches and recreational sites, could be affected.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on recreation and tourism are expected.

C.8.5 Land Use

Land use along the northern Gulf Coast is discussed in MMS (2007b) and BOEM (2012b,d). There are no routine IPFs potentially affecting 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 new construction or changes to existing land use and, therefore, will not have any impacts. Levels of boat and helicopter traffic, as well as demand for goods and services including scarce coastal resources, will represent a small fraction of the level of activity occurring at the shorebases.

A large oil spill is the only relevant accident IPF. A small fuel spill would not have impacts on land use, as the response would be staged out of existing shorebases and facilities.

Impacts of a Large Oil Spill

The initial response for a large oil spill would be staged out of existing facilities, with no effect on land use. A large spill could have limited temporary impacts on land use along the coast if additional staging areas were needed. For example, during the Macondo spill, 25 temporary staging areas were established in Louisiana, Mississippi, Alabama, and Florida for spill response and cleanup efforts (BOEM, 2012b). In the event of a large spill in the lease area, similar temporary staging areas could be needed. These areas would eventually return to their original use as the response is demobilized.

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on land use are expected.

C.8.6 Other Marine Uses

The lease area is not located within any USCG-designated fairway or shipping lane. MC 812 is not in a designated Military Warning Area, and there are no flowlines or umbilicals in the vicinity of the proposed wellsites (Fugro, 2012; GEMS, 2013a,b. Shell will comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft.

Shell's procedure "Waste Barrel Avoidance and Release Response in the Mississippi Canyon Area," which has been previously approved by MMS and BOEM, applies to operations that could cause a disturbance of a seafloor barrel. Shell's overarching policy is to avoid barrel contact. In the unlikely case that contact is suspected or has been made with any wastes from a barrel, the plan specifies actions to be taken for the topside safety of personnel handling the equipment. The plan also outlines barrel impact reporting procedures.

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

Impacts of a Large Oil Spill

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

A blowout resulting in a large oil spill is an extremely rare event, and the probability of such an event will be minimized by Shell's well control and blowout prevention measures as detailed in **EP Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **EP Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on other marine uses are expected.

C.9 Cumulative Impacts

For purposes of NEPA, 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. Prior to the lease sales, MMS prepared a multisale EIS in which it analyzed the environmental impact of activities that might occur in the multi-lease-sale area. The MMS also recently analyzed the cumulative impacts of OCS development activities similar to those planned in this EP in several documents. The level and types of activities planned in Shell's EP are within the range of activities described and evaluated in the Final EIS for Gulf of Mexico OCS Oil and Gas Lease Sales 2007-2012: Western Planning Area Sales 204, 207, 210, 215, and 218, and Central Planning Area Sales 205, 206, 208, 213, 216, and 222 (MMS, 2007b), as updated by a 2012 Final Supplemental EIS for Gulf of Mexico OCS Oil and Gas Lease Sales 2012-2017: Western Planning Area Lease Sales 229, 233, 246, and 248 and Central Planning Area Lease Sales 227, 231, 235, 241 and 247 (BOEM, 2012b). Past, present, and reasonably foreseeable activities were identified in the cumulative effects scenario of these documents, which are incorporated by reference. The proposed action will not result in any additional impacts beyond those evaluated in the Multisale and Final EISs (MMS, 2007b; BOEM, 2012b).

Description of Activities Reasonably Expected to Occur in the Vicinity of Project Area. Other exploration and development activities may occur in the vicinity of lease block MC 812. Shell does not anticipate other projects in the vicinity of the project area beyond the types of projects analyzed in the Multisale and Supplemental EISs (MMS, 2007b, 2008; BOEMRE, 2011; BOEM, 2012b).

Cumulative Impacts of Activities in the EP. The MMS (2007b) multi-lease-sale EIS and BOEM (2012b) Final EIS included a lengthy discussion of cumulative impacts, which analyzed the environmental and socioeconomic impacts from the incremental impact of the 11 proposed lease sales, in addition to all activities (including non-OCS activities) projected to occur from past, proposed, and future lease sales during the 40-year period of 2007 to 2046 (see MMS, 2007b; BOEM, 2012b). The EISs considered exploration, delineation, and development wells; platform installation; service-vessel trips; and oil spills. The EISs examined the potential cumulative effects on each specific resource for the entire Gulf of Mexico.

The level and type of activity proposed in Shell's EP are within the range of activities described and evaluated in the recent multi-lease-sale EISs. This EIA incorporates and builds on these analyses by examining the potential impacts on physical, biological, and socioeconomic resources from the work planned in this EP, in conjunction with the other reasonably foreseeable activities expected to occur in the Gulf of Mexico. Thus, for all impacts, the incremental contribution of Shell's proposed actions to the cumulative impacts analysis in these prior analyses is not significant.

C.9.1 Cumulative Impacts to Physical/Chemical Resources

The work planned in this EP is limited in geographic scope and duration, and the impacts on the physical/chemical environment will be correspondingly limited.

Air Quality. Emissions from pollutants into the atmosphere from activities are not projected to have significant effects on onshore air quality because of the prevailing atmospheric conditions, emission rates and heights, and resulting pollutant concentrations. As the BOEM found in the multi-lease-sale EISs, the incremental contribution of activities similar to Shell's proposed activities to the cumulative impacts is not significant and will not cause or contribute to a violation of NAAQS (MMS, 2007b; BOEM, 2012b,d). In addition, the cumulative contribution to visibility impairment is also very small (MMS, 2007b; BOEM, 2012b,d). As mentioned in previous sections, projected emissions meet the BOEM exemption criteria and would not contribute to cumulative impacts on air quality.

Climate Change. CO_2 and CH_4 emissions from the project would constitute a negligible contribution to greenhouse gas emissions from all OCS activities. According to BOEM (2012b), estimated CO_2 emissions from OCS oil and gas sources are 0.4% of the U.S. total and all OCS activities are about

0.005% of the total global CO_2 emissions . 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, 2007). In the Gulf of Mexico, sea level rise is an important issue due to the ongoing losses in coastal wetlands, particularly in coastal Louisiana. Greenhouse gas emissions from the EP represent a negligible contribution to the total greenhouse gas emissions from reasonably foreseeable activities in the Gulf of Mexico area and would not significantly alter any of the climate change impacts evaluated in the previous EISs. Globally, Shell is working to reduce greenhouse gas emissions by increasing the efficiency of its operations, establishing a substantial capability in CO_2 capture and storage, and continuing to research and develop technologies that increase efficiency and reduce emissions in hydrocarbon production. In 2010, Shell met a voluntary target set in 1998 for direct greenhouse gas emissions from its facilities to be at least 5% lower than the comparable 1990 level (Shell, 2011).

Water Quality. Shell's project will result in some minor water quality impacts due to the NPDES-permitted discharge of SBM cuttings, treated sanitary and domestic wastes, excess cement, non-contact cooling water, deck drainage, desalination unit brine, uncontaminated fire water and ballast water. These effects are expected to be minor (localized to the area within a few hundred meters of the drilling rig), and temporary (lasting only hours longer than the disturbance or discharge). Any cumulative effects to water quality are expected to be negligible.

Archaeological Resources. MC 812 is on the list of archaeology survey blocks (BOEM, 2012c). A geologic, stratigraphic, and archaeological assessment by Fugro (2012) and GEMS (2013a,b) identified no marine avoidance targets within 2,000 ft (610 m) of the wellsites. Also, the lease area is well beyond the 60-m (197-ft) depth contour used by the BOEM as the seaward extent for prehistoric archaeological site potential in the Gulf of Mexico. Therefore, Shell's operations will have no cumulative impacts on historic shipwrecks or prehistoric archaeological resources.

New Information. New information included in the most recent Programmatic, Supplemental, and Final EISs (BOEM, 2012a,b,d) has been incorporated into the EIA, where applicable.

C.9.2 Cumulative Impacts to Biological Resources

The work planned in this EP is limited in geographic scope and duration, and the impacts on biological resources will be correspondingly limited.

Seafloor Habitats and Biota. Effects on seafloor habitats and biota from discharges of drilling mud and cuttings are expected to be minor and limited to a small area. Areas that may support high-density deepwater benthic communities will be avoided as required by NTL 2009-G40. Soft bottom communities are ubiquitous along the northern Gulf of Mexico continental slope, and the extent of benthic impacts during this project is insignificant regionally. As noted in the multi-lease-sale EISs, the incremental contributions of activities similar to Shell's proposed activities to the cumulative impacts is not significant (MMS, 2007b; BOEM, 2012b,d).

Threatened, Endangered, and Protected Species. Threatened and endangered species reasonably likely to occur in the lease area include the sperm whale and five species of sea turtles. Potential impact sources include drilling rig presence including noise and lights; marine debris; and support vessel and aircraft traffic. Potential effects for these species would be limited and temporary, and would be reduced by Shell's compliance with BOEM-required mitigation measures including NTLs 2012-BSEE-G01 and 2012-JOINT-G01. No significant cumulative impacts are expected.

Coastal and Marine Birds. Birds may be exposed to contaminants including air pollutants and routine discharges, but significant impacts are unlikely due to rapid dispersion. Shell's compliance with NTL 2012-BSEE-G01 will minimize the likelihood of debris-related impacts on birds. Support vessel and helicopter traffic may disturb some foraging and resting birds; however, it is likely that individual birds would experience, at most, only short-term behavioral disruption.

Due to the limited scope, timing, and geographic extent of drilling activities, collisions or other adverse effects are unlikely, and no significant cumulative impacts are expected.

Fisheries Resources. Exploration and production structures occur in the vicinity of the lease area. The additional effect of the proposed drilling activity would be negligible.

Coastal Habitats. Due to the distance of the wellsites from shore, routine activities are not expected to have any impacts on beaches and dunes, wetlands, seagrass beds, coastal wildlife refuges, wilderness areas, or any other managed or protected coastal area. The support bases at Port Fourchon and Boothville, Louisiana, are not in wildlife refuge or wilderness areas. Support operations, including the crew boat and supply boats, may have a minor incremental impact on coastal habitats. Over time with a large number of vessel trips, vessel wakes can erode shorelines along inlets, channels, and harbors. Impacts will be minimized by following the speed and wake restrictions in harbors and channels.

New Information. New information included in the most recent Programmatic, Supplemental, and Final EISs (BOEM, 2012a,b,d) has been incorporated into the EIA, where applicable.

C.9.3 Cumulative Impacts to Socioeconomic Resources

The work planned in this EP is limited in geographic scope and duration, and the impacts on socioeconomic resources will be correspondingly limited.

The multi-lease-sale and supplemental and final EISs analyzed the cumulative impacts of oil and gas exploration and development in the lease area, in combination with other impact-producing activities, on commercial fishing, recreational fishing, recreational resources, historical and archaeological resources, land use and coastal infrastructure, demographics, and environmental justice (MMS, 2007b; BOEM, 2012b,d). The BOEM also analyzed the economic impact of oil and gas activities on the Gulf states, finding only minor impacts in most of Texas, Mississippi, Alabama, and Florida, more significant impacts in parts of Texas, and substantial impacts on Louisiana.

Shell's proposed activities will have negligible cumulative impacts on socioeconomic resources. There are no IPFs associated with routine operations that are expected to affect public health and safety, employment and infrastructure, recreation and tourism, land use, or other marine uses. Due to the distance from shore, it is unlikely that any recreational fishing activity is occurring in the project area, and it is unlikely that any commercial fishing activity other than longlining occurs at or near the project area. The project will have negligible impacts on fishing activities.

New Information. New information included in the most recent Programmatic, Supplemental, and Final EISs (BOEM, 2012a,b,d) has been incorporated into the EIA, where applicable.

D. Environmental Hazards

D.1 Geologic Hazards

The shallow hazards assessment included in this EP concludes that the wellsites are suitable for the planned activities. Proposed wellsite D will be located 540 ft from the nearest seafloor fault, with fault penetration expected at 3,049 ft BML. The casing programs for these wellsites are designed for fault penetration.

Proposed wellsites B, C, and E are located 1,320, 1,450, and 1,610 ft, respectively, from the nearest seafloor faults. No fault penetration is expected at these wellsites. Although all wellsites have a high potential for shallow subsurface water flow, there is no other evidence of near-surface faulting, slumping, or fluid expulsion features within 2,000 ft (610 m) of any of the proposed wellsites (Fugro, 2012; GEMS, 2013a,b).

Based on results of a high-resolution geophysical survey consisting of frequency-enhanced three-dimensional seismic, enhanced surface renderings, autonomous underwater vehicle surveys, and side-scan sonar, these locations appear suitable for the planned activity (Fugro 2012; GEMS, 2013a,b).

See **EP Section 6a** for supporting geological and geophysical information.

D.2 Severe Weather

Under most circumstances, weather is not expected to have any effect on the proposed activities. Extreme weather, including high winds, strong currents, and large waves, was considered in the design criteria for the drilling rig. High winds and limited visibility during a severe storm could disrupt communication and support activities (vessel and helicopter traffic) and make it necessary to suspend some activities on the drilling rig for safety reasons until the storm or weather event passes. In the event of a hurricane, procedures in Shell's Hurricane Evacuation Plan would be followed.

D.3 Currents and Waves

A rig-based acoustic Doppler current profiler will be used to continuously monitor the current beneath the rig. Metocean conditions such as sea states, wind speed, ocean currents, etc., will also be continuously monitored. Under most circumstances, physical oceanographic conditions are not expected to have any effect on the proposed activities. Strong currents (caused by Loop Current eddies and intrusions) and large waves were considered in the design criteria for the drilling rig. High waves during a severe storm could disrupt support activities (i.e., vessel and helicopter traffic) and make it necessary to suspend some activities on the drilling rig for safety reasons until the storm or weather event passes.

E. Alternatives

No formal alternatives were evaluated in this EIA. However, various technical and operational options, including the location of the wellsites and the selection of a drilling unit, were considered by Shell in developing the proposed action. There are no other reasonable alternatives to accomplish the goals of this project.

F. Mitigation Measures

The proposed action includes numerous mitigation measures required by laws, regulations, and BOEM lease stipulations and NTLs. The project will comply with applicable federal, state, and local requirements concerning air pollutant emissions, discharges to water, and solid waste disposal. Project activities will be conducted under Shell's OSRP and will include the measures described in **EP Section 2f**.

G. Consultation

No persons or agencies were consulted regarding potential impacts associated with the proposed activities during the preparation of this EIA.

H. Preparers

This EIA was prepared at the direction of Shell Offshore Inc. by its contractor, CSA Ocean Sciences Inc. Contributors included the following:

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SECTION 19: ADMINISTRATIVE INFORMATION

A. Exempted Information Description (Public Information Copies Only)

The following attachments were excluded from the public information copies of this plan:

Section 1B OCS Plan Information form – Bottom hole locations & proposed total depth
Section 2J Blowout Scenario – confidential information for NTL 2015 N01 calculation
Section 3A Geologic Description
Section 3B Structure Contour Maps
Section 3C Interpreted 2D or 3D seismic line(s)
Section 3D Cross Section(s)
Section 3E Stratigraphic Column with Time vs. depth table

B. Bibliography

CSA Environmental Impact Analysis

Geoscience Earth and Marine Services, Inc, Geologic, Stratigraphic, and Archaeological Assessment of Blocks 768 (OCS G 34458), 811 (OCS G 34460), and 812 (OCS G 34461) Mississippi Canyon Area, Gulf of Mexico, Project No. 0912-2139, dated April 11, 2013. Data: AUV side-scan sonar and sub-bottom profiler, and frequency enhanced 3-D seismic.

Geoscience Earth and Marine Services, Inc, Archaeological Assessment, Blocks 766-769 and 810-813, Mississippi Canyon Area, Gulf of Mexico, Project Nom 0912-2139B, dated March 22, 2013. Data: AUV side-scan sonar and Sub-bottom profiler – 4 data sets (Fugro GeoSurvey Services Inc, 2012, primary dataset; C&C 2007 MC854 & vicinity; C&C 2008, MC 810 & vicinity; C&C 2009, MC 720-722 & vicinity.

Shell's Regional OSRP

Shell's Initial EP N-9727 (2013)

Shell's Initial EP N9840 (2014)