UNITED STATES GOVERNMENT
MEMORANDUM

November 6, 2012

To: Public Information (MS 5030)

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

Subject: Public Information copy of plan

Control # - S-07584

Type - Supplemental Development Operations Coordinations Document

Lease(s) - OCS-G15565 Block - 248 Green Canyon Area

Operator - Shell Offshore Inc.

Description - Wells GL006, GL007, GL008 and GL009

Rig Type - SEMISUBMERSIBLE

Attached is a copy of the subject plan.

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

Chiquita Hill
Plan Coordinator

Site Type/Name	Botm Lse/Area/Blk	Surface Location	Surf Lse/Area/Blk
WELL/GL006	G15565/GC/248	3548 FNL, 2710 FWL	G15565/GC/248
WELL/GL007	G15565/GC/248	6790 FNL, 450 FWL	G15565/GC/248
WELL/GL007	G15565/GC/248	6790 FNL, 450 FWL	G15565/GC/248
WELL/GL008	G15565/GC/248	6910 FNL, 373 FWL	G15565/GC/248
WELL/GL009	G15565/GC/248	3581 FNL, 2794 FWL	G15565/GC/248

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

Supplmental DOCD: Glider

Projected generated waste			Projected ocean discharges		Projected Downhole Disposal
Type of Waste and Composition	**Composition**	**Projected Amount (Total)**	**Discharge rate (per well)**	**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*	*discharge pipe*	*No*
Water-based drilling fluid	barite, additives, mud	378,400 bbls	26,650 bbls/day	Seafloor discharge prior to marine riser installation	No
Cuttings wetted with water-based fluid	Cuttings coated with water based drilling mud	8,800 bbls	150 bbls/day	Seafloor discharge prior to marine riser installation	No
Cuttings wetted with synthetic-based fluid	Cuttings generated while using synthetic based drilling fluid	17,964 bbls	250 bbls/day	Cuttings chute below MSL	No
Synthetic based drilling fluid adhering to washed drill cuttings	Synthetic based drilling fluid adhering to washed drill cuttings	720 bbls	10 bbls/day	Cuttings chute below MSL	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	122,120 bbls	215 bbls/day	Ground to less than 25 mm mesh size and discharge overboard	No
Sanitary waste (toilet water)	treated sanitary waste	40896 Bbls	72 bbls/day	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	Wash and rainwater	5,680 Bbls	10 bbls/day	Drained overboard through deck scuppers	No
Will you conduct well treatment, completion, or workover?					
Well Treatment Fluids	Water based frac fluids. Solvent based pipe pickle	8,000 Bbls	50 bbls/well	Frac fluids will be injected in the well during the completion and will be flowed back to the host facility when the well is brought online. Returns will be minimal and will undergo static sheen testing and monthly grease compliance testing prior to discharge overboard. Pipe pickle to be collected and disposed of onshore.	No
Well Completion Fuids	Calcium Bromide brine	6,000 bbls	1,500 bbls/well	Base plan is to catch all brine and return onshore for reclaim. In the event that this cannot happen, returns will undergo static sheen testing and monthly grease compliance testing prior to discharge overboard.	No
Well Clean Up Fluids	Base oil Transition Spacer Solvent based sweep Viscous Spacer NaCl brine (riser clean out) CaBr2 Brine (wellbore clean out)	12,000 bbls	3,000 bbls/well	Base oil will be caught with SBM and taken onshore. Transition Spacer will be caught and taken onshore for disposal.Solvent based sweep will be caught and taken onshore for disposal. Viscous spacer and NaCl will undergo static sheen testing and monthly grease compliance and be discharged overboard. CaBr2 will be reclaimed.	No
Miscellaneous discharges. If yes, only fill in those associated with your activity.					
Desalinization unit discharge	Rejected water from watermaker unit	5,680 bbls	10 bbls/day	Discharged overboard 35 feet below waterline	No
Blowout prevent fluid	Water based	330 bbls	0.6 bbls/day	Disharge at seafloor	No
Ballast water	Uncontaminated seawater	1,249,600 bbls	2,200 bbls/day	Discharged overboard just above waterline	No
Bilge water	Bilge and drainage water will be treated to MARPOL standards (< 15ppm oil in water).	105,080 bbls	185 bbls/day	Bilge and drainage water will be treated to MARPOL standards (< 15ppm oil in water).	No
Excess cement at seafloor	Cement slurry	1,800 bbls	450 bbls/well	Discharged at the seafloor during riserless drilling	No
Fire water	Treated seawater	9,460 bbls	2,000 bbls/month	scuppers	No
Cooling water	Treated seawater	61,288,620 bbls	431,610 bbls/day	Discharged overboard 40 feet below waterline	No
Will you produce hydrocarbons? If yes fill in for produced water.					
Produced water	NA	NA	NA	NA	NA
Will you be covered by an individual or general NPDES permit ?		GMG 290103			

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

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

Supplmental DOCD: Glider

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
Oil-based drilling fluid or mud	NA	NA	NA	NA	NA
Synthetic-based drilling fluid or mud	Used SBF and additives	Drums or dedicated tanks on support vessels	MI Drilling Fluids - Fourchon, LA	7,000 bbls/well	Recycled
Cuttings wetted with Water-based fluid	NA	NA	NA	NA	NA
Cuttings wetted with Synthetic-based fluid	Drill cuttings from synthetic based interval.	Storage tank on supply boat	Newpark Environmental, Ingleside, TX	150 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 Management, W. Patterson, LA or ARC, New Iberia, LA	22,400 lbs/well	Recylce
Trash and debris - non-recyclables	trash and debris	Storage bins on supply boat	Newpark Environmental, Ingleside, TX or Bridge City, TX	11,200 lbs/well	Landfill
used oil	used oil	Drums on supply boat	Smiths Incinerator Venice, LA	55 bbls/well	Incinerate
Chemical product wastes	Solvent	Captured at surface in MPT tanks, transported onshore for disposal in an environmentally friendly manner.	Safety Kleep, Denton, TX or Lamp Environmental, Hammond, LA	150 bbls/well	Recycled

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

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

Proposed Well/Structure Location			
Well or Structure Name/Number (If renaming well or structure, reference previous name): GL007 Plan S-7337 (Previously GL006)		Subsea Completion	
Anchor Radius (if applicable) in feet: 12,000′		X Yes	No

	Surface Location	Bottom-Hole Location (For Wells)
Lease No.	OCS-G 15565	OCS-G 15565
Area Name	Green Canyon	Green Canyon
Block No.	248	248
Blockline Departures (in feet)	N/S Departure: 6,790′ FNL	N/S Departure: 1641′ FSL
	E/W Departure: 450′ FWL	E/W Departure: 789′ FWL
Lambert X-Y coordinates	X: 2,423,970	X: 2424309
	Y: 10,067,450	Y: 10060041
Latitude/ Longitude	Latitude 27°43′18.50″	Latitude 27°42′05.10″
	Longitude -90°34′39.47″	Longitude -90°34′37.32″
	TVD (Feet): 20,482′	MD (Feet): 23,024′ / Water Depth (Feet): 3350′

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

Anchor Name	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor

Paperwork Reduction Act of 1995 Statement: The Paperwork Reduction Act of 1995 (44 U.S.C. 2501 et seq.) requires us to inform you that BOEM collects this information as part of an applicant's Exploration Plan or Development Operations Coordination Document submitted for BOEM approval. We use the information to facilitate our review and data entry for OCS plans. We will protect proprietary data according to the Freedom of Information Act and 30 CFR 550.197. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid Office of Management and Budget Control Number. Responses are mandatory (43 U.S.C. 1334). The public reporting burden for this form is included in the burden for preparing Exploration Plans and Development Operations Coordination Documents. We estimate that burden to average 600 hours with an accompanying EP, or 700 hours with an accompanying DPP or DOCD, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms associated with subpart B. Direct comments regarding the burden estimate or any other aspect of this form to the Information Collection Clearance Officer, Bureau of Ocean Energy Management, 381 Elden Street, Herndon, VA 20170.

Form BOEM-0137 (December 2011-Supercedes all previous editions of form BOEM-0137 which may not be used.)

Shell Offshore Inc.
P. O. Box 61933
New Orleans, LA 70161-1933
United States of America
Tel +1 504 728 7215
Fax +1 504 728 6747
Email sylvia.bellone@shell.com

Public Information Copy

September 5, 2012

Ms. Liz Peuler, Section Chief
Bureau of Ocean Energy Management
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394

Attn: Plans Group MS GM1053C

SUBJECT: Supplemental Development Operations Coordination Document (DOCD/SDOCD)
OCS-G 15565, Green Canyon Block 248
Offshore, Louisiana

Dear Ms. Peuler:

In compliance with 30 CFR 250.103 and NTLs 2008-G04, 2009-G27 and 2010-N06, giving DOCD guidelines, Shell Offshore Inc. (Shell) requests your approval of this Supplemental DOCD to carry over previously approved locations to drill Wells GL006, GL007 and GL008 and drill new well GL009, as well as provide WCD information in compliance with NTL 2010-N06. This Plan will also include the installation of subsea equipment. Depending on plan approval, operations could commence as early as February 15, 2013.

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. Out of the four wells proposed, two wells are within 500' of each other, therefore the cost recovery receipt of $7,942 is provided with the proprietary copy of the plan.

Should you require additional information, please contact Tracy Albert at 504.728.4652 or tracy.albert@shell.com.

Sincerely,

Sylvia A. Bellone
Sr. Regulatory Specialist

SHELL OFFSHORE INC.

SUPPLEMENTAL DOCD

for

OCS-G 15565, Green Canyon Block 248

Offshore, Louisiana

PUBLIC INFORMATION COPY

PREPARED BY:

Tracy W. Albert
Regulatory Specialist

504.728.4652

tracy.albert@shell.com

REVISIONS TABLE

Date of Request	Plan Section	What was Corrected	Date Resubmitted

SUPPLEMENTAL DOCD
GREEN CANYON BLOCK 248
OCS-G 15565
OFFSHORE, LOUISIANA

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SECTION 1: PLAN CONTENT

A. DESCRIPTION, OBJECTIVES & SCHEDULE

This Supplemental DOCD (SDOCD/Plan) describes the drilling activities Shell Offshore Inc. (Shell) plans to conduct with respect to lease OCS-G 15565, Green Canyon Block 248 (GC 248). Plan S-7337 approved July 29, 2009 cleared the locations for wells GL006, GL007 and GL008. This Plan carries forward the previously approved wells and will include a new well, GL009, and subsea manifold and jumpers. The wells will be drilled and completed and will have subsea trees installed. If the wells are unsuccessful, they will be permanently plugged and abandoned in accordance with BSEE regulations.

Shell's plan, as detailed in this SDOCD, is to use a single semisubmersible Mobile Offshore Drilling Unit, the Transocean Nautilus or equivalent rig (the "rig"), to drill the development wells. Water depths in the lease range from approximately 3200 - 3400 feet. The subsea manifold installation is targeted to begin around February 15, 2013. The drilling activities are planned to commence on or about June 1, 2013 and take approximately 135 days per well to drill and complete.

The rig is a moored semisubmersible drilling vessel and is equipped with state-of-the-art drilling and well control equipment. It is a largely self-contained drilling vessel, including quarters, galley and sanitation facilities. The rig 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 SDOCD. 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 planned GC 248 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 WCD detailed in Section 9 of this SDOCD. 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 (R&D) 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 BOEM forms and location plats.

C. Rig Safety and Pollution Features:

The rig we plan to use (Transocean Nautilus 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, and oily water processing.

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 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 consist 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 be collected in portable tanks and sent to shore for processing.

3) Oily Water Processing

Oily water is collected in an oily water tank. It must be separated and not pumped overboard until oil content is $\leq$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 over board. 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 Attachment 18, EIA of this Plan.

4) Lower Hull Bilge System

- The main bilge system is designed to drain the pontoons. They are Gould's electrically driven, self priming centrifugal pumps - one for each main pump room. The aux pumps can pump out with the bilge pump but it 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 pumping 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; and
  - 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 when 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.

5) 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.

6) 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 $\leq$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

7) 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 Transocean's initiative to be good stewards of the environment. The oily water separators divide the drainage system into sections listed below.

8) Rig Floor Drainage

The rig floor has been 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 two separators and cleaned further to reduce oil content to $\leq$15 ppm.

9) 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 $\leq$15ppm, then discharge the clean product to sea.

10) 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 (≤15ppm) goes overboard.
- The locations and models of the Separators are as follows:
- Column #3 – Westfalia WSD-18
- Column #4 – Westfalia WSD-18
- Drill Floor – Facet International MAS 34-3

11) 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 skimmer 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. The 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 and 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 the port column oily water separator which discharges water overboard from the water side and oil is being pumped out into a 550 gal tote tank oil containment side. There is a high audible alarm on the ballast control panel.

D. <u>Storage Tanks</u> - Transocean Nautilus (or similar)

Type of Storage Tank	Type of Facility	Tank Capacity (Bbls)	Number of Tanks	Total Capacity (Bbls)	Fluid Gravity (Specific)
Main Diesel Storage Tank	Drilling Rig	16,569 bbls	2	33,138 bbls	Marine Diesel (0.87 SG)
Diesel Settling Tank	Drilling Rig	837 bbls	2	1,674 bbls	Marine Diesel (0.87 SG)
Diesel Day Tank	Drilling Rig	837 bbls	2	1,674 bbls	Marine Diesel (0.87 SG)
Emergency Diesel Generator Tank	Drilling Rig	101 bbls	1	101 bbls	Marine Diesel (0.87 SG)
Lube Oil Tank Aft	Drilling Rig	182 bbls	1	182 bbls	Lube Oil (0.93 SG)
Lube Oil Tank Fwd	Drilling Rig	182 bbls	1	182 bbls	Lube Oil (0.93 SG)
Hyd. Oil Tank Aft	Drilling Rig	63 bbls	1	63 bbls	Hydraulic Oil (0.93 SG)

Synthetic Drilling Base Fluid	Drilling Rig	9,190 bbls	2	18,380 bbls	Synthetic Base Oil
Active Port Mud Tanks	Drilling Rig	500 bbls	6	3,000 bbls	Drilling Mud
Active Stb Mud Tanks	Drilling Rig	500 bbls	6	3,000 bbls	Drilling Mud
Process Pit Tanks	Drilling Rig	34 bbls	12	408 bbls	Drilling Mud
Trip Tanks	Drilling Rig	100 bbls	3	300 bbls	Drilling Mud
Reserve Mud Tanks	Drilling Rig	1,500 bbls	6	9,000 bbls	Drilling Mud
Slug Tanks	Drilling Rig	100 bbls	4	400 bbls	Drilling Mud
Crude oil storage	Drilling Rig	25,000 bbls	4	100,000 bbls	Crude

E. Pollution Prevention Measures

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

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.

Drain on the rig are 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 to shore for disposal.

The rig is involved in a recycling program for cardboard, plastic, paper, glass, and aluminum.

Fuel and SBM hoses are changed on annual basis.

Spill prevention fittings are installed on all liquid take on hoses.

Waste paint thinner is recycled on board with a solvent still to further reduce hazards 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 (0.05% by weight) to reduce air pollutant impacts.

U. S. Department of the Interior

Bureau of Ocean Energy Management

OMB Control Number: 1010-0151
OMB Approval Expires: 12/31/2014

OCS PLAN INFORMATION FORM

General Information			
Type of OCS Plan:		Exploration Plan (EP)	X Development Operations Coordination Document (DOCD)
Company Name: Shell Offshore Inc.		BOEM Operator Number: 0689	
Address: P. O. Box 61933		Contact Person: Tracy Albert	
New Orleans, LA 70161-1933		Phone Number: (504) 728-4652	
		E-Mail Address: tracy.albert@shell.com	
Lease(s): OCS-G 15565	Area: GC	Block(s): 248	Project Name (If Applicable): Glider
Objective(s):		Onshore Base: Fourchon	Distance to Closest Land: 91

Description of Proposed Activities (Mark all that apply)			
	Exploration drilling	✓	Development drilling
✓	Well completion		Installation of production platform
	Well test flaring (for more than 48 hours)		Installation of production facilities
	Installation of caisson or platform as well		Installation of satellite structure
✓	Installation of subsea wellheads and/or	✓	Commence production
	Installation of lease term pipelines		Other (Specify and describe)

Have you submitted or do you plan to submit a Conservation Information Document to accompany this plan?		Yes	X	No
Do you propose to use new or unusual technology to conduct your activities?		Yes	X	No
Do you propose any facility that will serve as a host facility for deepwater subsea development?		Yes	X	No
Do you propose any activities that may disturb an BOEM-designated high-probability archaeological area?		Yes	X	No
Have all of the surface locations of your proposed activities been previously reviewed and approved by BOEM?		Yes	X	No

Tentative Schedule of Proposed Activities			
Proposed Activity	Start Date	End Date	No. of Days
See attached schedule			

Description of Drilling Rig				Description of Production Platform			
	Jackup		Drillship		Caisson		Tension leg platform
	Gorilla Jackup		Platform rig		Well protector		Compliant tower
X	Semisubmersible		Submersible		Fixed platform		Guyed tower
	DP Semisubmersible		Other (Attach Description)		Subsea manifold		Floating production system
Drilling Rig Name (If Known): Transocean Nautilus (or similar)					Spar		Other (Attach Description)

Description of Lease Term Pipelines			
From (Facility/Area/Block)	To (Facility/Area/Block)	Diameter	Length (Feet)
See attached			

Form BOEM-0137 (December 2011-Supercedes all previous editions of form BOEM-0137 which may not be used.)

Proposed Activity	Start Date	End Date	No. of Days
Install subsea manifold	2/15/2013	2/22/2013	7
Pre-install anchors	5/29/2013	5/31/2013	2
Drill & complete wells GL006	6/1/2013	10/14/2013	135
Install trees and jumpers for GL006	10/15/2013	11/18/2013	34
Drill and complete GL007	10/15/2013	2/26/2014	135
Install trees and jumpers GL007	2/26/2014	3/12/2014	34
Commence production GL006 & GL007	3/12/2014		
Pre-install anchors	5/29/2015	5/31/2015	2
Drill and complete GL008	6/1/2015	10/14/2015	135
Install trees and jumpers GL008	10/15/2015	11/18/2015	34
Drill & complete well GL009	10/15/2015	2/26/2016	135
Install trees and jumpers GL009	2/26/2016	3/12/2016	34
Commence production GL008 & GL009	3/12/2016		
Intervention/workover time	2017-2027		10 years

Description of Lease Term Pipelines:

From (Facility/Area/Block)	To (Facility/Area/Block)	Diameter (Inches)	Length (Feet)
Sled #1/Green Canyon Block 248	Brutus/Green Canyon Block 158	6.625	34252
Sled #3 /Green Canyon Block 248	Manifold/Green Canyon Block 248	6.625	3887
Sled #1/Green Canyon Block 248	Sled #2/Green Canyon Block 248	6.625	Approximately 100-ft
Well GL-3/Green Canyon Block 248	Sled #3/Green Canyon Block 248	5.938	Approximately 100-ft
Well GL-4/Green Canyon Block 248	Sled #2/Green Canyon Block 248	5.938	Approximately 100-ft
Well GL-5/Green Canyon Block 248	Sled #1/Green Canyon Block 248	5.938	Approximately 100-ft

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

Proposed Well/Structure Location			
Well or Structure Name/Number (If renaming well or structure, reference previous name): GL006 Plan S-7337 (Previously GL007)		Subsea Completion	
Anchor Radius (if applicable) in feet: 12,000'		X Yes	No

	Surface Location	Bottom-Hole Location (For Wells)
Lease No.	OCS-G 15565	
Area Name	Green Canyon	
Block No.	248	
Blockline Departures (in feet)	N/S Departure: 3548' FNL	
	E/W Departure: 2710' FWL	
Lambert X-Y coordinates	X: 2,426,230	
	Y: 10,070,692	
Latitude/ Longitude	Latitude 27°43'50.14"	
	Longitude -90°34'13.63"	
	TVD (Feet):	MD (Feet): / Water Depth (Feet): 3233'

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

Anchor Name	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor

Paperwork Reduction Act of 1995 Statement: The Paperwork Reduction Act of 1995 (44 U.S.C. 2501 et seq.) requires us to inform you that BOEM collects this information as part of an applicant's Exploration Plan or Development Operations Coordination Document submitted for BOEM approval. We use the information to facilitate our review and data entry for OCS plans. We will protect proprietary data according to the Freedom of Information Act and 30 CFR 550.197. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid Office of Management and Budget Control Number. Responses are mandatory (43 U.S.C. 1334). The public reporting burden for this form is included in the burden for preparing Exploration Plans and Development Operations Coordination Documents. We estimate that burden to average 600 hours with an accompanying EP, or 700 hours with an accompanying DPP or DOCD, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms associated with subpart B. Direct comments regarding the burden estimate or any other aspect of this form to the Information Collection Clearance Officer, Bureau of Ocean Energy Management, 381 Elden Street, Herndon, VA 20170.

Form BOEM-0137 (December 2011-Supercedes all previous editions of form BOEM-0137 which may not be used.)

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

Proposed Well/Structure Location			
Well or Structure Name/Number (If renaming well or structure, reference previous name): GL007 Plan S-7337 (Previously GL006)		Subsea Completion	
Anchor Radius (if applicable) in feet: 12,000′		X Yes	No

	Surface Location	Bottom-Hole Location (For Wells)
Lease No.	OCS-G 15565	
Area Name	Green Canyon	
Block No.	248	
Blockline Departures (in feet)	N/S Departure: 6,790′ FNL	
	E/W Departure: 450′ FWL	
Lambert X-Y coordinates	X: 2,423,970	
	Y: 10,067,450	
Latitude/ Longitude	Latitude 27°43′18.50″	
	Longitude -90°34′39.47″	
	TVD (Feet):	MD (Feet): / Water Depth (Feet): 3350′

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

Anchor Name	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor

Paperwork Reduction Act of 1995 Statement: The Paperwork Reduction Act of 1995 (44 U.S.C. 2501 et seq.) requires us to inform you that BOEM collects this information as part of an applicant's Exploration Plan or Development Operations Coordination Document submitted for BOEM approval. We use the information to facilitate our review and data entry for OCS plans. We will protect proprietary data according to the Freedom of Information Act and 30 CFR 550.197. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid Office of Management and Budget Control Number. Responses are mandatory (43 U.S.C. 1334). The public reporting burden for this form is included in the burden for preparing Exploration Plans and Development Operations Coordination Documents. We estimate that burden to average 600 hours with an accompanying EP, or 700 hours with an accompanying DPP or DOCD, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms associated with subpart B. Direct comments regarding the burden estimate or any other aspect of this form to the Information Collection Clearance Officer, Bureau of Ocean Energy Management, 381 Elden Street, Herndon, VA 20170.

Form BOEM-0137 (December 2011-Supercedes all previous editions of form BOEM-0137 which may not be used.)

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

Proposed Well/Structure Location			
Well or Structure Name/Number (If renaming well or structure, reference previous name): GL008 Plan S-7337 (Previously GL008)		Subsea Completion	
Anchor Radius (if applicable) in feet: 12,000′		X Yes	No

	Surface Location	Bottom-Hole Location (For Wells)
Lease No.	OCS-G 15565	
Area Name	Green Canyon	
Block No.	248	
Blockline Departures (in feet)	N/S Departure: 6,910′ FNL	
	E/W Departure: 373′ FWL	
Lambert X-Y coordinates	X: 2,423,893	
	Y: 10,067,330	
Latitude/ Longitude	Latitude 27°43′17.33″	
	Longitude -90°34′40.35″	
	TVD (Feet):	MD (Feet): / Water Depth (Feet): 3350′

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

Anchor Name	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor

Paperwork Reduction Act of 1995 Statement: The Paperwork Reduction Act of 1995 (44 U.S.C. 2501 et seq.) requires us to inform you that BOEM collects this information as part of an applicant's Exploration Plan or Development Operations Coordination Document submitted for BOEM approval. We use the information to facilitate our review and data entry for OCS plans. We will protect proprietary data according to the Freedom of Information Act and 30 CFR 550.197. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid Office of Management and Budget Control Number. Responses are mandatory (43 U.S.C. 1334). The public reporting burden for this form is included in the burden for preparing Exploration Plans and Development Operations Coordination Documents. We estimate that burden to average 600 hours with an accompanying EP, or 700 hours with an accompanying DPP or DOCD, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms associated with subpart B. Direct comments regarding the burden estimate or any other aspect of this form to the Information Collection Clearance Officer, Bureau of Ocean Energy Management, 381 Elden Street, Herndon, VA 20170.

Form BOEM-0137 (December 2011-Supercedes all previous editions of form BOEM-0137 which may not be used.)

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

Proposed Well/Structure Location			
Well or Structure Name/Number (If renaming well or structure, reference previous name): GL009		Subsea Completion	
Anchor Radius (if applicable) in feet: 12,000'		X Yes	No

	Surface Location	Bottom-Hole Location (For Wells)
Lease No.	OCS-G 15565	
Area Name	Green Canyon	
Block No.	248	
Blockline Departures (in feet)	N/S Departure: 3581' FNL	
	E/W Departure: 2794' FWL	
Lambert X-Y coordinates	X: 2,426,314	
	Y: 10,070,659	
Latitude/ Longitude	Latitude 27°43'50.00"	
	Longitude -90°34'12.69"	
	TVD (Feet):	MD (Feet): / Water Depth (Feet): 3233'

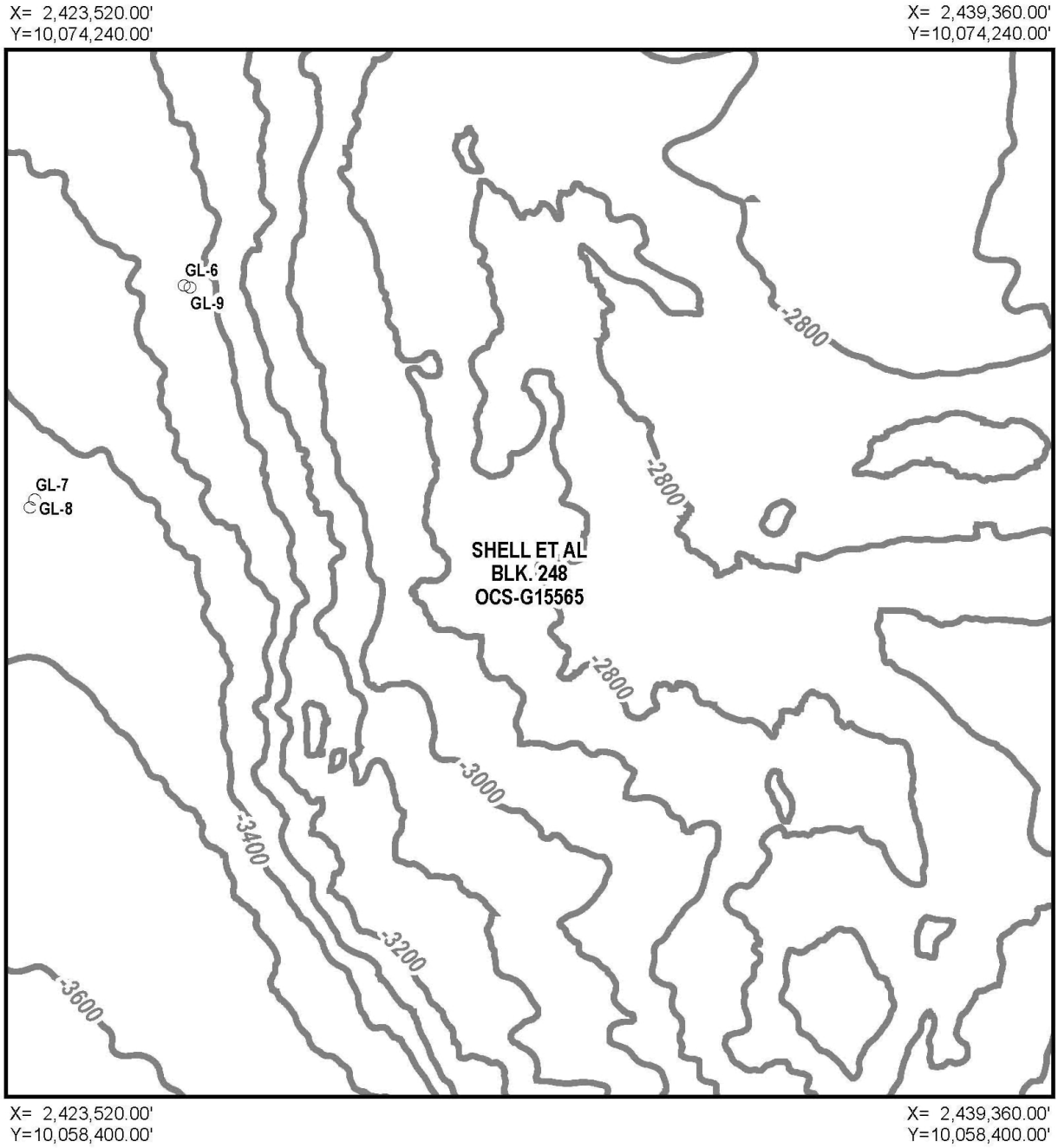
Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor

Paperwork Reduction Act of 1995 Statement: The Paperwork Reduction Act of 1995 (44 U.S.C. 2501 et seq.) requires us to inform you that BOEM collects this information as part of an applicant's Exploration Plan or Development Operations Coordination Document submitted for BOEM approval. We use the information to facilitate our review and data entry for OCS plans. We will protect proprietary data according to the Freedom of Information Act and 30 CFR 550.197. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid Office of Management and Budget Control Number. Responses are mandatory (43 U.S.C. 1334). The public reporting burden for this form is included in the burden for preparing Exploration Plans and Development Operations Coordination Documents. We estimate that burden to average 600 hours with an accompanying EP, or 700 hours with an accompanying DPP or DOCD, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms associated with subpart B. Direct comments regarding the burden estimate or any other aspect of this form to the Information Collection Clearance Officer, Bureau of Ocean Energy Management, 381 Elden Street, Herndon, VA 20170.

Form BOEM-0137 (December 2011-Supercedes all previous editions of form BOEM-0137 which may not be used.)

Proposed Surface Locations and Bathymetry Plat



○ Prop. Surface Location	
GL-6	2,710.00' FWL & 3,548.00' FNL of Blk. 248 X=2,426,230.00' Y=10,070,692.00'
GL-7	450.00' FWL & 6,790.00' FNL of Blk. 248 X=2,423,970.00' Y=10,067,450.00'
GL-8	373.00' FWL & 6,910.00' FNL of Blk. 248 X=2,423,893.00' Y=10,067,330.00'
GL-9	2,794.00' FWL & 3,581.00' FNL of Blk. 248 X=2,426,314.00' Y=10,070,659.00'

Coordinate System: NAD 1927 BLM Zone 15N

N

SHELL

PROPOSED SURFACE LOCATIONS & BATHYMETRY
D.O.C.D.

SHELL ET AL, OCS-G 15565, GREEN CANYON BLK. 248

GREEN CANYON AREA

OFFSHORE LOUISIANA

0 500 1,000 2,000 3,000 4,000 Feet

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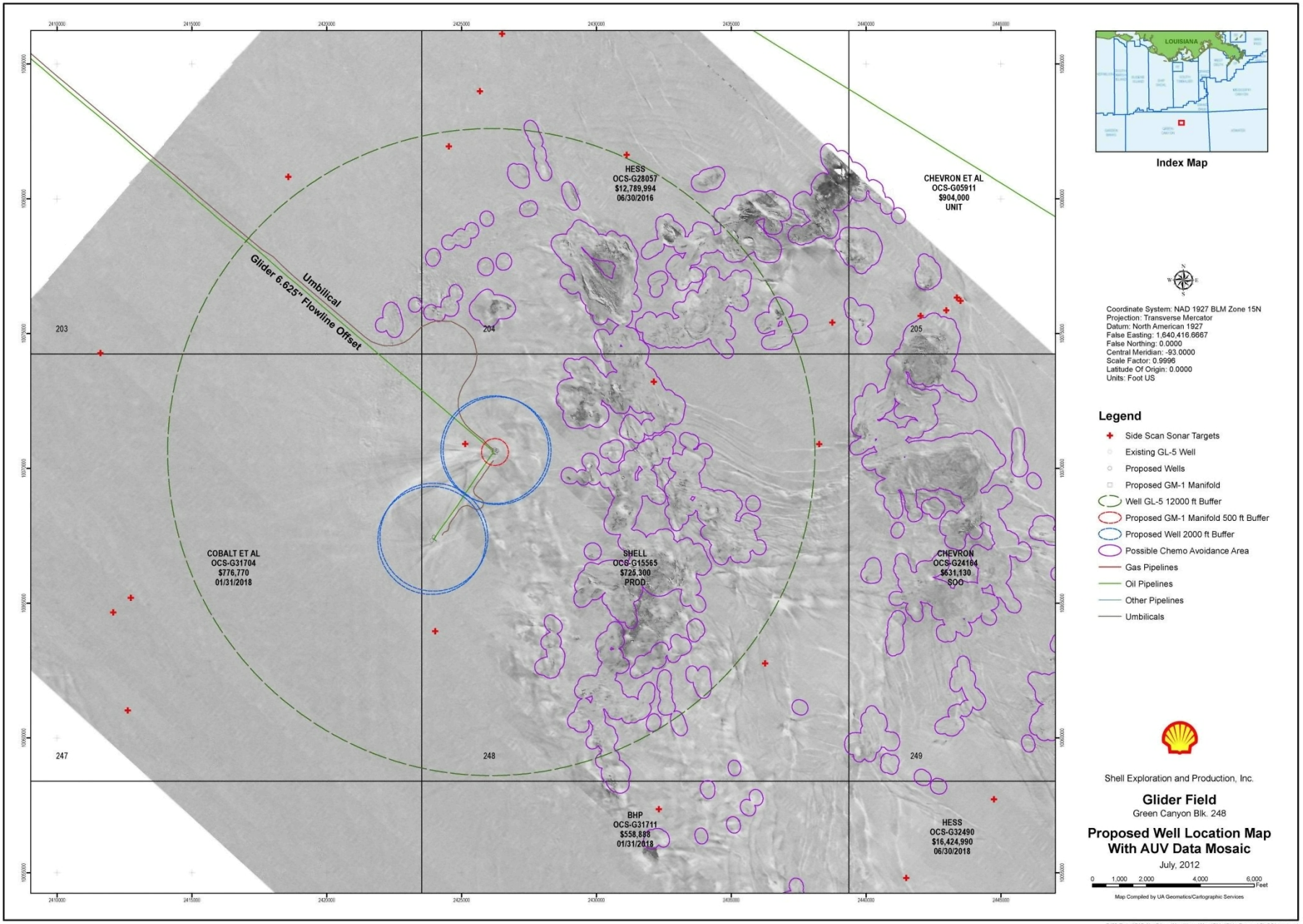
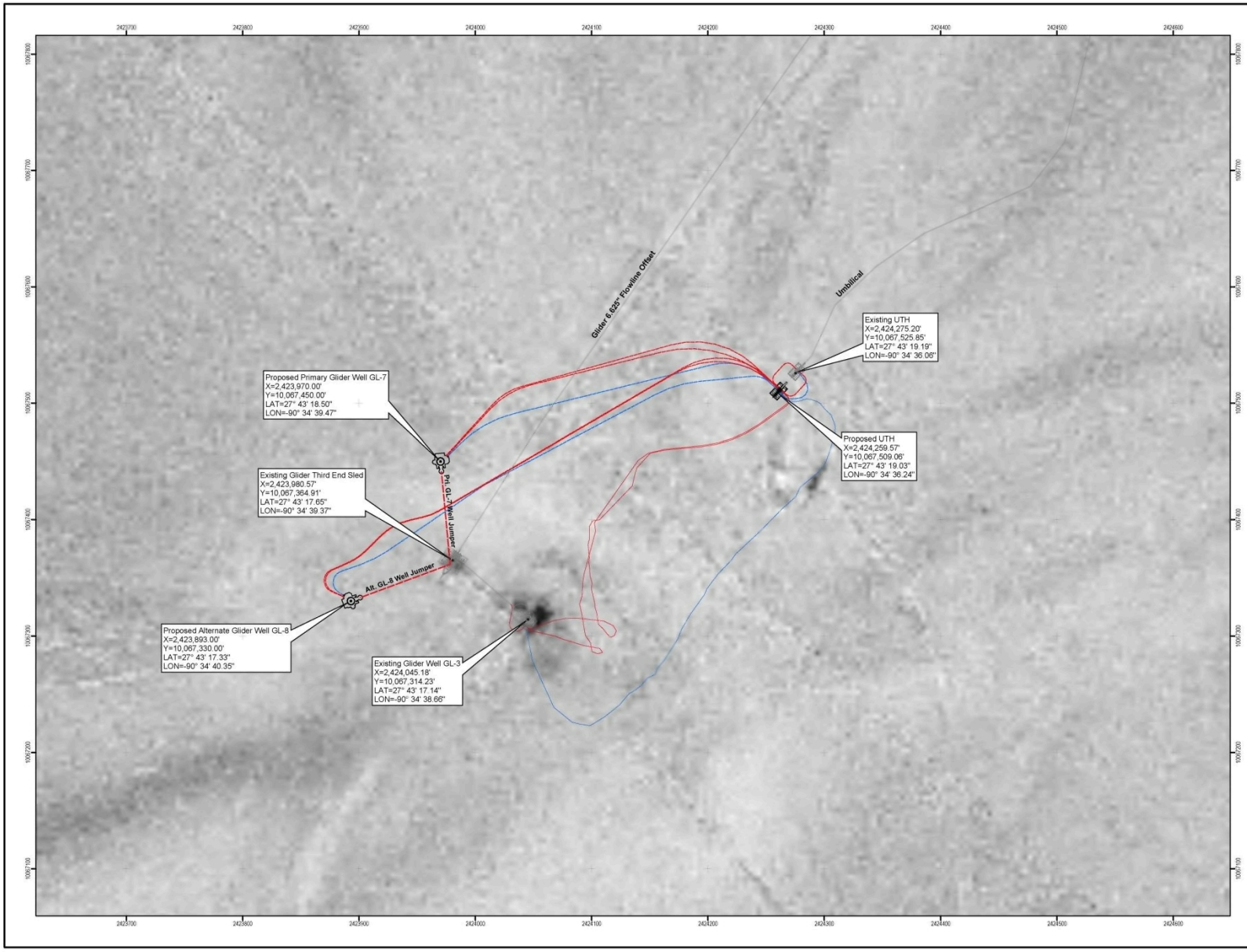
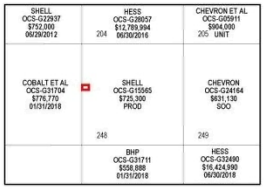


Public Information Copy





Index Map

Coordinate System: NAD 1927 BLM Zone 15N
Projection: Transverse Mercator
Datum: North American 1927
False Easting: 1,640,416.6667
False Northing: 0.0000
Central Meridian: -93.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Foot US

Legend

- Other
- Existing Steel Flying Lead
- Existing Electrical Flying Lead
- Existing Hydraulic Flying Lead
- Proposed Steel Flying Lead
- Proposed Electrical Flying Lead
- Proposed Well
- Proposed Well Jumper
- Proposed GM-1 Manifold

Shell Exploration and Production, Inc.

Glider Field

Green Canyon Blk. 248

Proposed Well Location Map GL-7 and GL-8 With AUV Data Mosaic

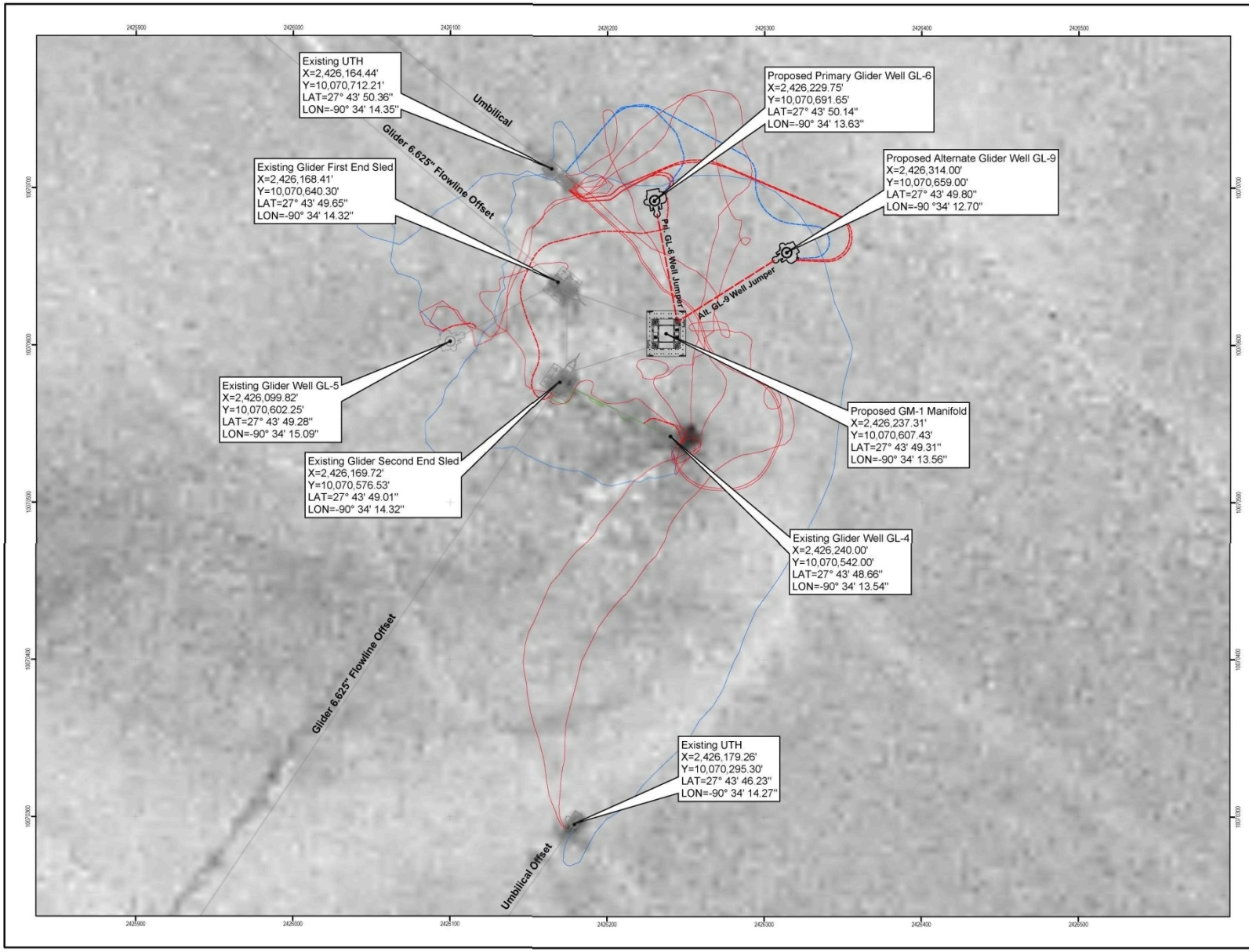
July, 2012

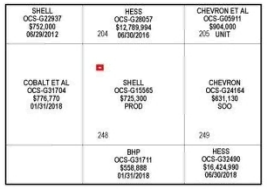
0 20 40 80 120 Feet

Map Compiled by UA Geomatics/Cartographic Services

G:\30_Project\CAD_NewOrleans\Maps\Hazard Maps\Glider\Glider Proposed GL-7 and GL-8 Layout.

Public Information Copy





Index Map

Coordinate System: NAD 1927 BLM Zone 15N
Projection: Transverse Mercator
Datum: North American 1927
False Easting: 1,640,416.6667
False Northing: 0.0000
Central Meridian: -93.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Foot US

Legend

- Other
- Existing Steel Flying Lead
- Existing Electrical Flying Lead
- Existing Hydraulic Flying Lead
- Proposed Steel Flying Lead
- Proposed Electrical Flying Lead
- Proposed Well
- Proposed Well Jumper
- Proposed GM-1 Manifold

Shell Exploration and Production, Inc.

Glider Field

Green Canyon Blk. 248

Proposed Well Location Map GL-6 and GL-9 With AUV Data Mosaic

July, 2012

0 20 40 80 120 Feet

Map Compiled by UA Geomatics/Cartographic Services

G:\30_Project\CAD_NewOrleans\Maps\Hazard Maps\Glider\Glider Proposed GL-6 and GL-9 Layout.

Public Information Copy

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.

B. Drilling Fluids

See Table 7A for a list of drilling fluids to be used.

C. Production

Type	Average Production Rate	Peak Production Rate	Life of Reservoir
Oil			
Gas			

D. Oil Characteristics

Characteristic	Analytical Methodologies Should Be Compatible With:
1. Gravity (API) (Flash Measurement) 32° / 36.5° G2/L	ASTM D4052
2. Flash Point (ºC) N/A (Not tested)	ASTM D93/IP 34
3. Pour Point (ºC) -15 / 39	ASTM D97
4. Viscosity (Centipoise at 25 °C) 0.53/0.7	ASTM D445
5. Wax Content (wt %) N/A not tested	Precipitate with 2-butanon/dichloromethane (1 to 1 volume) at -10 °C
6. Asphaltene Content (wt %) 1.2% / 3.1%	IP-Method 143/84
7. Resin Content (wt %) 11.1% / 9.9%	Jokuty et al., 1996
8. Boiling point distribution including, for each fraction, the percent volume or weight and the boiling point range in °C	ASTM D2892 (TBP distillation) or ASTM D2887/5307
9. Sulphur (wt %) 0.5wt %/0.26%	ASTM D4294

Note: If the distillation information in Item No. 8 in the above table is not available, the GOMR may accept the following information in lieu of Items Nos. 5, 6, 7, and 8: weight percent total of saturates, aromatics, waxes*, asphaltenes, and resins; and total BTEX (ppm) using analytical methods compatible with the Hydrocarbon Groups methodology found in Jokuty et al., 1996).

*No Data Available.

All in wt% Topped Basis

SARA (Topped Basis) All in wt %					
Wells**	Saturates	Aromatics	Resin	Asphaltenes	BTEX
OCS-G-15565 GL 248 #2BP3 "G2"	43.0	44.7	11.1	1.2	OCS-G-15565 GL 248 #2BP3 "G2"
OCS-G-15565 GL 248 #2BP3 "L"	48.1	38.0	9.9	3.1	OCS-G-15565 GL 248 #2BP3 "L"

Identify the oil you analyze. Refer to the following sample chart.

Oil from one well	Oil from more than one well sampled on a facility	Oil from a pipeline system
·Area/Block ·BSEE platform ·API Well No. ·Completion perforation interval ·BSEE's reservoir name ·Sample date ·Sample No.(if more than one is taken)	GC 248 OCS-G 15565 608115009700 L sand completed "G2" / "L" 12/5/96 NG-O-1411D / NG-O-1397D	NA

E. 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 SDOCD.

F. Bonding

The bond requirement for the activities proposed in this SDOCD 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 National NTL No. 2008-N07, "Supplemental Bond Procedures."

G. Oil Spill Financial Responsibility (OSFR)

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

H. Deepwater well control statement

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

I. Suspension of Production

The operations proposed in this SDOCD are not under a Suspension of Production.

J. Blowout Scenario

Summary

This Section was prepared by Shell Offshore Inc. (Shell) pursuant to the guidance provided in the Bureau of Ocean Energy Management's (BOEM) Notice to Lessees (NTL) No. 2010-N06 with respect to blowout and worst case discharge scenario descriptions.

Shell focuses on an integrated, three-pronged approach to a blowout, including prevention, intervention, containment and recovery. Shell believes that the best way to manage blowouts is to prevent them from happening. Maintaining well control at all times and thus preventing a blowout is the key focus of our operations. Significant effort goes into the design and execution of wells and into building and maintaining staff competence with the goal of safe and environmentally sound well construction. Shell continues to invest independently in Research and Development (R&D) to improve the safety and reliability of our well systems. Shell intends to comply with all applicable laws, regulations, rules, and Notice to Lessees.

Shell is a founding member of the Marine Well Containment Company (MWCC) and will have access to an integrated subsea well control and containment system that can be rapidly deployed through the MWCC. MWCC is a non-profit organization that owns, manages, and provides fully trained crews and operates the subsea containment system during a response. The near term containment response capability will include lessons learned and equipment used in the Macondo response. Shell is also investing in R&D to improve future containment systems. Shell is a member of Clean Caribbean America (CCA), Marine Spill Response Corporation (MSRC), Clean Gulf Associates (CGA), and OSRL/EARL to provide the resources necessary to respond to a spill as outlined in our Regional Oil Spill Response Plan.

The Worst Case Discharge (WCD) blowout scenario for the Green Canyon Block 248 (Glider Field) is calculated for the Green Canyon 248, OCS-G 15565 GC 248-GL006 proposed development well penetration and is based on the guidelines outlined in NTL No. 2010-N06 along with the subsequent Frequently Asked Questions (FAQ). In the unlikely event of a spill, Shell's Regional OSRP is designed to contain and respond to a spill that meets or exceeds this WCD. This WCD does not take into account potential flow mitigating factors such as well bridging, obstructions in the wellbore, reservoir barriers, or early intervention.

Uncontrolled blowout (volume first day)	398,000 bbl
Uncontrolled blowout rate (first 30-days average daily rate)	365,000 bopd
Duration of flow (days) based on relief well	92 days
Total volume of spill (bbls) for 100 days	25.4 MMBO

Table 1 Worst Case Discharge Summary

Glider Field Overview

The Glider Field (GC 248 OCS-G 15565) is located approximately 165 miles south-southwest of New Orleans, Louisiana. It is a subsea development in the deepwater Gulf of Mexico that is tied back to the GC 158 Brutus TLP via one 6 ½" OD flow line. The Brutus facility has the capacity of 120,000 BOPD, 150 MMSCF/Day and 35,000 BWPD. Glider is located in GC 248, approximately 7 miles southeast of the Brutus TLP. The maximum water depth of the Glider GC 248 lease is 3,651.'

A total of 11 wells (including sidetracks and bypasses and excluding a geotechnical well and a failed well) have been drilled. There are currently two wells producing in the field, GC 248-GL4 and GC 248-GL5ST1. When the proposed GC 248-GL006 is drilled a total of five development wells (including one sidetrack producer) would have been drilled in Glider field. Shell is the sole Operator of the field.

Glider was discovered in 1996 by the Green Canyon 248 OCS-G 15565 GC 248-2BP1 (and related bypasses; GC 248-2BP2 and GC 248-2BP3). Due to disappointing appraisal well results (1997) and challenging turbidite channel reservoir geology and faulting, first oil didn't occur until 2004.

Glider Field geology and development plan have been described in detail in the Glider Field Conservation Information Document (CID) submitted to the BOEM in 2003. The GC 248-GL006 referred to throughout this document has replaced the "planned" GC 248-GL4ST1 in the CID because planned sidetrack was deemed too difficult to drill after a recent engineering review.

Glider field is perched on the western flank of a north-plunging salt-cored ridge. Hydrocarbon accumulations at Glider as well as Brutus field are controlled by basin margin faulting and stratigraphic terminations. The Glider field structure is broken by several down-to-the-northwest normal faults, resulting in multiple small fault-block reservoirs per sand level. Significant production issues include solids production and asphaltene deposition.

Historically, the 3D seismic data quality over the field has not been adequate to image the aforementioned Glider geology. Recently Shell acquired an Ocean Bottom Seismic Survey, which was designed to better image reservoir details, including the terrain under a salt overhang.

1) Purpose

Pursuant with 30 CFR 250.213(g), 250.219, 250.250, and NTL No. 2010-N06, this document provides a blowout scenario description, further information regarding any potential oil spill, the assumptions and calculations used to determine the worst case discharge (WCD) and the measures taken to: (1) enhance our ability to prevent a blowout and (2) respond and manage a blowout if it were to occur. These calculations are based on our best technical estimates of subsurface parameters that are derived from the Glider CMG IMEX dynamic reservoir models and 3D seismic data. The parameters are 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 Development Operations Coordination Documents (DOCD) as requested by NTL No. 2010-N06 in response to the explosion and sinking of the Mobile Offshore Drilling Unit (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 development well locations in the approved Glider DOCD were assessed for WCD. The GC 248-GL006 well represented the highest flow potential. The WCD blowout scenario was calculated based on the guidelines outlined in NTL No. 2010-N06 and subsequent Frequently Asked Questions (FAQ) documents. The GC 248-GL006 will be drilled using the Transocean Deepwater Nautilus (Moored Semi). The well will be drilled using a typical post Macondo subsea wellhead system and casing program that will be described in detail later and is also shown in the attachments. A hydrocarbon influx and a well control event were modeled to occur from the target sands. The simulated blowout modeled results in unrestricted flow from the well at the surface which represents the WCD scenario (no restrictions in the wellbore, failure/loss of the BOP, and a blowout to the surface).

b) Estimated flow rate of the potential blowout

Category	**DOCD**
Type of Activity	Drilling
Facility Location (area/block)	GC 248
Facility Designation	Transocean Deepwater Nautilus (MODU)
Distance to Nearest Shoreline (miles)	91 miles
Uncontrolled blowout (volume first day)	398,000 bbl
Uncontrolled blowout rate (first 30-days average daily rate)	365,000 bopd

Table 2 Estimated Flow Rates of a Potential Blowout

c) Total volume and maximum duration of the potential blowout

Duration of flow (days)	92 days total duration to drill relief well (18 rig mob & transit, 50 spud to "E" Series, 24 ranging)
Total volume of spill (bbls)	25.4MMBO based on 92 days flowing. Note: From CMG IMEX dynamic reservoir models

Table 3 Estimated Duration and Volume of a Potential Blowout

There is a significant 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. At very short times, e.g. during the first 24 hours, the pressure profile in the reservoir changes from the moment the 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 models can include these effects and form the basis of the NTL No. 2010-N06 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 (WCD) (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 sand face. Based on the nodal analysis and reservoir simulation models outlined above, a surface blowout would create a high drawdown at the sand face. Given the substantial fluid velocities inherent in the WCD, 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 assume any bridging of the wellbore.

f) Likelihood for intervention to stop the blowout

Safety of our operations is Shell's top priority. Maintaining well control at all times and thus preventing 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 that make 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 NTL No. 2008-N05 (to the extent applicable) and the Drilling Safety Rule.

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 deepwater. Shell is further analyzing these advances and incorporating them into its comprehensive approach to help prevent and, if needed, control another deepwater well control incident.

Should intervention at the wellhead not be possible, specialized equipment can be used to connect to a riser stub, damaged connector, casing stub, or to the sea floor and allow the well to be shut-in to contain the blowout. The subsea containment assembly and other specialized connection devices will be available from the Marine Well Containment Company (MWCC). Shell is a founding member in the Marine Well Containment Company which is currently constructing the containment equipment and developing contracts for access to near term response capability. The near term response capability will incorporate lessons learned and technology advances as they apply to containment. Shell is currently in the process of concluding contracts that will secure the availability of some of the equipment and vessels used by BP during the Macondo spill response. The MWCC website can be accessed for a full description of the systems and components. It is expected that key components of the system will begin to be available by January 2011. The MWCC will own, maintain, and deploy

both existing equipment and equipment being constructed for well intervention and containment. The newly constructed system will be designed to be flexible and adaptable, and be responsive to a wide range of potential scenarios, deepwater depths up to 10,000 feet, weather conditions, and flow rates. Once constructed, the system components will be fully tested to ensure functionality and will be maintained in a state of continuous operational readiness. In the event of a future incident, mobilization to the field will start within days and the system will be fully operational within weeks. Once built, the new containment system will further enhance Shell's Regional OSRP.

Shell is investing in research and development activities on its own to identify additional containment components and equipment that will potentially increase the range of applications and effectiveness for equipment similar to that of MWCC, and systems that can be deployed more effectively in the water column that resemble "tents or capture domes" and thus enhance well shut-in capability.

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

Blowout intervention can be conducted from 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 three to five MODU rigs in the 2012–2017 timeframe capable of executing work at Glider water depths. The dynamically positioned rigs currently under contract, the Noble Danny Adkins and the Bully 1, will be the preferred rigs for blowout intervention work. Additionally, in the event of a blowout, there is the distinct possibility that other non-contracted rigs in the GOM could be utilized because they are readily available or more suitable. All efforts will be made at the time to secure the appropriate rig. Shell's current contracted rigs capable of operating at Glider water depths and reservoir depths are shown in Table 4 below:

Rig Name	Rig Type	Water Depth Capability	Depth Rating*
Deepwater Nautilus	Moored semi	9,500′	30,000′
Noble Jim Thompson	Moored semi	7,500′	30,000′
Noble Driller	Moored semi	5,000′	25,000′
Noble Danny Adkins	Dynamically positioned semi	10,000′	35,000′
Bully 1	Dynamically positioned drill ship	10,000′	35,000

Table 4 Shell Contracted Rigs Capable at Glider Field

*Rig depth rating is based loosely on racking capacity of the rig and in many cases the ability of the rig to drill or intervene deeper that the depth rating 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. The list of rigs capable of operating at Glider is tabled above. It is expected to take an average of 4 days to safely secure the well that the rig is working on up to the point the rig departs location, and an additional 14 days transit to mobilize to the relief well site depending on distance to the site. The relief well will take approximately 50 days to drill down to the last casing string above the blowout zone, plus approximately 24 days for precision ranging activity to intersect the blowout well bore. Total time to drill a relief well would be ~92 days for the Glider wells.

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 during 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). The safety case requirement is ingrained into Shell's Health, Security, Safety, Environment, and Social Performance Control Framework. 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 and execution phases of the well, providing their specific expertise. Drill the Well On Paper (DWOP) exercises are routinely conducted with rig personnel and vendors involved in execution of our wells. 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 Glider. 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 drilling foreman and Shell representative 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 virtually by onshore teams consisting of geoscientists, petrophysicists, well engineers, and 24/7 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 Foreman is practiced which includes internal professional examinations to verify competency. Other industry training in well control by the 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 with 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 and 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 Section 3f of this document, Shell is currently analyzing recent advances in containment technology and equipment and will incorporate them as they become available and is a founding member of MWCC.

k) Arrangements for drilling a relief well

The size of the Shell contracted rig fleet in the GOM from 2012 - 2017 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 a 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 OSRP

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 an exploration 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.

K. Chemical Products

Information regarding chemical products is not included in this SDOCD as such information is not required by BOEM GOMR.

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. Shallow Hazards Report

Fugro-McClelland Marine Geosciences, Inc prepared a report for Shell titled "Shallow Hazards Report, Blocks 203, 204, 247, and 248 Green Canyon Area, Gulf of Mexico" (Report 0201-2688) in August 1995.

Fugro-McClelland Marine Geosciences, Inc. prepared a report for Shell titled "Geotechnical Investigation Glider Prospect, Boring GC-15 Block 248, Green Canyon Area, Gulf of Mexico" (Project No. 0201-2819) in August 1996.

GEMS, Inc. prepared a report for Shell titled "Integrated Geological and Geotechnical Study, Glider Prospect, Green Canyon Area, Gulf of Mexico" (Report 0697-022) in May 1998.

C&C Technologies prepared for a report for Shell titled "Archaeological Assessment Report Block 248 and Vicinity, Green Canyon Area" (Report No. 083925-084293) in November 2008.

GEMS, Inc. prepared a report for Shell titled "Geologic and Stratigraphic Assessment the "Glider Field", Block 248 (OCS-G-15565) Green Canyon Area, Gulf of Mexico" (Project No. 0608-1518) in June 2009.

F. Shallow Hazards Assessment

Seafloor and Archaeological Assessment:

BOEM Plan Number S-7337 granted Shell approval to drill Green Canyon 248 Wells GL006, GL007 and GL008. The locations are:

Approved Location # GL006 (Previously called #7):	X = 2,246,230.00	Y = 10,070,692.00
Approved Location # GL007 (Previously called #6):	X = 2,423,970.00	Y = 10,067,450.00
Approved Location # GL008:	X = 2,423,893.00	Y = 10,067,330.00

Per the C&C report referenced, none of the sonar contacts within the approved 12,000' anchor radius are deemed to be of historical significance. (See reports for details.)

Current Planned Operations:

The Glider development is a subsea tieback to the Brutus Field TLP located in Green Canyon Block 158. None of the Glider wells or objectives will be drilled from the Brutus TLP.

Shell requests approval to install the following equipment on the seafloor to connect to Brutus:

Proposed New Seafloor Equipment	X Coordinate	Y Coordinate
Proposed Manifold Center	2,426,237.00	10,070,607.00
Proposed Location #9	2,426,314.00	10,007,659.00

Existing/Approved Seafloor Equipment	X Coordinate	Y Coordinate
Existing Sled 1	2,426,168.00	10,070,640.00
Existing Sled 2	2,426,170.00	10,070,577.00
Existing UTH	2,426,164.44	10,070,712.21
Existing Well #3	2,424,045.18	10,067,314.23
Existing Well #4	2,426,240.00	10,070,542.00
Existing Well #5	2,426,099.82	10,070,602.25
Approved Proposed Well #6	2,246,230.00	10,070,692.00
Approved Proposed Well #7	2,423,970.00	10,067,450.00
Approved Proposed Well #8	2,423,893.00	10,067,330.00
Existing UTH	2,426,179.26	10,070,295.20
Existing UTH	2,424,275.20	10,067,525.85

Regional Geologic Setting

GC 248 is dominated by a north-south trending seafloor scarp and dips over 7 degrees to the southwest at the drill center. There are fluid expulsion features and high amplitude mud mounds in the block. There is no evidence of seafloor or near-surface faulting, slumping, amplitudes or fluid expulsion features within a 2000' vicinity of Proposed Location #GL009 and the Proposed Glider Manifold.

This submittal complies with the BOEM's NTLs 2008-G04, 2008-G05, and 2009-G40. Within above referenced Archaeological Report study area; there are no marine avoidance targets in the approved 12,000 ft radius (See Shallow Hazards and Archaeological reports for details.)

Site Clearance

Proposed Location GL006, Green Canyon 248:

Proposed Location GC248 GL006 will be located in a water depth of approximately 3215 feet and will be located 400 feet southeast seafloor gullies. A seafloor mudflow occurs over 3000 feet northwest of this location and there are no faults in the vicinity of this location.

GL006 will be positioned 150 feet north of Location GL004 and will not interfere with existing location GL004 or Proposed Location GL007.

The stratigraphy at the site of Proposed Location GC248 GL006 consists of alternating sections of layered stratigraphy and channel-fill sequences. Horizon B is identified 495 feet below the mud line. Horizon C is identified 640 feet below the mud line. Horizon D is identified 1780 feet below the mud line.
An amplitude anomaly is identified 900 feet northwest of this site. This anomaly is identified 1000 to 2500 feet below the mud line. GL006 will not penetrate this amplitude anomaly.

Flowlines and umbilicals associated with the Glider field are the only flowlines and umbilicals currently located in the vicinity of Proposed Location GC245 GL006.

Proposed Location GL007, Green Canyon 248:

Proposed Location GC248 GL007 will be located in a water depth of approximately 3429 feet and will be located 300 feet northwest seafloor gullies. A seafloor mudflow occurs over 4000 feet northwest of this location. The stratigraphy below consists of alternating sections of layered stratigraphy and channel-fill sequences.

GL007 will be positioned 155 southwest of Location GL4 and 143 feet southwest of proposed Location GL008 and will not interfere with existing location GL004 or Proposed Location GL008.

A borehole (BH-1) was drilled over 3000 feet north of GL007, to 1680 feet below the mud line. The results of BH-1 indicated that sands were encountered 591 to 600 feet below the mud line. This sand interval did not flow in BH-1. A swelling clay was encountered 800 feet below the mud line. The channel-fill sequences below 800 feet are clay filled.

An amplitude anomaly occurs over 100 feet southwest of Proposed Location GL007. This anomaly occurs over 1000 feet below the mud line. GL007 will not penetrate this amplitude anomaly.

A buried fault occurs over 1800 feet south of this location. This fault occurs 3400 feet below the mud line. GL007 will not penetrate this fault during the shallow casing program.

Proposed Location GL008, Green Canyon 248:

Proposed Location GC248 GL8 will be located in a water depth of approximately 3429 feet. The well will be located 300 feet northwest seafloor gullies. A seafloor mudflow occurs over 4000 feet northwest of location. The stratigraphy below consists of alternating sections of layered stratigraphy and channel-fill sequences.

The well will be positioned 152 northwest of Location GL4 and 143 feet northeast of Proposed Location GL007 and will not interfere with existing location GL004 or GL007.

A borehole (BH-1) was drilled over 3000 feet north of GL008, to 1680 feet below the mud line. The results of BH-1 indicated that sands were encountered 591 to 600 feet below the mud line. This sand interval did not flow in BH-1. A swelling clay was encountered 800 feet below the mud line. The channel-fill sequences below 800 feet are clay filled.

An amplitude anomaly occurs over 200 feet southwest of Proposed Location GL008. This anomaly occurs over 1000 feet below the mud line. This location will not penetrate this amplitude anomaly.

A buried fault occurs over 1800 feet south of this location. This fault occurs 3400 feet below the mud line. GL008 will not penetrate this fault during the shallow casing program.

Proposed Location GL009, Green Canyon 248:

The well is in the northwest quadrant of the block in a water depth of 3,223 feet. It is less than 100 feet of approved Proposed Well #7. There are two wells, G4 and G5, within the drill center. Their distances are 138' and 221' respectively.

There are no marine avoidance targets within the 2,000 ft radii of the existing and planned wellsites. There are no marine avoidance targets within the approved 12,000' anchor radius requiring avoidance. (See Shallow Hazards and Archaeological reports for details.)

The shallow stratigraphy at this location has five units.

- Unit 1 (486 ft thick) from 3323 to 3709 ft SS of continuous reflectors with greater discontinuity near the escarpment. Hemipelagic drape of 75-100 ft thick overlays parallel, stratified clays and silts.

- Unit 2 (178 ft thick) from 3709 to 3887 ft SS is composed of low to moderate amplitude reflectors representing mud and silts.

- Unit 3 (1074 ft thick) from 3887 to 4961 ft SS is composed of two sections. The upper section is 419 feet thick composed of low amplitude, interbedded clays and minor silts. The lower section is 655 ft thick composed of well developed sand and mud, prone to flow and gumbo formation. The drilling program is designed to minimize the risk of shallow water flow potential.

- Unit 4 (655 ft thick) from 4961 to 6306 ft is composed of low amplitude, low frequency, seismic reflectors, primarily consisting of mud.

- Unit 5 (1484 ft thick) from 6306 to 7790 ft is composed of poorly developed mud and sand.

The well will penetrate a known shallow-water flow zone which was successfully controlled in previously drilled wells. The location was optimized to minimize the potential for shallow water flow and shallow gas. The potentials are as follows:

Unit	SWF Potential	Shallow Gas Potential
Unit 1	Low	Low
Unit 2	Moderately Low	Low
Unit 3 (Upper)	Low	Low
Unit 3 (Lower)	Moderately High	Low
Unit 4	Low	Low
Unit 5	Moderate-low	Low

There are no known shallow gas amplitudes within 500 ft of the proposed well. The nearest potential shallow gas is in the SWF prone Unit 3, approximately 700 ft northeast of the well at a depth of 4280 ft subsea.

Man-Made Features

Currently, a pipeline and umbilical run from Glider to the Brutus TLP. Based on the BOEM database, there are no other known pipelines or communications cables in the subsurface study area. All known equipment within 2,000 ft of Proposed Well #9 and the Proposed Glider Manifold is identified above.

Based on a high-resolution geophysical survey consisting of frequency enhanced 3-D seismic, ESRs, ESRs with amplitudes applied and AUV high-resolution data these locations appear suitable for the planned activity.

Conclusion

Based on a high-resolution geophysical survey, consisting of frequency enhanced 3-D seismic, ESRs, ESRs with amplitudes applied and AUV high-resolution data, these locations appear suitable for the planned activity.

G. High-Resolution Seismic Lines

Proposed wells GL006 & GL8 are within 500' of No. 3 well (GL3) approved 5/9/97 (R3136) and proposed wells GL 5 and GL7 are within 500' of No. 4 well (GL4) approved 12/10/03 (N-7841).
Well GL009 is included in this plan.

H & I Stratigraphic Column with Time vs depth table

Not required for DOCDs.

J. Geochemical Information

This information is not required for Plans submitted in the GOM Region.

K. 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 550.245, Shell requests that the Regional Supervisor, Field Operations, determine the zones in the proposed drilling operations in this plan to be classified as an area where the absence of H_2S has been confirmed.

C. 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

A. Technology and reservoir engineering practices and procedures

Proprietary data

B. Technology and recovery practices and procedures

Proprietary Data

C. Reservoir Development

Proprietary Data

SECTION 6: BIOLOGICAL, PHYSICAL, AND SOCIOECONOMIC INFORMATION

A. Chemosynthetic Communities Report

ANCHOR CLEARANCE AND CHEMOSYNTHETIC
ORGANISMS COMMENTS

Chemosynthetic Community Statement

Per NTL No. 2009-G40, there are no high-density deepwater benthic communities located within 2,000' of the proposed mud and cuttings discharge location and there are no high-density deepwater benthic communities located within 500' of the proposed equipment locations. The flowlines will not disturb any high-density areas of chemosynthetic communities.

There is no evidence within this area of seafloor or near-surface hydrocarbon-charged sediments associated with surface faulting, acoustic void zones associated with surface faulting, mounds, knolls, gas seeps, oil seeps, or hard bottom.

Shell will maintain avoidance zones around all areas of possible chemosynthetic communities, pipelines, and marine avoidance zones.

B - F

Pursuant to NTL No. 2008-G04 the proposed operations covered by this SDOCD do not involve operations impacting the following: Topographic features map, Topographic features statement (shunting), Live bottoms, (Pinnacle Trend) map, Live bottoms (low relief) map, or potentially sensitive biological features map.

G. Remotely Operated Vehicle (ROV) Monitoring Plan

In accordance with the provisions of NTL 2008-G06, Remotely Operated Vehicle Surveys in Deepwater, Green Canyon Block 248 is located in Grid 9. Grid 9 is an area that has adequate ROV survey coverage; therefore we are not proposing to run the pre- and post-ROV survey in accordance with the NTL.

H. Threatened and Endangered Species Information

There are 5 species of sea turtles that may be found in the Gulf of Mexico (see table below). No critical habitat for these species has been designated in the Gulf of Mexico.

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

There are 29 species of marine mammals that may be found in the Gulf of Mexico (see table 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	
Northern 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	
West Indian manatee	Trichechus manatus	E

The EIA found in Section 18 discusses potential impacts and mitigation measures related to threatened and endangered species.

I. Archaeological Report

An archaeological report was generated by C&C Technologies in 2008 and provide to BOEM at that time. Shell will comply with all conditions of NTL 2005-G07.

J. Air and Water Quality Information

Pursuant to NTL 2008-G04 the proposed operations covered by this SDOCD do not require Shell to provide additional information relating to air and water quality information. For specific information relating to air and water quality information please refer to the EIA, Attachment 18.

K. Socioeconomic Information

Pursuant to NTL 2008-G04 the proposed operations covered by this SDOCD do not require Shell to provide additional information relating to air and water quality information. For specific information relating to socioeconomic information please refer to the EIA, Attachment 18.

SECTION 7: WASTE AND DISCHARGE INFORMATION

A. Projected Generated Wastes

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

Supplmental DOCD: Glider

Projected generated waste			Projected ocean discharges		Projected Downhole Disposal
Type of Waste and Composition	**Composition**	**Projected Amount (Total)**	**Discharge rate (per well)**	**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*	*discharge pipe*	*No*
Water-based drilling fluid	barite, additives, mud	378,400	26,650 bbls/day	Seafloor discharge prior to marine riser installation	No
Cuttings wetted with water-based fluid	Cuttings coated with water based drilling mud	8,800	150 bbls/day	Seafloor discharge prior to marine riser installation	No
Cuttings wetted with synthetic-based fluid	Cuttings generated while using synthetic based drilling fluid	17,964	250 bbls/day	Cuttings chute below MSL	No
Synthetic based drilling fluid adhering to washed drill cuttings	Synthetic based drilling fluid adhering to washed drill cuttings	720	10 bbls/day	Cuttings chute below MSL	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	122,120	215 bbls/day	Ground to less than 25 mm mesh size and discharge overboard	No
Sanitary waste (toilet water)	treated sanitary waste	40,896	72 bbls/day	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	Wash and rainwater	5,680	10 bbls/day	Drained overboard through deck scuppers	No
Will you conduct well treatment, completion, or workover?					
Well Treatment Fluids	Water based frac fluids. Solvent based pipe pickle	8,000	50 bbls/well	Frac fluids will be injected in the well during the completion and will be flowed back to the host facility when the well is brought online. Returns will be minimal and will undergo static sheen testing and monthly grease compliance testing prior to discharge overboard. Pipe pickle to be collected and disposed of onshore.	No
Well Completion Fuids	Calcium Bromide brine	6000	1,500 bbls/well	Base plan is to catch all brine and return onshore for reclaim. In the event that this cannot happen, returns will undergo static sheen testing and monthly grease compliance testing prior to discharge overboard.	No
Well Clean Up Fluids	Base oil Transition Spacer Solvent based sweep Viscous Spacer NaCl brine (riser clean out) CaBr2 Brine (wellbore clean out)	12,000	3,000 bbls/well	Base oil will be caught with SBM and taken onshore. Transition Spacer will be caught and taken onshore for disposal.Solvent based sweep will be caught and taken onshore for disposal. Viscous spacer and NaCl will undergo static sheen testing and monthly grease compliance and be discharged overboard. CaBr2 will be reclaimed.	No
Miscellaneous discharges. If yes, only fill in those associated with your activity.					
Desalinization unit discharge	Rejected water from watermaker unit	5680	10 bbls/day	Discharged overboard 35 feet below waterline	No
Blowout prevent fluid	Water based	330	0.6 bbls/day	Disharge at seafloor	No
Ballast water	Uncontaminated seawater	1,249,600	2,200 bbls/day	Discharged overboard just above waterline	No
Bilge water	Bilge and drainage water will be treated to MARPOL standards (< 15ppm oil in water).	105,080	185 bbls/day	Bilge and drainage water will be treated to MARPOL standards (< 15ppm oil in water).	No
Excess cement at seafloor	Cement slurry	450 bbls/well (assume planned 100% excess is discharged)	450 bbls/well	Discharged at the seafloor during riserless drilling	No
Fire water	Treated seawater	9,460 bbls/well	2,000 bbls/month	scuppers	No
Cooling water	Treated seawater	61,288,620 bbls/well	431,610 bbls/day	Discharged overboard 40 feet below waterline	No
Will you produce hydrocarbons? If yes fill in for produced water.					
Produced water	NA	NA	NA	NA	NA
Will you be covered by an individual or general NPDES permit ?		GMG 290103			

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

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B. Projected Ocean Discharges

TABLE 7B: WASTES YOU WILL TRANSPORT AND /OR DISPOSE OF ONSHORE					
			Supplmental DOCD: Glider		
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
Oil-based drilling fluid or mud	NA	NA	NA	NA	NA
Synthetic-based drilling fluid or mud	Used SBF and additives	Drums or dedicated tanks on support vessels	MI Drilling Fluids - Fourchon, LA	7,000 bbls/well	Recycled
Cuttings wetted with Water-based fluid	NA	NA	NA	NA	NA
Cuttings wetted with Synthetic-based fluid	Drill cuttings from synthetic based interval.	Storage tank on supply boat	Newpark Environmental, Ingleside, TX	150 bbls / well	Disposal
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 Management, W. Patterson, LA or ARC, New Iberia, LA	22,400 lbs/well	Recylce
Trash and debris - non-recyclables	trash and debris	Storage bins on supply boat	Newpark Environmental, Ingleside, TX or Bridge City, TX	11,200 lbs/well	Landfill
used oil	used oil	Drums on supply boat	Smiths Incinerator Venice, LA	55 bbls/well	Incinerate
Chemical product wastes	Solvent	Captured at surface in MPT tanks, transported onshore for disposal in an environmentally friendly manner.	Safety Kleep, Denton, TX or Lamp Environmental, Hammond, LA	150 bbls/well	Recycled
NOTE: If you will not have a type of waste, enter NA in the row.					

C. Modeling Report

Shell did not model the trajectory for discharges because it is not required in the GOM.

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SECTION 8: AIR EMISSIONS INFORMATION

Emissions Worksheet and Screening Questions

Screening Questions for DOCD'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
Does or will the facility complex associated with your proposed development and production activities process production from eight or more wells?		X
Do you expect to encounter H_2S at concentrations greater than 20 parts per million (ppm)?		X
Do you propose to flare or vent natural gas in excess of the criteria set forth under 250.1105(a)(2) and (3)?		X
Do you propose to burn produced hydrocarbon liquids?		X
Are your proposed development and production activities located within 25 miles from shore?		X
Are your proposed development and production activities located within 200 kilometers of the Breton Wilderness Area?		X

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

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		87.75	3030.30		NA
SO_x		49.01	3030.30		NA
NOx		2,947.89	3030.30		NA
VOC		90.79	3030.30		NA
CO		643.09	68,787.02		NA

Contact: Tracy Albert, 504.728.4652, tracy.albert@shell.com.

(1) Worksheets: Worksheets are not required but a copy of the Excel worksheet is provided on the Proprietary Copy of the CD.

SECTION 9: OIL SPILL INFORMATION

A. Oil Spill Response Planning

All the proposed activities and facilities in this SDOCD will be covered by the Regional OSRP filed by Shell Offshore Inc (0689) in accordance with 30 CFR 250. An update to the Regional OSRP was filed with the BSEE October 26, 2010, March 15, 2011, May 31, 2011, July 6, 2011 and August 1, 2011, January, February and March 2012 and July 2012, and is pending approval. An updated OSRP Certification in accordance with 30 CFR 254.2 was accepted by the BSEE in July 2012.

(ii) Spill Response Sites:

Primary Response Equipment Locations	Preplanned Staging Location(s)
Venice, LA; Houma, LA; Pascagoula, MS; Fort Jackson, LA	Fourchon, LA; Pascagoula, MS; Fort Jackson, LA; Venice, LA

(iii) The names of the oil spill removal organizations (OSRO's) under contract include Clean Gulf Associates (CGA), Marine Spill Response Company (MSRC), Clean Caribbean America (CCA), and OSRL/EARL.

Worst Case Scenario Determination:

Category	Regional OSRP	Regional OSRP	DOCD Drilling	DOCD Production
Type of Activity[1]	Subsea Drilling	Production >10 miles to shore	DOCD Drilling	DOCD Production
Facility Location (area/block)	MC 391	MC 807	GC 248	GC 248
Facility Designation[2]	Subsea well 1◇	MB001◇◇	Well GL006	Glider wells
Distance to Nearest Shoreline (miles)	70	53	91	91
Volume[3] Storage tanks (total) Flowlines (on facility) Pipelines Uncontrolled blowout (volume per day) Total Volume	 N/A N/A N/A 416,414* BOPD 416,414 Bbls	 11,163 Bbls 100 Bbls 1,604 Bbls 446,000** BOPD 458,867 Bbls	 0 0 981 398,000*** BOPD 398,981 BOPD	 0 100 981 8,000 BOPD 9,081 Bbls
Type of Oil(s) - (crude oil, condensate, diesel)	Crude oil	Crude oil	Crude oil	Crude oil
API Gravity(s)[4]	26º	26º	33.1º	33.1º

*24 hour rate (391,808 BOPD 30 day average)
**24 hour rate (365,000 BOPD 30 day average)
***24 hour rate (365,000 BOPD 30 day average)

◇This well was reviewed and accepted by BOEM on July 10, 2012 during the drilling of the well. The 30-day average was updated in ROSRP July 2012
◇◇This well was submitted for BOEM approval in Plan N-9627 and Shell's OSRP update March 2012 and is pending approval.

Since Shell Offshore Inc. has the capability to respond to the appropriate worst-case spill scenario included in its regional OSRP, filed with the BSEE October 26, 2010 and updated March 15, 2011, May 31, 2011, July 6, 2011 and August 1, 2011, January, February, March and July 2012 and is pending approval, and 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 SDOCD.

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 BOEMRE Oil Spill Risk Analysis Model (OSRAM) for the Central and Western Gulf of Mexico available on the BOEMRE 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	%
GC 248	15565	44	Matagorda, TX	1
			Brazoria, TX	0
			Galveston, TX	2
			Jefferson, TX	1
			Camaeron, LA	5
			Vermilion, LA	2
			Iberia, LA	0
			Terrebonne, LA	2
			LaFourche, LA	1
			Jefferson, LA	1
			Plaquemines, LA	4

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 BSEE 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 Green Canyon 248 WCD scenario.

Onshore/Nearshore: Cameron Parish is identified as the most probable impacted Parish within the Gulf of Mexico for the Exploratory Worst Case Discharge. Cameron Parish is located in the southwest corner of Louisiana and has a total area of 1,932 square miles of which, 1,313 square miles of it is land and 619 square miles is water. Cameron Parish includes four National Wildlife Refuges including the Cameron Prairie National Wildlife Refuge, East Cove National Wildlife Refuge, Sabine National Wildlife Refuge and part of the Lacassine National Wildlife Refuge. Key ESI maps for Cameron Parish and the legend are shown in Figures 9.C.1through 9.C.10.

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 worst case discharge as effectively as possible. Below is a table outlining the applicable evaporation and surface dispersion quantity:

	Green Canyon Block 248	Calculations (BBLS)
	TOTAL WCD (based on 30 day average (per day))	~365,000
	Loss of volume of oil to natural surface dispersion and evaporation base (approximate bbls per day)* (12% Natural surface evaporation and dispersion in 24 hrs)	-43,800
	TOTAL REMAINING	~321,200

Table 9.D.1 Oil Remaining After Subsurface and Surface Dispersion

* As this scenario involves a surface blowout onboard the platform, an ADIOS 2 Model was ran to account for surface dispersion and evaporation.

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 26 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 GC 248 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 219,800 barrels/day. Temporary storage associated with the identified skimming and temporary storage equipment equals approximately 181,414 barrels.

	De-rated Recovery Rate (bopd)	Storage (bbls)
Offshore Recovery and Storage	825,920	1,233,676
Nearshore Recovery and Storage	146,592	9,690
Total	975,512	1,243,366

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.

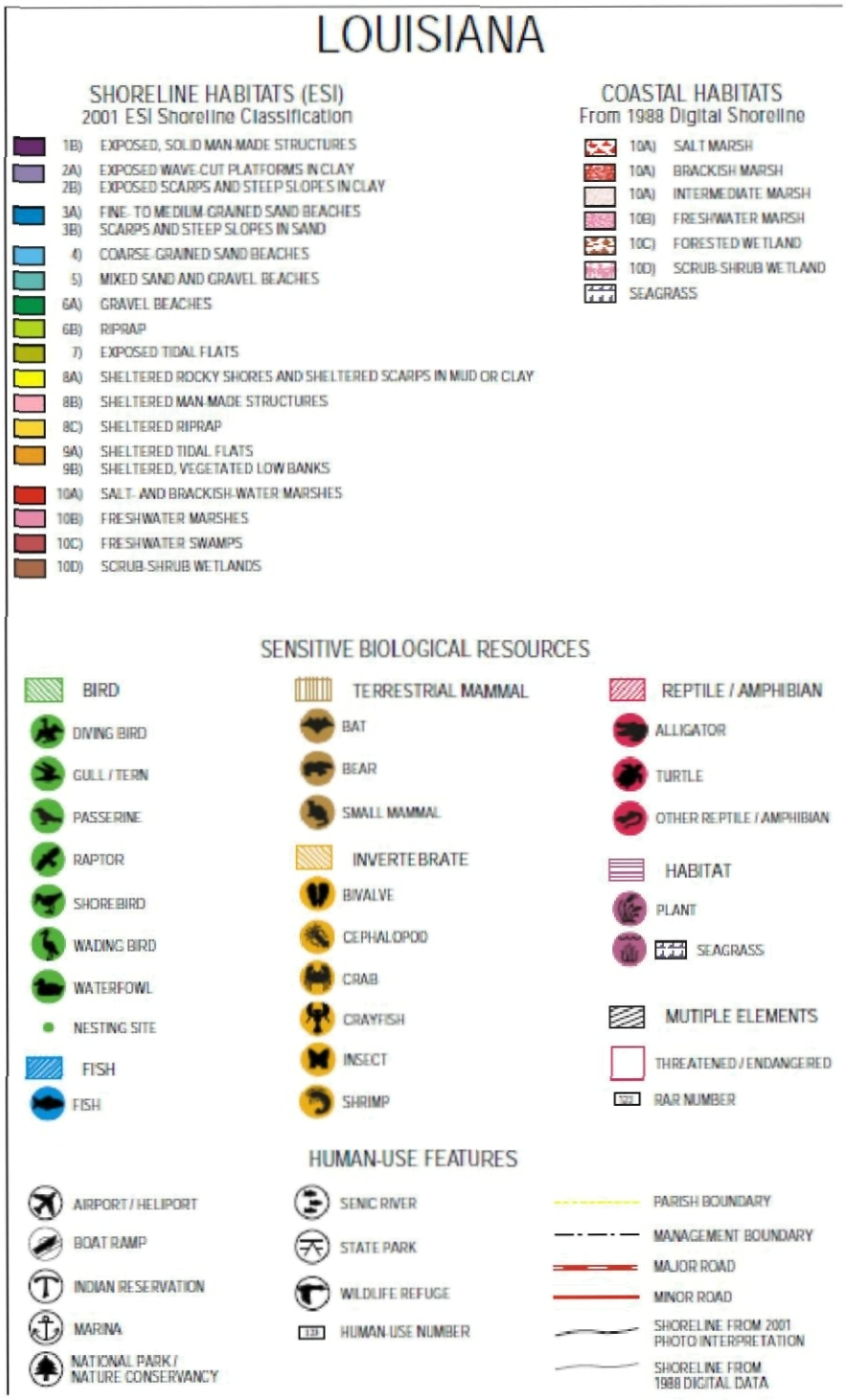

Figure 9.C.1 Environmental Sensitivity Index Map Legend

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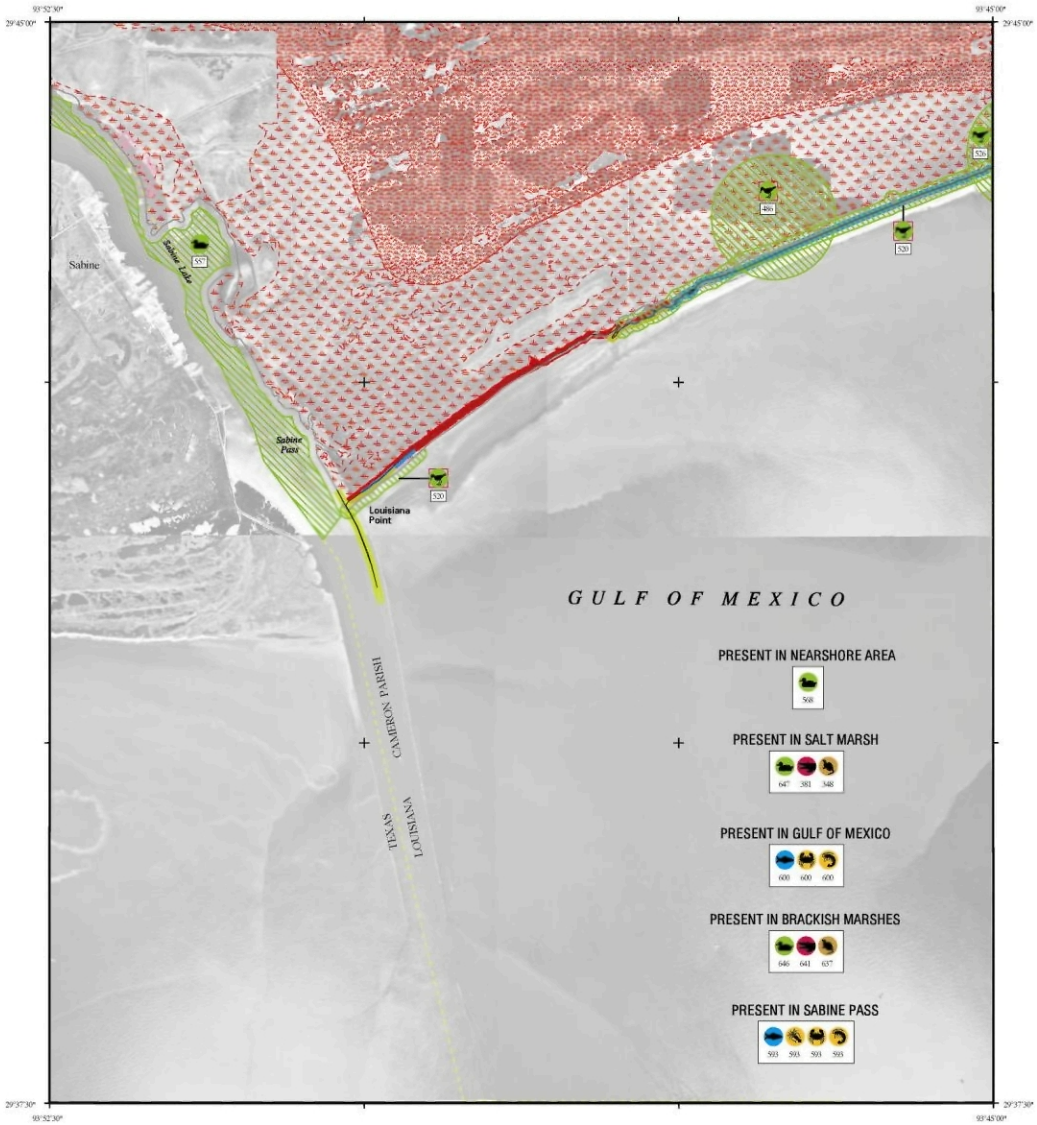
ENVIRONMENTAL SENSITIVITY INDEX MAP



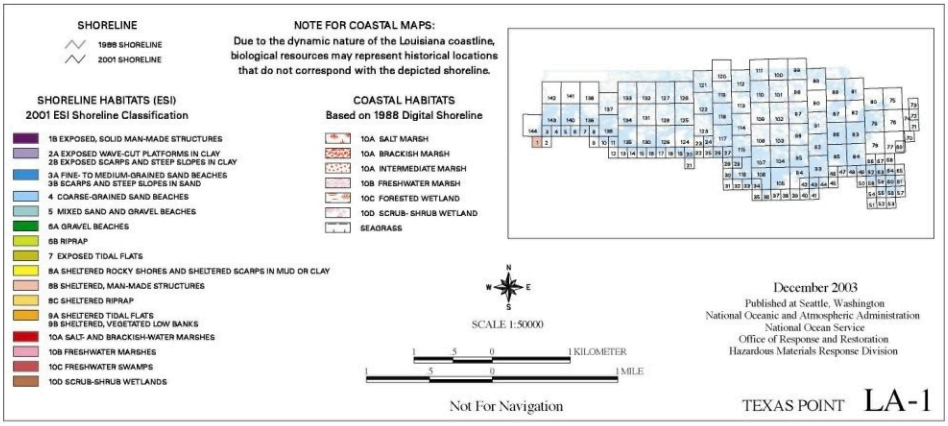
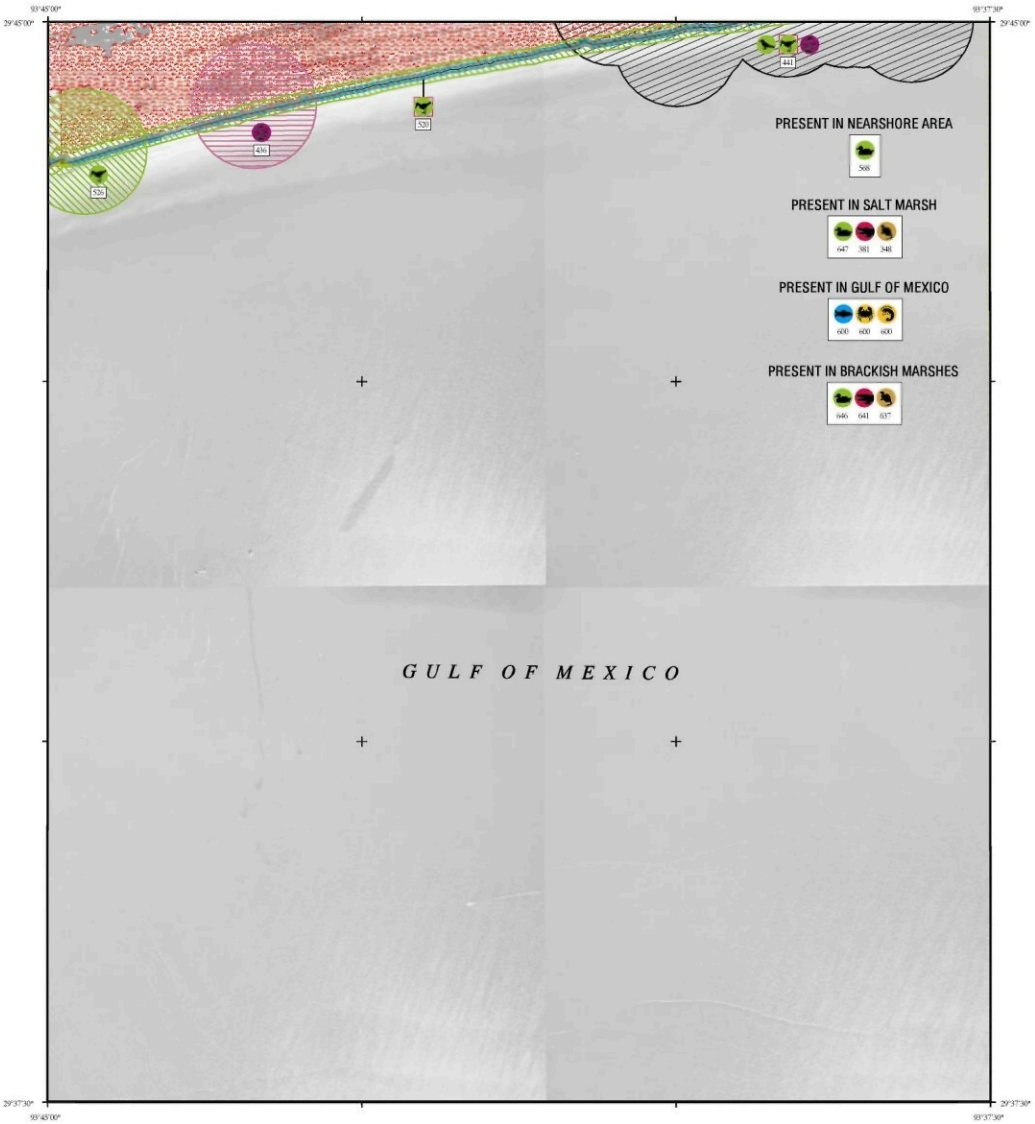


Figure 9.C.2 Texas Point ESI Map

ENVIRONMENTAL SENSITIVITY INDEX MAP



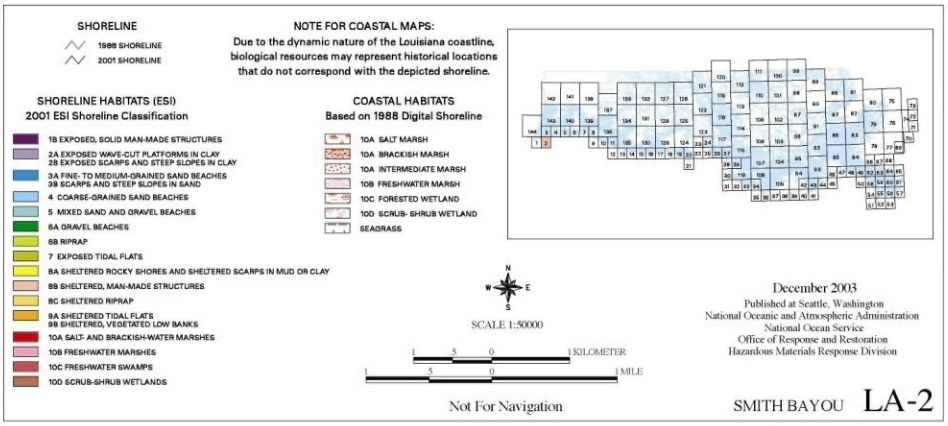
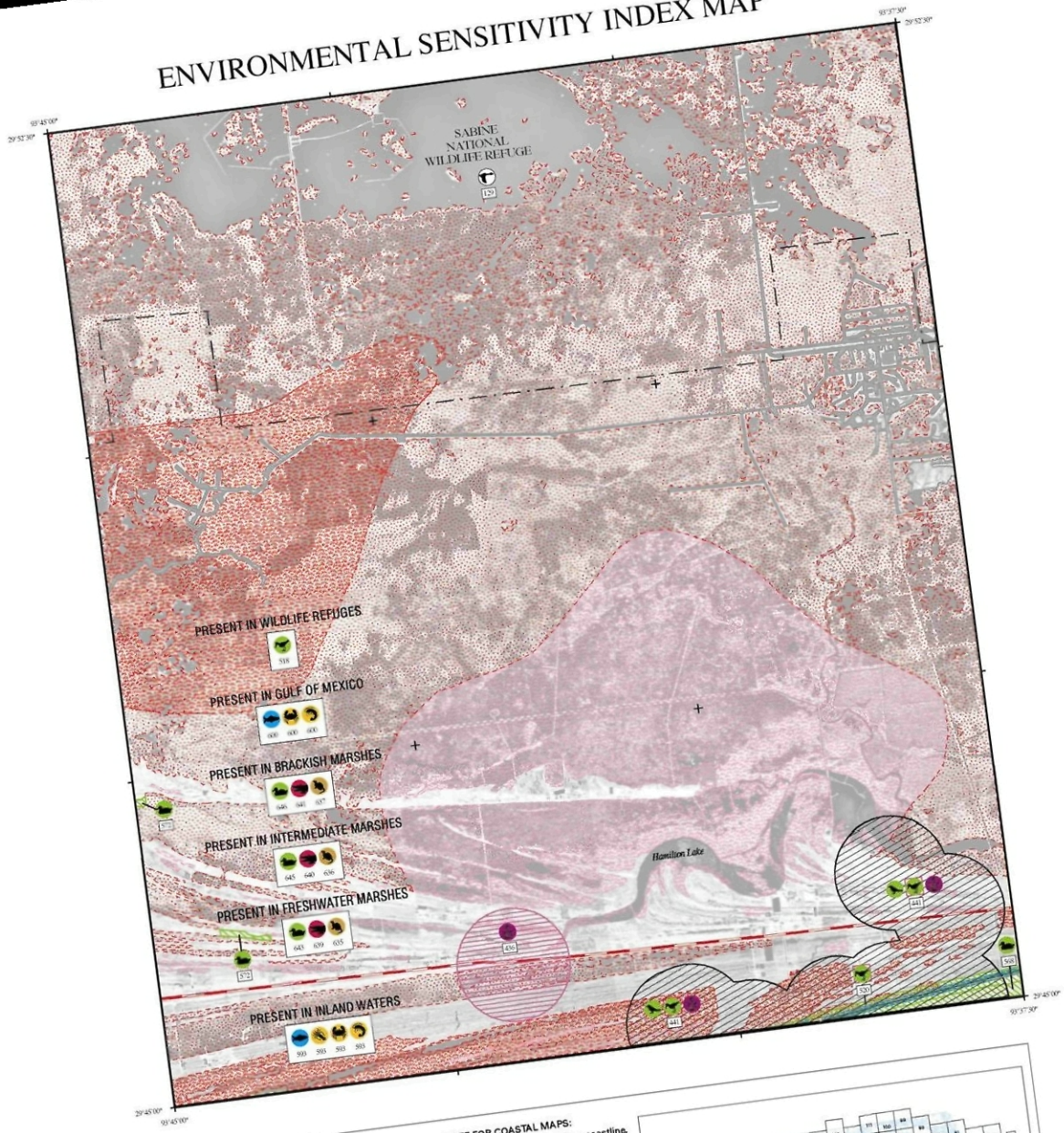


Figure 9.C.3 Smith Bayou ESI Map

ENVIRONMENTAL SENSITIVITY INDEX MAP



SHORELINE

1988 SHORELINE

2001 SHORELINE

NOTE FOR COASTAL MAPS:
Due to the dynamic nature of the Louisiana coastline, biological resources may represent historical locations that do not correspond with the depicted shoreline.

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
Based on 1988 Digital Shoreline

- 10A SALT MARSH
- 10A BRACKISH MARSH
- 10A INTERMEDIATE MARSH
- 10B FRESHWATER MARSH
- 10C FORESTED WETLAND
- 10D SCRUB- SHRUB WETLAND
- SEAGRASS

SCALE 1:50000

1 .5 0 1 KILOMETER

1 .5 0 1 MILE

Not For Navigation

December 2003
Published at Seattle, Washington
National Oceanic and Atmospheric Administration
National Ocean Service
Office of Response and Restoration
Hazardous Materials Response Division

JOHNSONS BAYOU LA-3

Figure 9.C.4 Johnsons ESI Map

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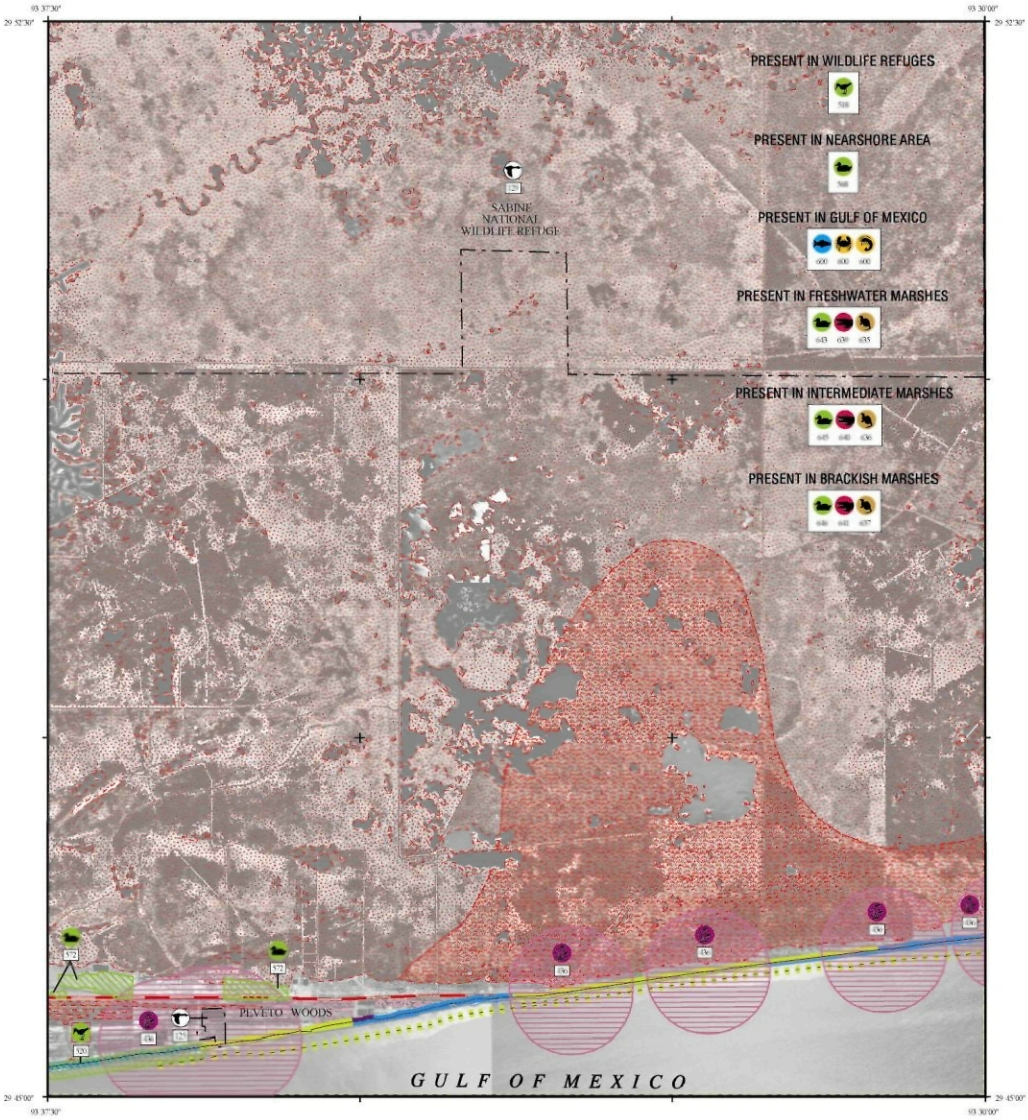
ENVIRONMENTAL SENSITIVITY INDEX MAP



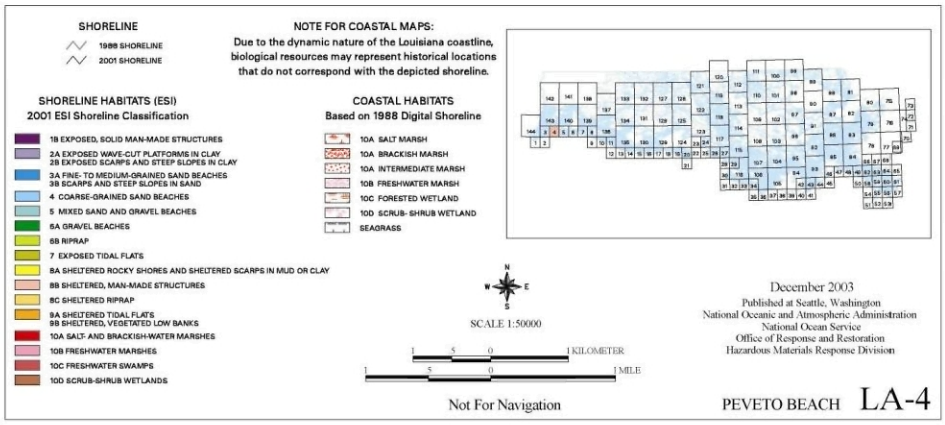
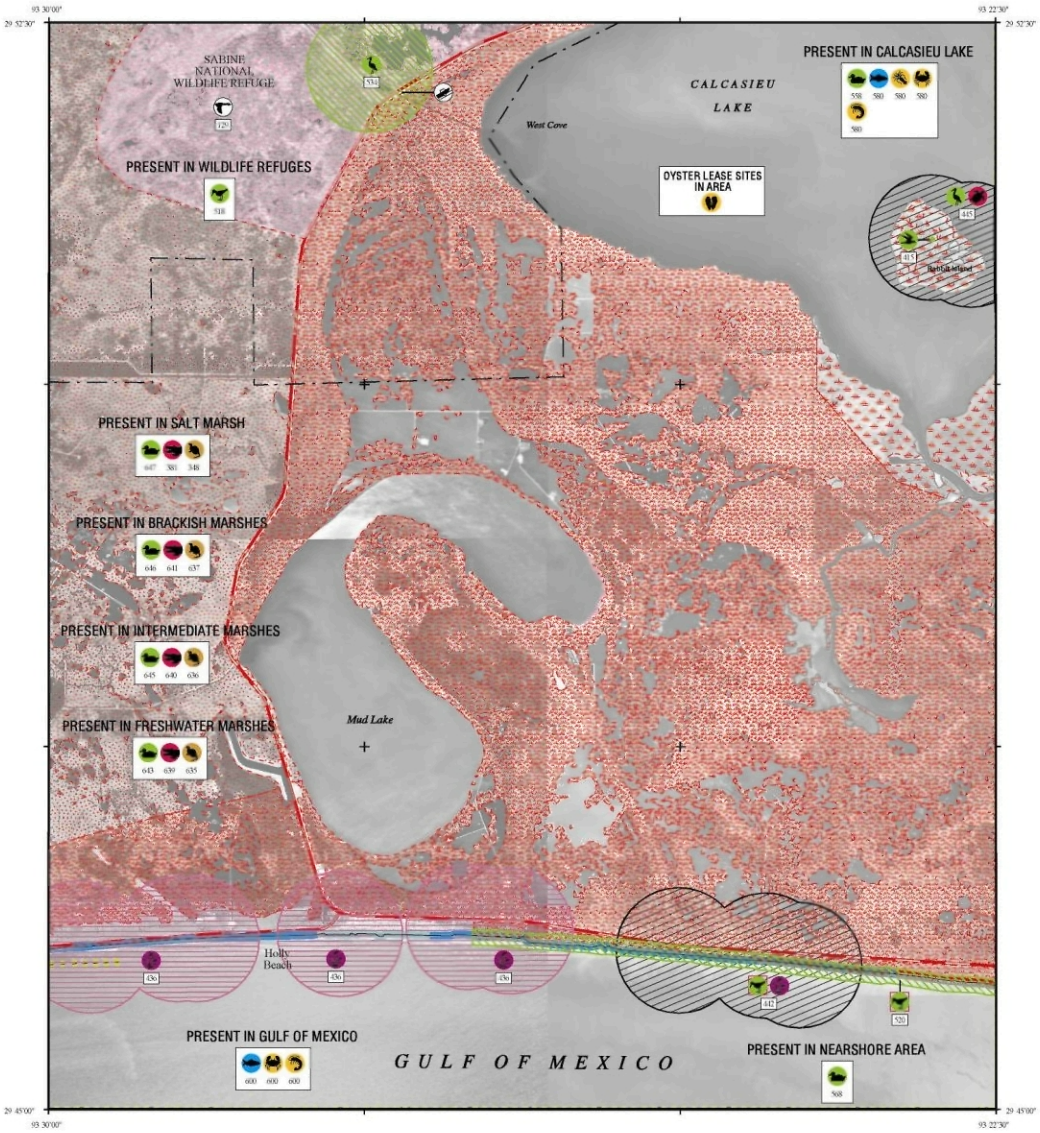


Figure 9.C.5 Peveto Beach ESI Map

ENVIRONMENTAL SENSITIVITY INDEX MAP



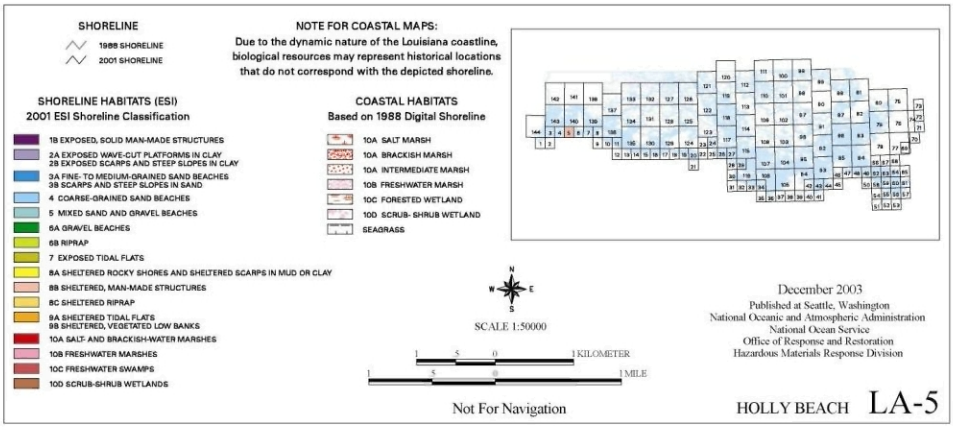
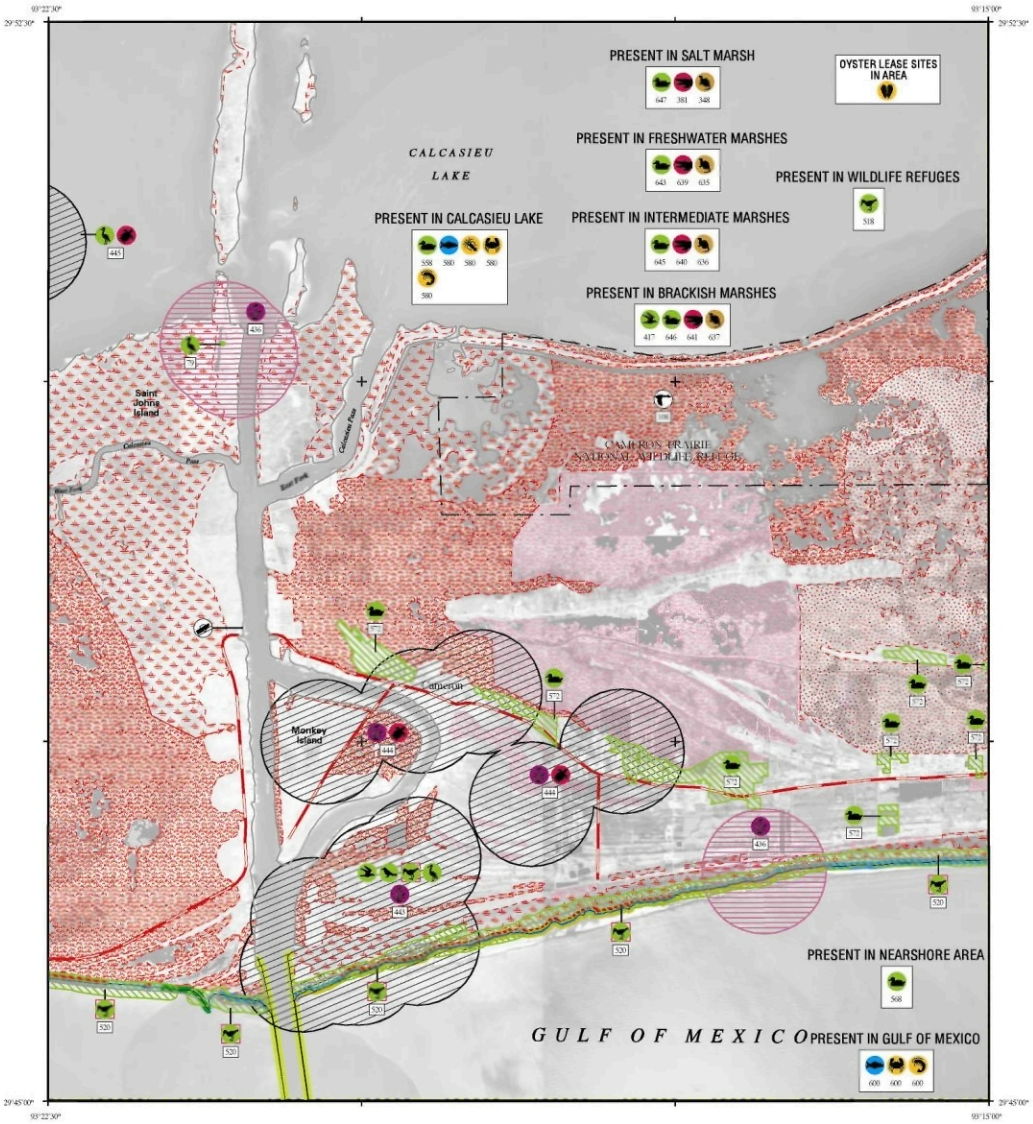


Figure 9.C.6 Holly Beach ESI Map

ENVIRONMENTAL SENSITIVITY INDEX MAP



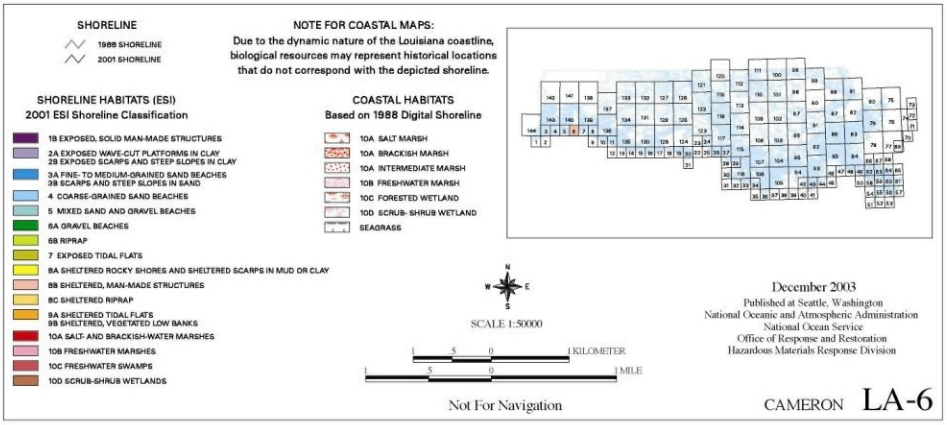
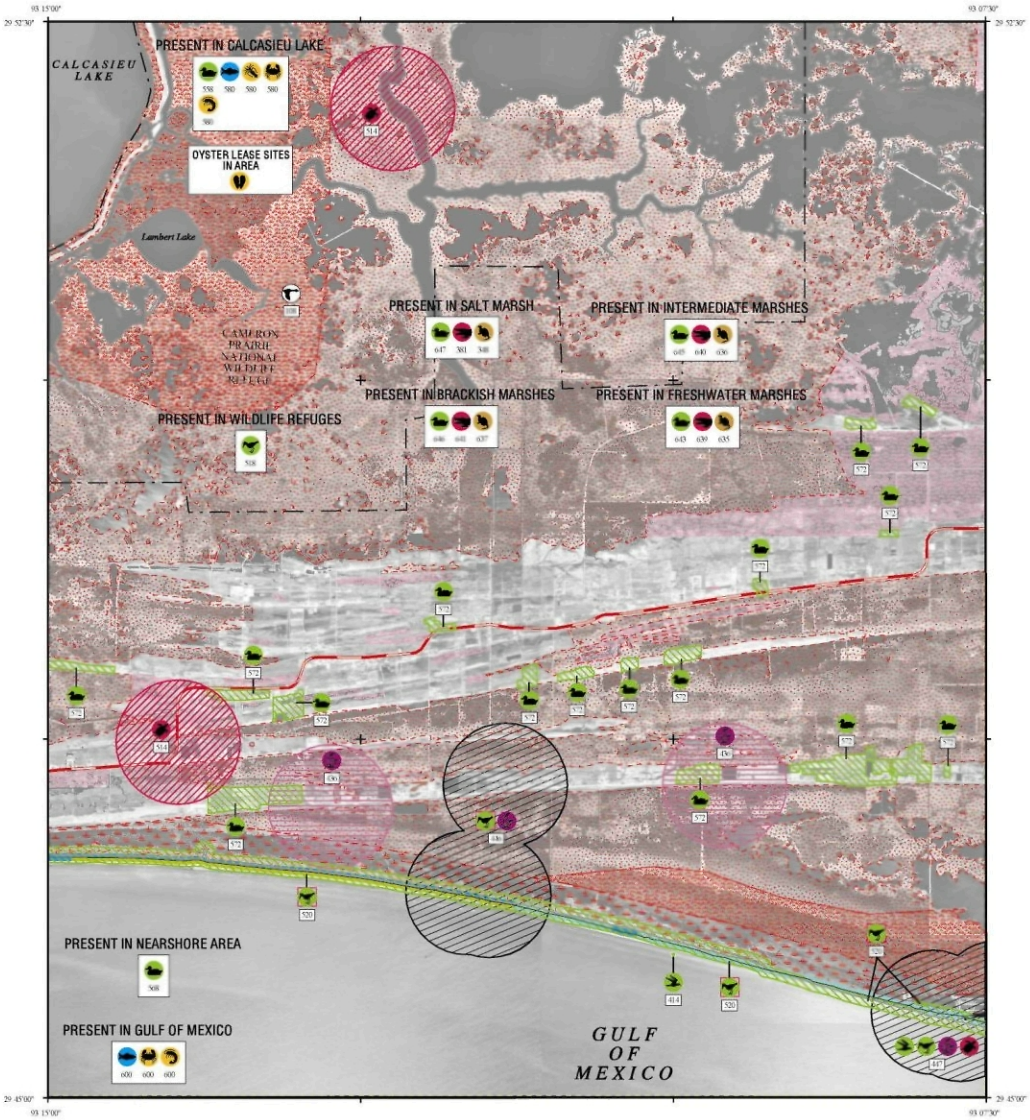


Figure 9.C.7 Cameron ESI Map

ENVIRONMENTAL SENSITIVITY INDEX MAP



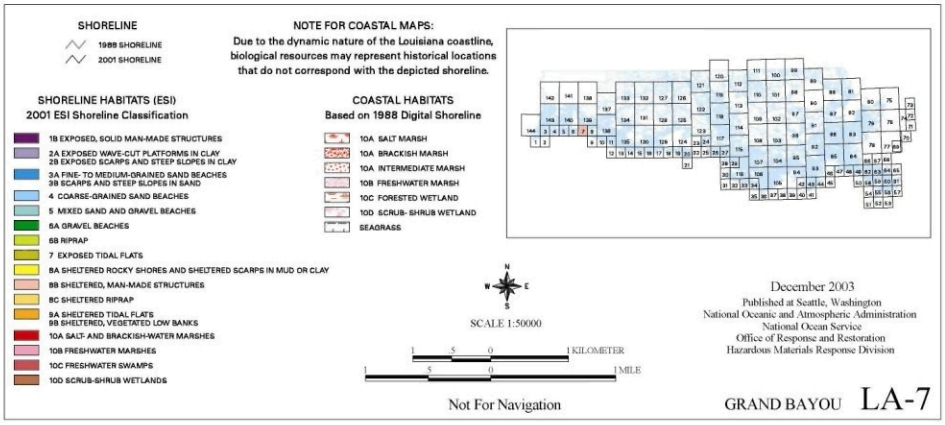
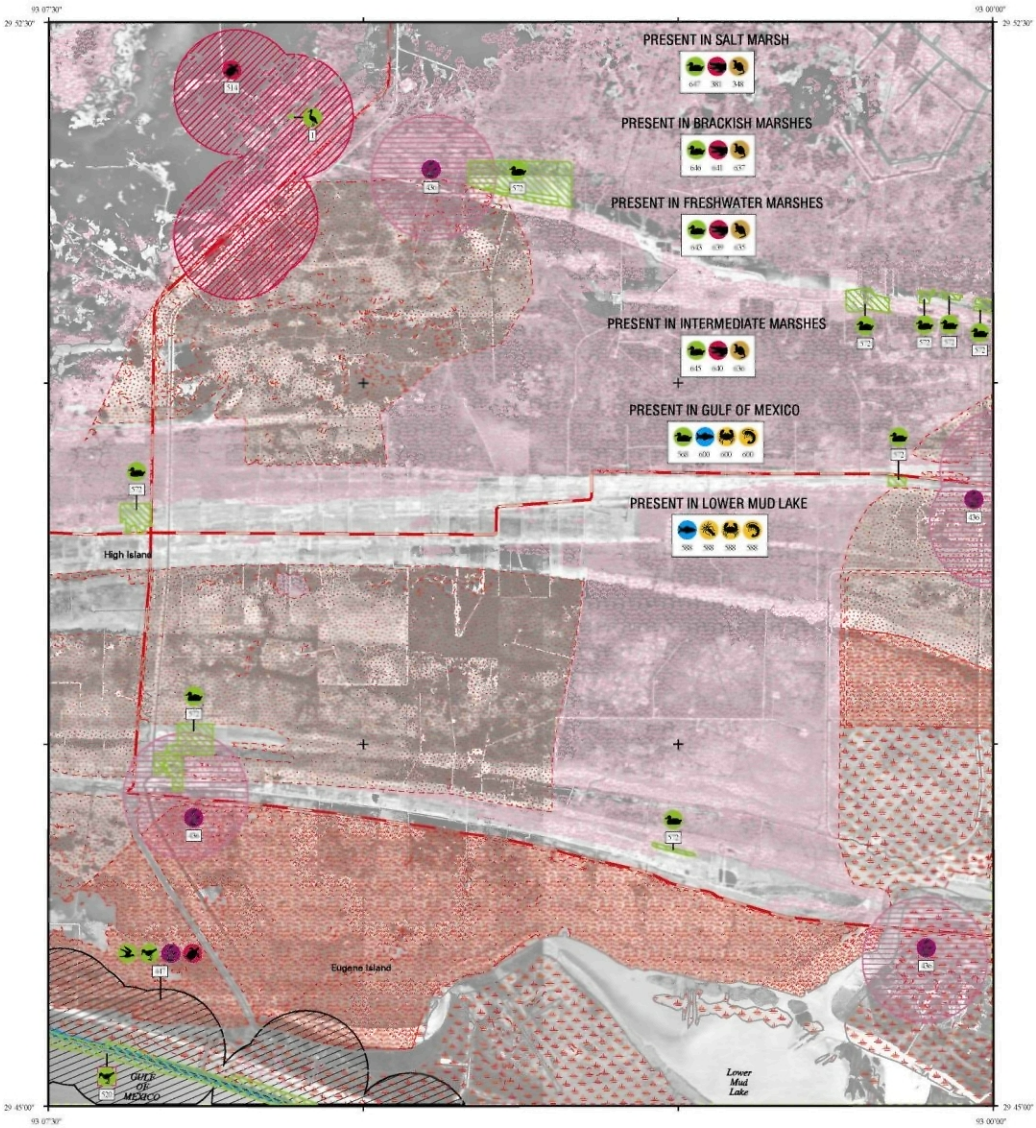


Figure 9.C.8 Grand Bayou ESI Map

ENVIRONMENTAL SENSITIVITY INDEX MAP



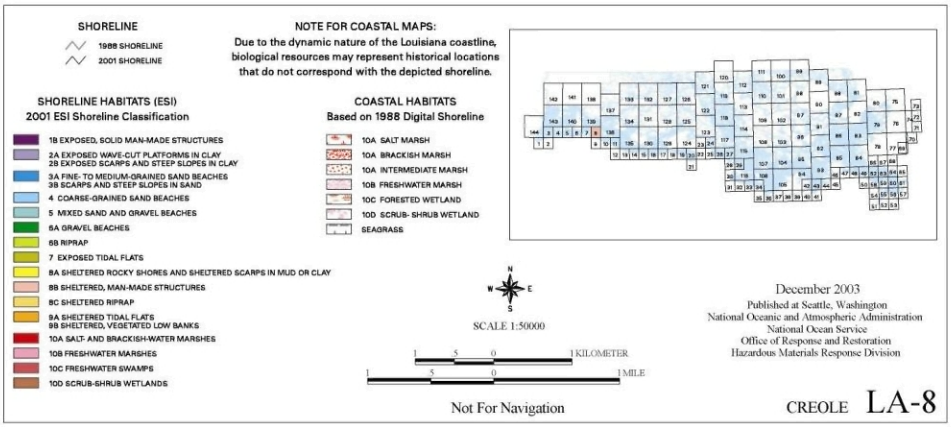
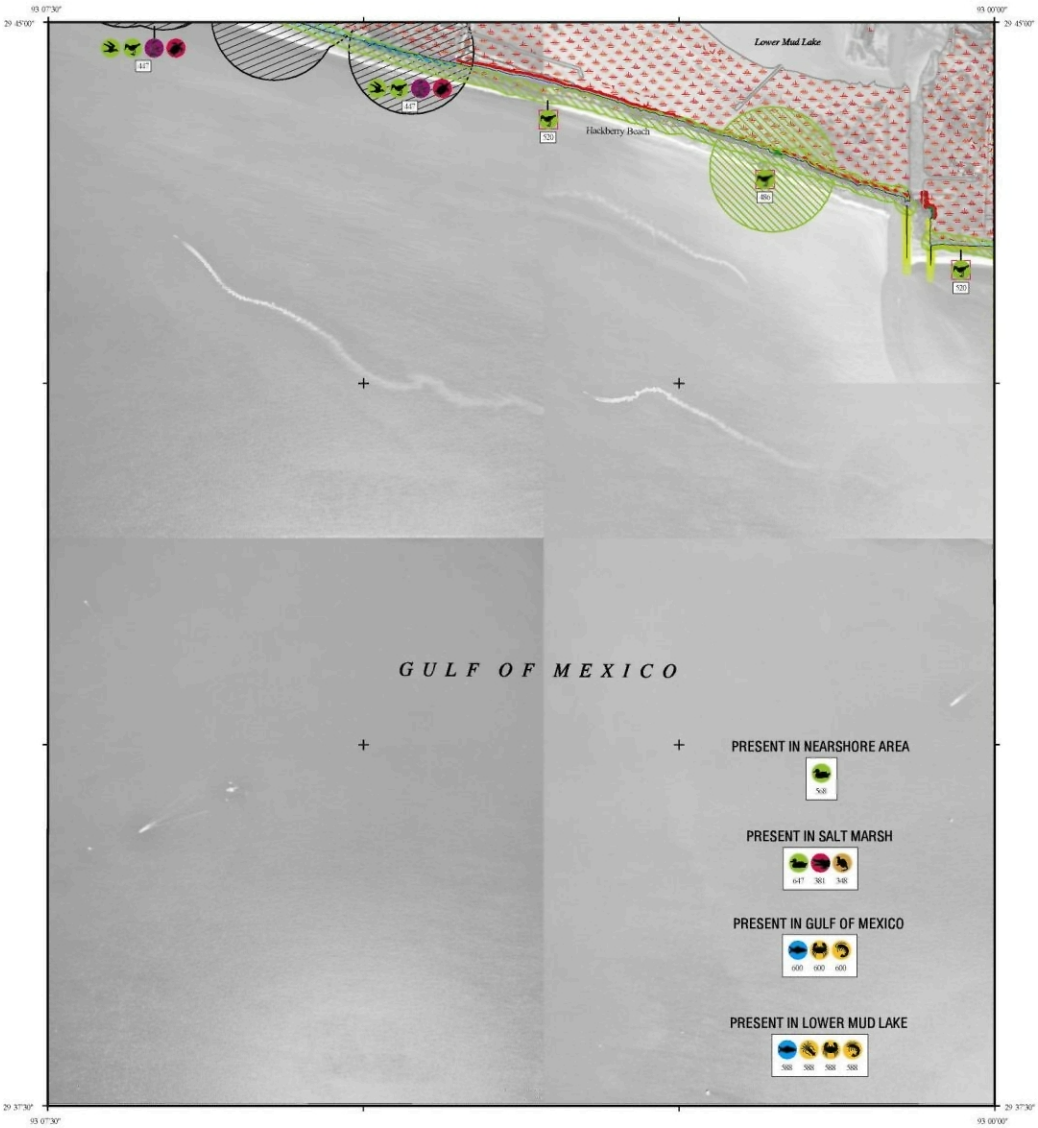


Figure 9.C.9 Creole ESI Map

ENVIRONMENTAL SENSITIVITY INDEX MAP



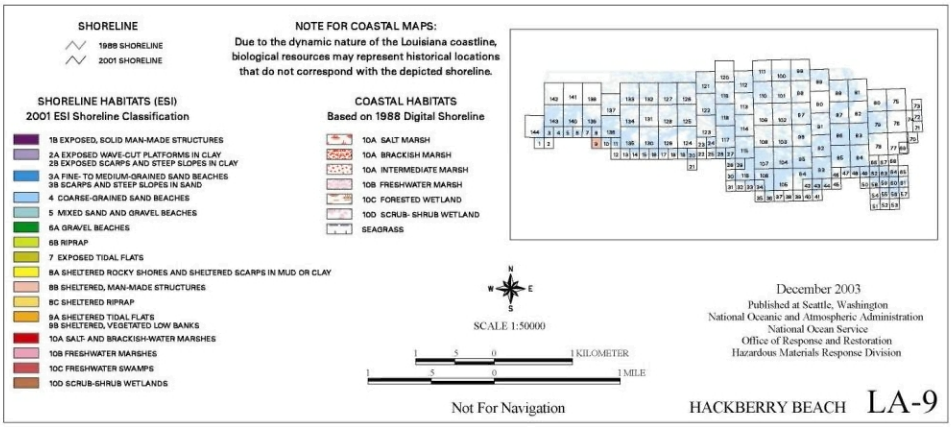


Figure 9.C.10 Hackberry Beach ESI Map

GC 248 Well GL006 WCD
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Est. Derated 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
Koseq Skimming Arms (3)	CGA 888-CGA-2007	Fourchon, LA	15m rigid skimming arm	2	17,829	0	Fourchon, LA	98	1	1	7	1	**10**
			Personnel	4									
			* Offshore vessel (>200')	1									
			30T crane	1									
			500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (4)	CGA 888-CGA-2007	Galliano, LA	15m rigid skimming arm	2	17,829	0	Fourchon, LA	98	1	1	7	1	**10**
			Personnel	4									
			* Offshore vessel (>200')	1									
			30T crane	1									
			500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (5)	CGA 888-CGA-2007	Galliano, LA	15m rigid skimming arm	2	17,829	0	Fourchon, LA	98	1	1	7	1	**10**
			Personnel	4									
			* Offshore vessel (>200')	1									
			30T crane	1									
			500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (6)	CGA 888-CGA-2007	Galliano, LA	15m rigid skimming arm	2	17,829	0	Fourchon, LA	98	1	1	7	1	**10**
			Personnel	4									
			* Offshore vessel (>200')	1									
			30T crane	1									
			500 bbl Portable tank	4		2,000							
Deep Blue Responder LFF 100 Brush	MSRC 800-OIL-SPIL	Fourchon, LA	LFF 100 Brush Skimmer	1	18,086	4,000	Fourchon, LA	98	2	1	7	1	**11**
			67" Boom	7260'									
			210' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
M/V Recovery MOSS Unit w/ GT-185	AMPOL 800-482-6765	Fourchon, LA	GT-185 Skimmer	1	1,371	200	Fourchon, LA	98	2	1	7	1	**11**
			36" Expandi Boom	720'									
			Personnel	8									
			110' Utility Boat	1									
			Crew Boat - >65'	1									
PSV Alyssa Chouest LFF 100 Brush	MSRC 800-OIL-SPIL	Fourchon, LA	Crucial Disc Skimmer	1	18,086	10,510	Fourchon, LA	98	2	1	7	1	**11**
			67" Boom	1320'									
			308' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
PSV C - Freedom LFF 100 Brush	MSRC 800-OIL-SPIL	Fourchon, LA	Crucial Disc Skimmer	1	18,086	12,130	Fourchon, LA	98	2	1	7	1	**11**
			67" Boom	1320'									
			260' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
PSV C - Leader LFF 100 Brush	MSRC 800-OIL-SPIL	Fourchon, LA	Crucial Disc Skimmer	1	18,086	12,112	Fourchon, LA	98	2	1	7	1	**11**
			67" Boom	1320'									
			305' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
PSV HOS Strongline Crucial Disk	MSRC 800-OIL-SPIL	Fourchon, LA	Crucial Disc Skimmer	1	11,122	24,300	Fourchon, LA	98	2	1	7	1	**11**
			67" Boom	1320'									
			370' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
PSV HOS Centerline Crucial Disk	MSRC 800-OIL-SPIL	Fourchon, LA	Crucial Disc Skimmer	1	11,122	24,300	Fourchon, LA	98	2	1	7	1	**11**
			67" Boom	1320'									
			370' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
Stress 1	MSRC 800-OIL-SPIL	Lake Charles, LA	Offshore Skimmer	1	15,840		Fourchon, LA	98	3	1	7	1	**12**
			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 and Storage Activation List

GC 248 Well GL006 WCD
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Est. Derated 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
FOILEX 250	MSRC 800-OIL-SPIL	Lake Charles, LA	Offshore Skimmer	1	3,977		Fourchon, LA	98	3	1	7	1	12
			43" Offshore Boom	100'									
			Personnel	4									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
DESMI OCEAN	MSRC 800-OIL-SPIL	Lake Charles, LA	Offshore Skimmer	1	3,017		Fourchon, LA	98	3	1	7	1	12
			67" Offshore Boom	330'									
			* Crew Boat	1									
			Personnel	4									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC 800-OIL-SPIL	Baton Rouge, LA	Offshore Skimmer	1	1,371		Fourchon, LA	98	3	1	7	1	12
			67" Offshore Boom	330'									
			Personnel	4									
			* Crew Boat	1									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
WP-1	MSRC 800-OIL-SPIL	Pascagoula, MS	Offshore Skimmer	1	3,017		Fourchon, LA	98	3	1	7	1	12
			67" Offshore Boom	330'									
			Personnel	4									
			* Crew Boat	1									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
Koseq Skimming Arms (1)	CGA 888-CGA-2007	Venice, LA	15m rigid skimming arm	2	17,829	0	Venice, LA	136	1	1	9.5	1	12.5
			Personnel	4									
			* Offshore vessel (>200')	1									
			30T crane	1									
			500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (2)	CGA 888-CGA-2007	Venice, LA	15m rigid skimming arm	2	17,829	0	Venice, LA	136	1	1	9.5	1	12.5
			Personnel	4									
			* Offshore vessel (>200')	1									
			30T crane	1									
			500 bbl Portable tank	4		2,000							
FOILEX 200	MSRC 800-OIL-SPIL	Belle Chasse, LA	Offshore Skimmer	1	1,989		Fourchon, LA	98	4	1	7	1	13
			43" Offshore Boom	100'									
			Personnel	4									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
FOILEX 250	MSRC 800-OIL-SPIL	Belle Chasse, LA	Offshore Skimmer	1	3,977		Fourchon, LA	98	4	1	7	1	13
			43' Offshore Boom	100'									
			Personnel	4									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
DESMI OCEAN	MSRC 800-OIL-SPIL	Belle Chase, LA	Offshore Skimmer	1	3,017		Fourchon, LA	98	4	1	7	1	13
			67" Offshore Boom	330'									
			Personnel	4									
			* Crew Boat	1									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC 800-OIL-SPIL	Belle Chase, LA	Offshore Skimmer	1	1,371		Fourchon, LA	98	4	1	7	1	13
			67" Offshore Boom	330'									
			Personnel	4									
			* Crew Boat	1									
			>110' Utility Boat w/crane	1									
			Towable Bladder	1		500							
W-4	MSRC 800-OIL-SPIL	Belle Chase, LA	Offshore Skimmer	1	3,017		Fourchon, LA	98	4	1	7	1	13
			67" Offshore Boom	330'									
			Personnel	4									
			* Crew Boat	1									
			>110' Utility Boat w/crane	1									
			Towable Bladder	1		500							

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

GC 248 Well GL006 WCD
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Est. Derated 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
Louisiana Responder LFF 100 Brush	MSRC 800-OIL-SPIL	Fort Jackson, LA	LFF 100 Brush Skimmer	1	18,086	4,000	Fort Jackson, LA	145	2	1	10.5	1	14.5
			67" Boom	7920'									
			210' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
W-4	MSRC 800-OIL-SPIL	Galveston, TX	Offshore Skimmer	1	3,017		Fourchon, LA	98	6	1	7	1	15
			67" Offshore Boom	330'									
			Personnel	4									
			* Crew Boat	1									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
FOILEX 250	MSRC 800-OIL-SPIL	Galveston, TX	Offshore Skimmer	1	3,977		Fourchon, LA	98	6	1	7	1	15
			43" Offshore Boom	100'									
			Personnel	4									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC 800-OIL-SPIL	Galveston, TX	Offshore Skimmer	1	1,371		Fourchon, LA	98	6	1	7	1	15
			67" Offshore Boom	330'									
			Personnel	4									
			* Crew Boat	1									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC 800-OIL-SPIL	Galveston, TX	Offshore Skimmer	1	1,371		Fourchon, LA	98	6	1	7	1	15
			67" Offshore Boom	330'									
			Personnel	4									
			* Crew Boat	1									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
FOILEX 250	MSRC 800-OIL-SPIL	Ingleside, TX	Offshore Skimmer	1	3,977		Fourchon, LA	98	9	1	7	1	18
			43" Offshore Boom	100'									
			Personnel	4									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC 800-OIL-SPIL	Ingleside, TX	Offshore Skimmer	1	1,371		Fourchon, LA	98	9	1	7	1	18
			67" Offshore Boom	330'									
			Personnel	4									
			* Crew Boat	1									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
CTCo-5001 Offshore Barge	CGA 888-CGA-2007	Houma, LA	Offshore Barge	1	N/A	45,000	Houma, LA	129	2	1	16.5	1	20.5
			Personnel	4									
			Offshore Tug	1									
CTCo-2606 Offshore Barge	CGA 888-CGA-2007	Houma, LA	Offshore Barge	1	N/A	24,000	Houma, LA	129	2	1	16.5	1	20.5
			Personnel	4									
			Offshore Tug	1									
CTCo-2603 Offshore Barge	CGA 888-CGA-2007	Houma, LA	Offshore Barge	1	N/A	24,000	Houma, LA	129	2	1	16.5	1	20.5
			Personnel	4									
			Offshore Tug	1									
CTCo-2605 Offshore Barge	CGA 888-CGA-2007	Houma, LA	Offshore Barge	1	N/A	24,000	Houma, LA	129	2	1	16.5	1	20.5
			Personnel	4									
			Offshore Tug	1									
CTCo-2604 Offshore Barge	CGA 888-CGA-2007	Houma, LA	Offshore Barge	1	N/A	22,500	Houma, LA	129	2	1	16.5	1	20.5
			Personnel	4									
			Offshore Tug	1									
CTCo-2601 Offshore Barge	CGA 888-CGA-2007	Houma, LA	Offshore Barge	1	N/A	24,000	Houma, LA	129	2	1	16.5	1	20.5
			Personnel	4									
			Offshore Tug	1									
CTCo-2602 Offshore Barge	CGA 888-CGA-2007	Houma, LA	Offshore Barge	1	N/A	24,000	Houma, LA	129	2	1	16.5	1	20.5
			Personnel	4									
			Offshore Tug	1									

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

GC 248 Well GL006 WCD
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Est. Derated 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
CTCo-2404 Offshore Barge	CGA 888-CGA-2007	Houma, LA	Offshore Barge	1	N/A	24,000	Houma, LA	129	2	1	16.5	1	20.5
			Personnel	4									
			Offshore Tug	1									
Koseq Skimming Arms (7)	CGA 888-CGA-2007	Galveston, TX	15m rigid skimming arm	2	17,829	0	Venice, LA	136	9	1	9.5	1	20.5
			Personnel	4									
			* Offshore vessel (>200')	1									
			30T crane	1									
			500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (8)	CGA 888-CGA-2007	Galveston, TX	15m rigid skimming arm	2	17,829	0	Venice, LA	136	9	1	9.5	1	20.5
			Personnel	4									
			* Offshore vessel (>200')	1									
			30T crane	1									
			500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (9)	CGA 888-CGA-2007	Galveston, TX	15m rigid skimming arm	2	17,829	0	Venice, LA	136	9	1	9.5	1	20.5
			Personnel	4									
			* Offshore vessel (>200')	1									
			30T crane	1									
			500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (10)	CGA 888-CGA-2007	Galveston, TX	15m rigid skimming arm	2	17,829	0	Venice, LA	136	9	1	9.5	1	20.5
			Personnel	4									
			* Offshore vessel (>200')	1									
			30T crane	1									
			500 bbl Portable tank	4		2,000							
Koseq Skimming Arms (11)	CGA 888-CGA-2007	Galveston, TX	15m rigid skimming arm	2	17,829	0	Venice, LA	136	9	1	9.5	1	20.5
			Personnel	4									
			* Offshore vessel (>200')	1									
			30T crane	1									
			500 bbl Portable tank	4		2,000							
PT 150 Aquaguard Skimmer (1)	CGA 888-CGA-2007	Galveston, TX	brush skimmer	1	22,780	0	Venice, LA	136	9	1	9.5	1	20.5
			Personnel	4									
			* Offshore vessel (>200')	1									
			500 bbl Portable tank	4		2,000							
PT 150 Aquaguard Skimmer (2)	CGA 888-CGA-2007	Galveston, TX	brush skimmer	1	22,780	0	Venice, LA	136	9	1	9.5	1	20.5
			Personnel	4									
			* Offshore vessel (>200')	1									
			500 bbl Portable tank	4		2,000							
DESMI OCEAN	MSRC 800-OIL-SPIL	Ponce, Puerto Rico	Offshore Skimmer	1	3,017		Fourchon, LA	98	12	1	7	1	21
			67" Offshore Boom	330'									
			Utility Boat	1									
			Personnel	4									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
Stress 2	MSRC 800-OIL-SPIL	San Juan, Puerto Rico	Offshore Skimmer	1	3,017		Fourchon, LA	98	12	1	7	1	21
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		100							
FOILEX 200	MSRC 800-OIL-SPIL	Yabucoa, Puerto Rico	Offshore Skimmer	1	1,989	50	Fourchon, LA	98	12	1	7	1	21
			43" Offshore Boom	100'									
			Personnel	4									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
Stress 1	MSRC 800-OIL-SPIL	St Croix, VI	Offshore Skimmer	1	15,840		Fourchon, LA	98	12	1	7	1	21
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		3,000							

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

GC 248 Well GL006 WCD
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Est. Derated 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
Mississippi Responder Transrec-350	MSRC 800-OIL-SPIL	Pascagoula, MS	Transrec/Stress 1 Skimm	2	10,567	4,000	Pascagoula, MS	236	2	1	17	1	21
			67" Boom	2640'									
			210' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
GT-185	MSRC 800-OIL-SPIL	Jacksonville, FL	Offshore Skimmer	1	1,371		Fourchon, LA	98	12	1	7	1	21
			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/Stress 1 Skimm	2	10,567	4,000	Lake Charles, LA	243	2	1	17.5	1	21.5
			67" Boom	2640'									
			210' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
MSRC-452 Offshore Barge	MSRC 800-OIL-SPIL	Fort Jackson, LA	67" Inflatable Boom	110'	22,056	45,000	Fort Jackson, LA	145	4	1	16	1	22
			Offshore Barge	1									
			Crucial Disc Skimmer	2									
			Personnel	4									
			Offshore Tug	1									
GT-185	MSRC 800-OIL-SPIL	Tampa, FL	Offshore Skimmer	1	1,371		Fourchon, LA	98	13	1	7	1	22
			67" Offshore Boom	330'									
			Personnel	4									
			* Crew Boat	1									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC 800-OIL-SPIL	Roxana, IL	Offshore Skimmer	1	1,371		Fourchon, LA	98	13	1	7	1	22
			67" Offshore Boom	330'									
			Personnel	4									
			* Crew Boat	1									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
Texas Responder Transrec-350	MSRC 800-OIL-SPIL	Galveston, TX	Transrec/Stress 1 Skimm	2	10,567	4,000	Galveston, TX	282	2	1	20	1	24
			67" Boom	2640'									
			210' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
Stress 1	MSRC 800-OIL-SPIL	Miami, FL	Offshore Skimmer	1	15,840		Fourchon, LA	98	16	1	7	1	25
			67" Offshore Boom	330'									
			Personnel	4									
			* Crew Boat	1									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
DESMI OCEAN	MSRC 800-OIL-SPIL	Miami, FL	Offshore Skimmer	1	3,017		Fourchon, LA	98	16	1	7	1	25
			67" Offshore Boom	330'									
			* Crew Boat	1									
			Personnel	4									
			* >110' Utility Boat	1									
			Towable Bladder	1		500							
W-4	MSRC 800-OIL-SPIL	Miami, FL	Offshore Skimmer	1	3,017		Fourchon, LA	98	16	1	7	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		Fourchon, LA	98	16	1	7	1	25
			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 and Storage Activation List (cont.)

GC 248 Well GL006 WCD
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Est. Derated 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
K-Sea DBL 155 Offshore Barge	CGA 888-CGA-2007	Belle Chasse, LA	Offshore Barge	1	N/A	163,974	Belle Chasse, LA	198	2	1	24.5	1	28.5
			Personnel	10									
			* Offshore Tug	1									
CGA-200 HOSS Barge (OSRB)	CGA 888-CGA-2007	Houma, LA	Belt Skimmer	1	43,000	4,000	Houma, LA	198	2	1	24.5	1	28.5
			43" Expandi Boom	2000'									
			Personnel	8									
			Tug - 1,200 HP	2									
			Tug - 1,800 HP	1									
OSG 192 Offshore Barge	MSRC 800-OIL-SPIL	New Orleans, LA	Offshore Barge	1	N/A	165,000	New Orleans, LA	215	2	1	26.5	1	30.5
			Personnel	11									
			* Offshore Tug	1									
MSRC-402 Offshore Barge	MSRC 800-OIL-SPIL	Pascagoula, MS	Offshore Barge	1	22,056	40,300	Pascagoula, MS	236	4	1	26	1	32
			67" Offshore Boom	110'									
			Crucial Disc Skimmer	2									
			Personnel	4									
			Offshore Tug	1									
GT-185	MSRC 800-OIL-SPIL	Yorktown, VA	Offshore Skimmer	1	1,371		Fourchon, LA	98	24	1	7	1	33
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
GT-185	MSRC 800-OIL-SPIL	Virginia Beach, VA	Offshore Skimmer	1	1,371		Fourchon, LA	98	24	1	7	1	33
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
Southern Responder Transrec-350	MSRC 800-OIL-SPIL	Ingleside, TX	Transrec/Stress 1 Skimm	2	10,567	4,000	Ingleside, TX	411	2	1	29.5	1	33.5
			67" Boom	1980'									
			210' Vessel	1									
			Personnel	12									
GT-185	MSRC 800-OIL-SPIL	Baltimore, MD	Offshore Skimmer	1	1,371		Fourchon, LA	98	26	1	7	1	35
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
W-4	MSRC 800-OIL-SPIL	Chesapeake City, MD	Offshore Skimmer	1	3,017		Fourchon, LA	98	26	1	7	1	35
			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		Fourchon, LA	98	26	1	7	1	35
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
W-4	MSRC 800-OIL-SPIL	Edison/Perth Amboy, NJ	Offshore Skimmer	1	3,017		Fourchon, LA	98	28	1	7	1	37
			67" Offshore Boom	330'									
			Utility Boat	1									
			Personnel	4									
			>110' Utility Boat	1									
			Towable Bladder	1		500							

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

GC 248 Well GL006 WCD
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Est. Derated 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
Desmi Ocean	MSRC 800-OIL-SPIL	Edison/Perth Amboy, NJ	Offshore Skimmer	1	3,017		Fourchon, LA	98	28	1	7	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	Edison/Perth Amboy, NJ	Offshore Skimmer	1	1,371		Fourchon, LA	98	28	1	7	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	Bayonne, NJ	Offshore Skimmer	1	1,371		Fourchon, LA	98	28	1	7	1	37
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
MSRC-570 Offshore Barge	MSRC 800-OIL-SPIL	Galveston, TX	Offshore Barge	1	22,056	56,900	Galveston, TX	282	4	1	31.5	1	37.5
			67" Offshore Boom	110'									
			Crucial Disc Skimmer	2									
			Personnel	4									
			Offshore Tug	1									
GT-185	MSRC 800-OIL-SPIL	Providence, RI	Offshore Skimmer	1	1,371		Fourchon, LA	98	30	1	7	1	39
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
DESMI OCEAN	MSRC 800-OIL-SPIL	Boston, MA	Offshore Skimmer	1	3,017		Fourchon, LA	98	30	1	7	1	39
			67" Offshore Boom	330'									
			Utility Boat	1									
			Personnel	4									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
Desmi 250	MSRC 800-OIL-SPIL	Portland, ME	Offshore Skimmer	1	2,112		Fourchon, LA	98	34	1	7	1	43
			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		Fourchon, LA	98	34	1	7	1	43
			67" Offshore Boom	330'									
			Personnel	4									
			Crew Boat	1									
			>110' Utility Boat	1									
			Towable Bladder	1		500							
MSRC-403 Offshore Barge	MSRC 800-OIL-SPIL	Ingleside, TX	Offshore Barge	1	22,056	40,300	Ingleside, TX	411	4	1	45.5	1	51.5
			67" Offshore Boom	110'									
			Crucial Disc Skimmer	2									
			Personnel	4									
			Offshore Tug	1									
Florida Responder Transrec-350	MSRC 800-OIL-SPIL	Miami, FL	Transrec/Stress 1 Skimm	2	10,567	4,000	Miami, FL	754	2	1	54	1	58
			67" Boom	2640'									
			210' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
MSRC Offshore Tank Barge 360	MSRC 800-OIL-SPIL	Tampa, FL	67" Offshore Boom	110'	22,056	36,000	Tampa, FL	512	4	1	57	1	63
			Offshore Barge	1									
			Crucial Disc Skimmer	2									
			Personnel	4									
			Tug - 3000 HP	1									

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

GC 248 Well GL006 WCD
Sample Offshore On-Water Recovery & Storage Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Est. Derated 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
Virginia Responder Transrec-350	MSRC 800-OIL-SPIL	Virginia Beach, VA	Transrec Skimmer	1	10,567	4,000	Virginia Beach, VA	1598	2	1	114	1	**118**
			67" Boom	2640'									
			210' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
Delaware Responder Transrec-350	MSRC 800-OIL-SPIL	Chesapeake City, MD	Transrec Skimmer	1	10,567	4,000	Chesapeake City, MD	1815	2	1	129.5	1	**133.5**
			67" Boom	2640'									
			210' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
New Jersey Responder Transrec-350	MSRC 800-OIL-SPIL	Edison/Perth Amboy, NJ	Transrec Skimmer	1	10,567	4,000	Edison/Perth Amboy, NJ	1871	2	1	133.5	1	**137.5**
			67" Boom	2640'									
			210' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
MSRC-350 Offshore Barge	MSRC 800-OIL-SPIL	Savannah, GA	Offshore Barge	1	10,567	35,000	Savannah, GA	1220	4	1	135.5	1	**141.5**
			67" Offshore Boom	220'									
			Transrec Skimmer	1									
			Personnel	4									
			Offshore Tug	1									
Maine Responder Transrec-350	MSRC 800-OIL-SPIL	Portland, ME	Transrec Skimmer	1	10,567	4,000	Portland, ME	2159	2	1	154	1	**158**
			67" Boom	2640'									
			210' Vessel	1									
			Personnel	12									
			32' Support Boat	1									
MSRC-680 Offshore Barge	MSRC 800-OIL-SPIL	Virginia Beach, VA	Offshore Barge	1	15,840	68,000	Virginia Beach, VA	1598	4	1	177.5	1	**183.5**
			67" Offshore Boom	220'									
			Stress 1 Skimmer	1									
			Personnel	4									
			Offshore Tug	1									
MSRC-401 Offshore Barge	MSRC 800-OIL-SPIL	Chesapeake City, MD	Offshore Barge	1	15,840	40,000	Chesapeake City, MD	1815	4	1	201.5	1	**207.5**
			67" Offshore Boom	220'									
			Stress 1 Skimmer	1									
			Personnel	4									
			Offshore Tug	1									
MSRC-520 Offshore Barge	MSRC 800-OIL-SPIL	Edison/Perth Amboy, NJ	Offshore Barge	1	15,840	52,000	Edison/ Perth Amboy, NJ	1871	4	1	208	1	**214**
			67" Offshore Boom	220'									
			Stress 1 Skimmer	1									
			Personnel	4									
			Offshore Tug	1									
MSRC-381 Offshore Barge	MSRC 800-OIL-SPIL	St Croix, VI	Offshore Barge	1	15,840	38,000	St Croix, VI	1950	2	1	216.5	1	**220.5**
			67" Offshore Boom	770'									
			Stress 1 Skimmer	1									
			Personnel	4									
			Offshore Tug	1									
MSRC-620 Offshore Barge	MSRC 800-OIL-SPIL	Portland, ME	Offshore Barge	1	15,840	62,000	Portland, ME	2159	4	1	240	1	**246**
			67" Offshore Boom	220'									
			Stress 1 Skimmer	1									
			Personnel	4									
			Offshore Tug	1									
DERATED RECOVERY RATE (BBLS/DAY)													825,920
STORAGE CAPACITY INCLUDING SKIMMING VESSELS (BARRELS)													1,233,676

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

GC 248 Well GL006 WCD
Sample Nearshore On-Water Recovery Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Est. Derated 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
M/V Grand Bay	CGA 888-CGA-2007	Venice, LA	Lori Brush Skimmer	1	5,000	65	Venice, LA	50	1	0	3.5	1	5.5
			56" Boom	50'									
			46' Vessel	1									
			Personnel	4									
M/V RW Armstrong	CGA 888-CGA-2007	Houma, LA	Lori Brush Skimmer	1	5,000	65	Houma, LA	65	1	0	4.5	0.5	6
			56" Boom	50'									
			46' Vessel	1									
			Personnel	4									
SBS w/ Queensboro	MSRC 800-OIL-SPIL	Houma, LA	Skimmer	1	905		Fourchon, LA	20	3	1	1.5	1	6.5
			20" Boom	50'									
			Personnel	4									
			* Push Boat	1									
			Towable Bladder	1		400							
Trinity Shallow Water Skimmer	CGA 888-CGA-2007	Leeville, LA	Marco Belt Skimmer	2	19,709	249	Leeville, LA	35	1	1	4	1	7
			30" Auto Boom	150'									
			Personnel	5									
			56' SWS Vessel	1									
			14'-16' Aluminum Flatboa	2									
SBS w/ Queensboro	MSRC 800-OIL-SPIL	Lake Charles, LA	Skimmer	1	905	400	Fourchon, LA	20	4	1	1.5	1	7.5
			20" Boom	50'									
			Personnel	4									
			* Push Boat	1									
SBS w/ Queensboro	MSRC 800-OIL-SPIL	Lake Charles, LA	Offshore Skimmer	1	905	400	Fourchon, LA	20	4	1	1.5	1	7.5
			20" Boom	50'									
			Personnel	4									
			* Push Boat	1									
			Towable Bladder	1									
SBS w/ Queensboro	MSRC 800-OIL-SPIL	Lake Charles, LA	Skimmer	1	905	500	Fourchon, LA	20	4	1	1.5	1	7.5
			20" Boom	50'									
			Personnel	4									
			* Push Boat	1									
			Towable Bladder	1									
SBS w/ Queensboro	MSRC 800-OIL-SPIL	Lake Charles, LA	Offshore Skimmer	1	905	400	Fourchon, LA	20	4	1	1.5	1	7.5
			20" Boom	50'									
			Personnel	4									
			* Push Boat	1									
			Towable Bladder	1									
CGA-51 MARCO Shallow Water Skimmer	CGA 888-CGA-2007	Lake Charles, LA	Marco Belt Skimmer	1	3,588	20	Fourchon, LA	20	4	1	2	1	8
			18" Boom (contractor)	100'									
			Personnel	3									
			34' Skimming Vessel	1									
			Shallow Water Barge	1		249							
CGA-52 MARCO Shallow Water Skimmer	CGA 888-CGA-2007	Venice, LA	Marco Belt Skimmer	1	3,588	34	Fourchon, LA	20	4	1	2	1	8
			18" Boom (contractor)	100'									
			Personnel	3									
			36' Skimming Vessel	1									
			Shallow Water Barge	1		249							

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

Public Information Copy

GC 248 Well GL006 WCD
Sample Nearshore On-Water Recovery Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Est. Derated 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
CGA-53 MARCO Shallow Water Skimmer	CGA 888-CGA-2007	Houma, LA	Marco Belt Skimmer	1	3,588	34	Fourchon, LA	20	4	1	2	1	8
			18" Boom (contractor)	100'									
			Personnel	3									
			38' Skimming Vessel	1									
CGA-54 Egmopol Shallow Water Skimmer	CGA 888-CGA-2007	Houma, LA	Belt Skimmer	1	3,000	90	Fourchon, LA	20	4	1	2	1	8
			18" Boom	100'									
			Personnel	3									
			38' Skimming Vessel	1									
			Shallow Water Barge	1		249							
SBS w/ GT-185	MSRC 800-OIL-SPIL	Pascagoula, MS	Skimmer	1	1,371		Fourchon, LA	20	5	1	1.5	1	8.5
			20" Boom	50'									
			Personnel	4									
			* Push Boat	1									
			Towable Bladder	1		400							
VOSS w/ AARDVAC	MSRC 800-OIL-SPIL	Pascagoula, MS	Skimmer	1	3,840		Fourchon, LA	20	5	1	1.5	1	8.5
			20" Boom	50'									
			Personnel	4									
			* Utility Boat	1									
			Towable Bladder	1		500							
VOSS w/ Queensboro	MSRC 800-OIL-SPIL	Pascagoula, MS	Skimmer	1	905		Fourchon, LA	20	5	1	1.5	1	8.5
			20" Boom	50'									
			Personnel	4									
			* Utility Boat	1									
			Towable Bladder	1		500							
Trinity Shallow Water Skimmer	CGA 888-CGA-2007	Venice, LA	Marco Belt Skimmer	2	19,709	249	Venice, LA	50	1	1	5.5	1	8.5
			30" Auto Boom	150'									
			Personnel	5									
			56' SWS Vessel	1									
			14'-16' Aluminum Flatboa	2									
SBS w/ Queensboro	MSRC 800-OIL-SPIL	Galveston, TX	Offshore Skimmer	1	905	400	Fourchon, LA	20	6	1	1.5	1	9.5
			20" Boom	50'									
			Personnel	4									
			* Push Boat	1									
			Towable Bladder	1									
CGA-55 Egmopol Shallow Water Skimmer	CGA 888-CGA-2007	Galveston, TX	Egmopol Belt Skimmer	1	3,000	90	Fourchon, LA	20	6	1	2	1	10
			18" Boom	100'									
			Personnel	3									
			34' Skimming Vessel	1									
			Shallow Water Barge	1		249							
SBS w/ Queensboro	MSRC 800-OIL-SPIL	Memphis, TN	Offshore Skimmer	1	905		Fourchon, LA	20	9	1	1.5	1	12.5
			20" Boom	50'									
			Personnel	4									
			* Push Boat	1									
			Towable Bladder	1									
WP-1	MSRC 800-OIL-SPIL	Ingleside, TX	Offshore Skimmer	1	3,017		Fourchon, LA	20	10	1	1.5	1	13.5
			20" Boom	50'									
			Personnel	4									
			* Crew Boat	1									
			* Utility Boat	1									
			Towable Bladder	1		500							
Trinity Shallow Water Skimmer	CGA 888-CGA-2007	Morgan City, LA	Marco Belt Skimmer	2	19,709	249	Morgan City, LA	115	1	1	13	1	16
			30" Auto Boom	150'									
			Personnel	5									
			56' SWS Vessel	1									
			14'-16' Aluminum Flatboa	2									

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

Public Information Copy

GC 248 Well GL006 WCD
Sample Nearshore On-Water Recovery Activation List

Skimming System	Supplier & Phone	Warehouse	Skimming Package	Quantity	Est. Derated 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
M/V Bastian Bay	CGA 888-CGA-2007	Lake Charles, LA	Lori Brush Skimmer	1	5,000	65	Lake Charles, LA	220	1	0	15.5	1	17.5
			56" Boom	50'									
			46' Vessel	1									
			Personnel	4									
WP-1	MSRC 800-OIL-SPIL	Tampa, FL	Offshore Skimmer	1	3,017		Fourchon, LA	20	14	1	1.5	1	17.5
			20" Boom	50'									
			Personnel	4									
			* Crew Boat	1									
			Towable Bladder	1		500							
WP-1	MSRC 800-OIL-SPIL	Miami, FL	Offshore Skimmer	1	3,017		Fourchon, LA	20	16	1	1.5	1	19.5
			20" Boom	50'									
			Personnel	4									
			* Utility Boat	2									
			Towable Bladder	1		500							
Barge Boat w/ AARDVAC	MSRC 800-OIL-SPIL	Miami, FL	Offshore Skimmer	1	3,840		Fourchon, LA	20	16	1	1.5	1	19.5
			20" Boom	50'									
			Personnel	4									
			* Barge Boat	1									
			Towable Bladder	1		500							
Barge Boat w/ AARDVAC	MSRC 800-OIL-SPIL	Miami, FL	Offshore Skimmer	1	3,840		Fourchon, LA	20	16	1	1.5	1	19.5
			20" Boom	50'									
			Personnel	4									
			* Barge Boat	1									
			Towable Bladder	1		500							
CGA 58 Timbalier Bay	CGA 888-CGA-2007	Galveston, TX	Lori Brush Skimmer	1	5,000	65	Galveston, TX	265	1	0	19	1	21
			56" Boom	50'									
			46' Vessel	1									
			Personnel	4									
SBS w/ Queensboro	MSRC 800-OIL-SPIL	Whiting, IN	Offshore Skimmer	1	905	400	Fourchon, LA	20	18	1	1.5	1	21.5
			20" Boom	50'									
			Personnel	4									
			* Push Boat	1									
SBS w/ Queensboro	MSRC 800-OIL-SPIL	Toledo, OH	Offshore Skimmer	1	905	400	Fourchon, LA	20	22	1	1.5	1	25.5
			20" Boom	50'									
			Personnel	4									
			* Push Boat	1									
Trinity Shallow Water Skimmer	CGA 888-CGA-2007	Galveston, TX	Marco Belt Skimmer	2	19,709	249	Galveston, TX	265	1	1	29.5	1	32.5
			30" Auto Boom	150'									
			Personnel	5									
			56' SWS Vessel	1									
			14'-16' Aluminum Flatboa	2									
MSRC "Quick Strike"	MSRC 800-OIL-SPIL	Ingleside, TX	LORI Brush Skimmer	1	5,000	50	Ingleside, TX	430	2	1	30.5	1	34.5
			Personnel	4									
			47' Fast Response Boat	1									
MSRC "Lightning"	MSRC 800-OIL-SPIL	Tampa, FL	LORI Brush Skimmer	1	5,000	50	Tampa, FL	550	2	1	39.5	1	43.5
			Personnel	4									
			47' Fast Response Boat	1									
							DERATED RECOVERY RATE (BBLS/DAY)						146,592
							SKIMMING VESSEL STORAGE CAPACITY (BARRELS)						9,690

* - These components are additional operational requirements that must be procured by OSROs in addition to the system identified.

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

GC 248 Well GL006 WCD Sample Aerial Surveillance Activation List										
Aerial Surveillance System	Supplier & Phone	Warehouse	Aerial Surveillance Package	Quantity	Staging Area	Distance to Site from Staging (miles)	Response Times (Hours)			
							Staging ETA	Loadout Time	ETA to Site	Total ETA
Twin Commander Air Speed - 288 MPH	Airborne Support 985-851-6391	Houma, LA	Surveillance Aircraft	1	Houma, LA	127	1	0.25	0.44	**2.00**
			Spotter Personnel	2						
			Crew - Pilots	1						
Eurocopter EC-135 Helicopter Air Speed - 141 knots	PHI 985-475-5400	Houma, LA	Surveillance Aircraft	1	Houma, LA	127	1	0.25	0.44	**2.00**
			Spotter Personnel	2						
			Crew - Pilots	1						
Sikorsky S-76 Helicopter Air Speed - 141 knots	PHI 985-475-5400	Houma, LA	Surveillance Aircraft	1	Houma, LA	127	1	0.25	0.44	**2.00**
			Spotter Personnel	2						
			Crew - Pilots	1						

Table 9.D.6 Aerial Surveillance Activation List

GC 248 Well GL006 WCD
Sample Offshore Aerial Dispersant Activation List

Aerial Dispersant System	Supplier & Phone	Warehouse	Aerial 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
Twin Commander Air Speed - 288 MPH	Airborne Support 985-851-6391	Houma, LA	Aero Commander	1	Houma, LA	127	2	0.4	0.44	0.2	3.05
			Spotter Personnel	2							
			Crew - Pilots	1							
BT-67 (DC-3 Turboprop) Aircraft Air Speed - 194 MPH	Airborne Support 985-851-6391	Houma, LA	DC-3 Dispersant Aircraft	1	Houma, LA 1st Flight	127	2	0.5	0.65	0.3	3.50
			Dispersant - Gallons	2000							
			Spotter Aircraft	1							
			Spotter Personnel	2	Houma, LA 2nd Flight	127	0.65	0.5	0.65	0.3	2.15
			Crew - Pilots	2							
DC-3 Aircraft Air Speed - 150 MPH	Airborne Support 985-851-6391	Houma, LA	DC-3 Dispersant Aircraft	1	Houma, LA 1st Flight	127	2	0.5	0.85	0.3	3.65
			Dispersant - Gallons	1200							
			Spotter Aircraft	1							
			Spotter Personnel	2	Houma, LA 2nd Flight	127	0.85	0.5	0.85	0.3	2.50
			Crew - Pilots	2							
DC-3 Aircraft Air Speed - 150 MPH	Airborne Support 985-851-6391	Houma, LA	DC-3 Dispersant Aircraft	1	Houma, LA 1st Flight	127	2	0.5	0.85	0.3	3.65
			Dispersant - Gallons	1200							
			Spotter Aircraft	1							
			Spotter Personnel	2	Houma, LA 2nd Flight	127	0.85	0.5	0.85	0.3	2.50
			Crew - Pilots	2							
DC-4 Aircraft Air Speed - 150 MPH	Airborne Support 985-851-6391	Houma, LA	DC-4 Dispersant Aircraft	1	Houma, LA 1st Flight	127	2	0.5	0.85	0.3	3.65
			Dispersant - Gallons	2000							
			Spotter Aircraft	1							
			Spotter Personnel	2	Houma, LA 2nd Flight	127	0.85	0.5	0.85	0.3	2.50
			Crew - Pilots	2							
BE-90 King Air Aircraft Air Speed - 213 MPH	MSRC 800-OIL-SPIL	Stennis, MS	BE-90 Dispersant Aircraft	1	Stennis INTL., MS 1st Flight	193	4.00	0.20	0.91	0.20	5.35
			Dispersant - Gallons	250							
			Spotter Aircraft	1							
			Spotter Personnel	2	Stennis INTL., MS 2nd Flight	193	0.91	0.20	0.91	0.20	2.25
			Crew - Pilots	2							
C130-A Aircraft Air Speed - 342 MPH	MSRC 800-OIL-SPIL	Stennis, MS	C130-A Dispersant Aircraft	1	Stennis INTL., MS 1st Flight	193	4.00	0.3	0.56	0.5	5.40
			Dispersant - Gallons	3250							
			Spotter Aircraft	1							
			Spotter Personnel	2	Stennis INTL., MS 2nd Flight	193	0.56	0.3	0.56	0.5	2.00
			Crew - Pilots	2							
C130-A Aircraft Air Speed - 342 MPH	MSRC 800-OIL-SPIL	Coolidge, AZ	C130-A Dispersant Aircraft	1	Ellington Field, TX 1st Flight	306	8	0.3	0.89	0.5	9.75
			Dispersant - Gallons	3250							
			Spotter Aircraft	1							
			Spotter Personnel	2	Stennis INTL., MS 2nd Flight	193	0.56	0.3	0.56	0.5	2.00
			Crew - Pilots	2							
ADDS PACK Air Speed - 330 MPH	Clean Carribean 985-851-6391	Pt. Everglades, FL	C-130 Aircraft (contractor)	1	Clearwater, FL 1st Flight	481	24-48	1	1.46	0.5	27 to 51
			ADDS PACK	1							
			Dispersant - Gallons	5000							
			Spotter Aircraft	1	Stennis INTL, MS 2nd Flight	193	0.58	0.3	0.58	0.5	1.97
			Spotter Personne	2							
			Crew - Pilots	2							
ADDS PACK Air Speed - 330 MPH	Oil Spill Response +44 (0) 1224-72-6859	South Hampton, UK	L-382 Hercules Aircraft	1	Stennis INTL, MS 1st Flight	193	6-24	2-4	0.58	0.5	9.1 to 29.1
			ADDS PACK	1							
			Dispersant - Gallons	5000							
			Spotter Aircraft	1	Stennis INTL, MS 2nd Flight	193	0.58	0.3	0.58	0.5	1.97
			Spotter Personne	2							
			Crew - Pilots	2							
ADDS PACK Air Speed - 330 MPH	Oil Spill Response +44 (0) 1224-72-6859	Singapore, SG	L-382 Hercules Aircraft	1	Stennis INTL, MS 1st Flight	193	6-24	2-4	0.58	0.5	9.1 to 29.1
			ADDS PACK	1							
			Dispersant - Gallons	5000							
			Spotter Aircraft	1	Stennis INTL, MS 2nd Flight	193	0.58	0.3	0.58	0.5	1.97
			Spotter Personnel	2							
			Crew - Pilots	2							

Table 9.D.7 Offshore Aerial Dispersant Activation List

GC 248 Well GL006 WCD
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
Fire Monitor Induction Dispersant Spray System	AMPOL 800-482-6765	Fourchon, LA	Dispersant Spray System	1	Fourchon, LA	98	2	0.5	7	1	10.5
			Dispersant (Gallons)	500							
			Personnel	4							
			* 110' Utility Boat	1							
			* Crew Boat	1							
Fire Monitor Induction Dispersant Spray System	AMPOL 800-482-6765	Cameron, LA	Dispersant Spray System	1	Fourchon, LA	98	4	0.5	7	1	12.5
			Dispersant (Gallons)	500							
			Personnel	4							
			* 110' Utility Boat	1							
			* Crew Boat	1							
USCG SMART Team	USCG	Mobile, AL	Personnel	4	Fourchon, LA	98	6	1	7	0.5	14.5
			* Crew Boat	1							
Skid-Mounted Dispersant Spray System	MSRC 800-OIL-SPIL	San Jose, PR	Dispersant Spray System	1	Fort Jackson, LA	145	12	1	10.5	1	24.5
			Dispersant (Gallons)	880							
			* 110' Utility Boat	1							
			Personnel	12							

* - These components are additional operational requirements that must be procured by OSROs in addition to the system identified.

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

GC 248 Well GL006 WCD
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
Site Assessment and Surveillance	RP	Fourchon, LA	Multi-Service Vessel	1	Fourchon, LA	96	0	1.5	7	0.5	9
			ROV's	2							
Subsea Dispersant Application	RP / MWCC	Fourchon, LA	Multi-Service Vessel	1	Fourchon, LA	96	1.5	1.5	7	2	12
			ROV's	2							
			Coil Tubing Unit	1							
		Houston, TX	Dispersant	200,000 gal							
			Manifold	1							
			System	1							
Capping Stack	RP / MWCC	Fourchon, LA	Anchor Handling Tug Supply Vessel	1	Fourchon, LA	96	2	1.5	7	3	13.5
			ROV's	1							
		Houston, TX	Hydraulic System	1							
			Capping Stack	1							
"Top Hat" Unit	RP / MWCC	Fourchon, LA	Vessel	1	Fourchon, LA	96	13*	1	7	3	18
			ROV's	2							
			Multi-Purpose Supply Vessel	1							
			Drill Ship (Processing Vessel)	1							
			"Top Hat"	1							
			Containment Chamber	1							
			Shuttle Barge	1							

* - Response time may vary depending on Drill Ship's operations and location at the time of deployment.

Table 9.D.9 Control and Containment Activation List

GC 248 Well GL006 WCD
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
ISB Fire-Fighting Team	TBD	TBD	* Offshore Firefighting Vessels	2	Fourchon, LA	98	TBD	1	7	1	TBD
			* Cranes	2							
			* Roll-off Boxes	2							
			Personnel	8							
			* Air Monitoring Equipment	2							
Safety Monitoring Team	TBD	TBD	* Air Monitoring Equipment	1	Fourchon, LA	98	TBD	1	7	1	TBD
			* Offshore Vessel	1							
			Personnel	4							
Wildlife Monitoring Team	TBD	TBD	* Air Monitoring Equipment	1	Fourchon, LA	98	TBD	1	7	1	TBD
			* Offshore Vessel	1							
			Personnel	4							
Aerial Spotting Team (per 2 ISB Task Forces)	TBD	TBD	Fixed Wing Aircraft	1	Fourchon, LA	98	TBD	1	7	1	TBD
			Trained ISB Spotter	2							
			ISB Documenter	1							
Fire Team (In-Situ Burn Fire System)	MSRC 800-OIL-SPIL	Fourchon, LA	Fire Boom (ft)	500	Fourchon, LA	98	2	1	7	1	11
			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)	MSRC 800-OIL-SPIL	Fourchon, LA	Fire Boom (ft)	500	Fourchon, LA	98	2	1	7	1	11
			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-CGA-2007	Harvey, LA	Fire Boom (ft)	500	Fourchon, LA	98	4	1	7	1	13
			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-CGA-2007	Harvey, LA	Fire Boom (ft)	500	Fourchon, LA	98	4	1	7	1	13
			Guide Boom/Tow Line (ft)	400							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
SMART In-Situ Burn Monitoring Team	USCG	Mobile, AL	* Air Monitoring Equipment	1	Fourchon, LA	98	6	1	7	1	15
			* Offshore Vessel	1							
			Personnel	4							
Fire Team (In-Situ Burn Fire System)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			Guide Boom/Tow Line (ft)	400							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							

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

GC 248 Well GL006 WCD
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	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			Guide Boom/Tow Line (ft)	400							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							

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

GC 248 Well GL006 WCD
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	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			Guide Boom/Tow Line (ft)	400							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							

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

GC 248 Well GL006 WCD
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	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	Houston, TX.	Fire Boom (ft)	500	Fourchon, LA	98	6	1	7	1	15
			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)	MSRC 800-OIL-SPIL	St. Croix, USVI	Fire Boom (ft)	500	Fourchon, LA	98	12	1	7	1	21
			Guide Boom/Tow Line (ft)	400							
			* Offshore Vessel (0.5 kt capability)	2							
			Personnel	6							
			Ignition Device	10							
						TOTAL FIRE BOOM AVAILABLE (FEET)					20,000

** - These components are additional operational requirements that must be procured by OSROs in addition to the system identified.*

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

GC 248 Well GL006 WCD
Sample Shoreline Protection & Wildlife Support List

Supplier & Phone (MSRC Star Contractor)	Warehouse	Equipment Listing	Quantity	Staging Area	Response Times (Hours)			
					Staging ETA	Loadout Time	Deployment Time	Total ETA
WR&E 281-731-8826	Baton Rouge, LA	Wildlife Specialist - Personnel	6 to 20	Fourchon, LA	3	1	0	4
ES&H Environmental 877-437-2634	Fourchon, LA	Containment Boom - 18" to 24"	1000'	Fourchon, LA	2	1	1	4
		Containment Boom - 6" to 10"	200'					
		Response Boats - 14' to 20'	3					
		Portable Skimmers	3					
		Response Personnel	2					
AMPOL 800-482-6765	New Iberia, LA	Containment Boom - 18" to 24"	43,250'	Fourchon, LA	3	1	1	5
		Response Boats - 14' to 20'	4					
		Response Boats - 21' to 36'	6					
		Portable Skimmers	33					
		Shallow Water Skimmers	1					
		Bird Scare Cannons	7					
		Response Personnel	70					
Oilmop 800-645-6671	New Iberia, LA	Containment Boom - 18" to 24"	3,500'	Fourchon, LA	3	1	1	5
		Containment Boom - 6" to 10"	500'					
		Response Boats - 14' to 20'	6					
		Response Boats - 21' to 36'	2					
		Portable Skimmers	2					
		Shallow Water Skimmers	2					
		Response Personnel	8					
USES Environmental 888-279-9930	Geismar, LA	Containment Boom - 18" to 24"	1000'	Fourchon, LA	3	1	1	5
		Response Boats - 14' to 20'	3					
		Portable Skimmers	2					
		Response Personnel	9 to 18					
Oilmop 800-645-6671	Belle Chasse, LA	Containment Boom - 18" to 24"	21,000'	Fourchon, LA	4	1	1	6
		Containment Boom - 6" to 10"	500'					
		Response Boats - 14' to 20'	19					
		Response Boats - 21' to 36'	7					
		Portable Skimmers	22					
		Shallow Water Skimmers	1					
		Bird Scare Cannons	20					
		Response Personnel	18					
AMPOL 800-482-6765	Harvey, LA	Containment Boom - 18" to 24"	19,500'	Fourchon, LA	4	1	1	6
		Response Boats - 14' to 20'	2					
USES Environmental 888-279-9930	Meraux, LA	Containment Boom - 18" to 24"	6000'	Fourchon, 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					
ES&H Environmental 877-437-2634	Houma, LA	Containment Boom - 18" to 24"	27,000'	Fourchon, LA	4	1	1	6
		Containment Boom - 6" to 10"	15,000'					
		Response Boats - 14' to 20'	38					
		Response Boats - 21' to 36'	12					
		Portable Skimmers	25					
		Shallow Water Skimmers	1					
		Bird Scare Cannons	200					
		Response Personnel	11					
CGA 888-CGA-2007	Houma, LA	Wildlife Trailer	1	Fourchon, LA	4	1	2	7
		Contract Truck (Third Party)	1					
		Personnel (Responder/Mechanic)	1					
MSRC 800-OIL-SPIL	Lake Charles, LA	Wildlife Trailer	1	Fourchon, LA	4	1	2	7
		Contract Truck (Third Party)	1					
		Personnel (Responder/Mechanic)	1					
WR&E 281-731-8826	Houston, TX	Wildlife Specialist - Personnel	6 to 20	Fourchon, LA	6	1	0	7
TRI-STATE 302-737-9543	Newark, DE	Wildlife Specialist - Personnel	6 to 12	Fourchon, LA	12	1	0	13

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

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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

B. Incidental Takes

No incidental takes are anticipated. Shell implements the mitigation measures and monitors for incidental takes of protected species according to the following notices to lessees and operators from the Minerals Management Service:

NTL 2012-BSEE-G01 "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 and Protected Species Observer Program"

C. Flower Garden Banks National Marine Sanctuary

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

SECTION 11: LEASE STIPULATIONS INFORMATION

Lease OCS-G 15565 is not part of a Biological Sensitive Area, known Chemosynthetic Area or Shipping Fairway. It is on the list of areas that the BOEM has identified as having a high probability for archeological resources. See Section 6 of this plan for site specific archeological information. It is located in Military Warning Area W-92 and Shell will enter into an agreement with the commander prior to commencing operations.

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 Oil Spill Response Plan. The EIA in Section 18 to this plan discusses impacts and mitigation measures.

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 Minerals Management Service:

NTL 2012-BSEE-G01 "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 and Protected Species Observer Program"

SECTION 13: RELATED FACILITIES AND OPERATIONS INFORMATION

A. Related OCS Facilities and Operations

Under the proposed SDOCD, Shell plans to drill, complete and produce up to four new subsea wells, connected to an open hub on one of two existing flowline PLETs with a flowline jumper. The existing 6.5" buried flowlines will transport hydrocarbons from the PLETs to the Brutus TLP.

The wells will be controlled from the Brutus TLP through a single 7.05-mile long, steel-tube electro-hydraulic umbilical. The umbilical will be utilized to deliver chemicals and water-based hydraulic control fluid to the subsea wells and flowline as well as to provide for multiplexed electrical control and monitoring of the subsea system.

Shell will tie the proposed wells back to produce to the existing GC 158 Brutus TLP for processing and delivery into the existing export line system for transportation to shore. No expansion to the existing TLP is anticipated as a result of the addition of these wells. There will be minor plumbing modification to the chemical distribution system on Brutus TLP to accommodate the new wells.

B. Transportation System

Oil Transportation – From the Brutus Platform gas leaves by a 20" gas line via SS Block 332 A platform to the Transco Pipeline to Terrebonne plant or the Nautilus Pipeline to the Neptune plant. From the Brutus Platform liquid hydrocarbons leave by a 20" oil pipeline via ST 301 B platform to Fourchon or Houma, LA.

Gas Transportation – From the Brutus Platform gas leaves by a 20" gas line via SS Block 332 A platform to the Transco Pipeline to Terrebonne plant or the Nautilus Pipeline to the Neptune plant.

C. Produced liquid hydrocarbons transportation vessels

Not applicable.

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	2	Twice per week
Offshore Support Vessels	120,000	3	Twice per week
Tug Boats	100,000	2	Once per rig move
Anchor Handling Vessel	250,000	3	Once per rig move
Helicopter	764	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	Port Fourchon to GC 248

C. Drilling Fluids Transportation

Required for State of Florida only.

D. Solid and Liquid Wastes Transportation

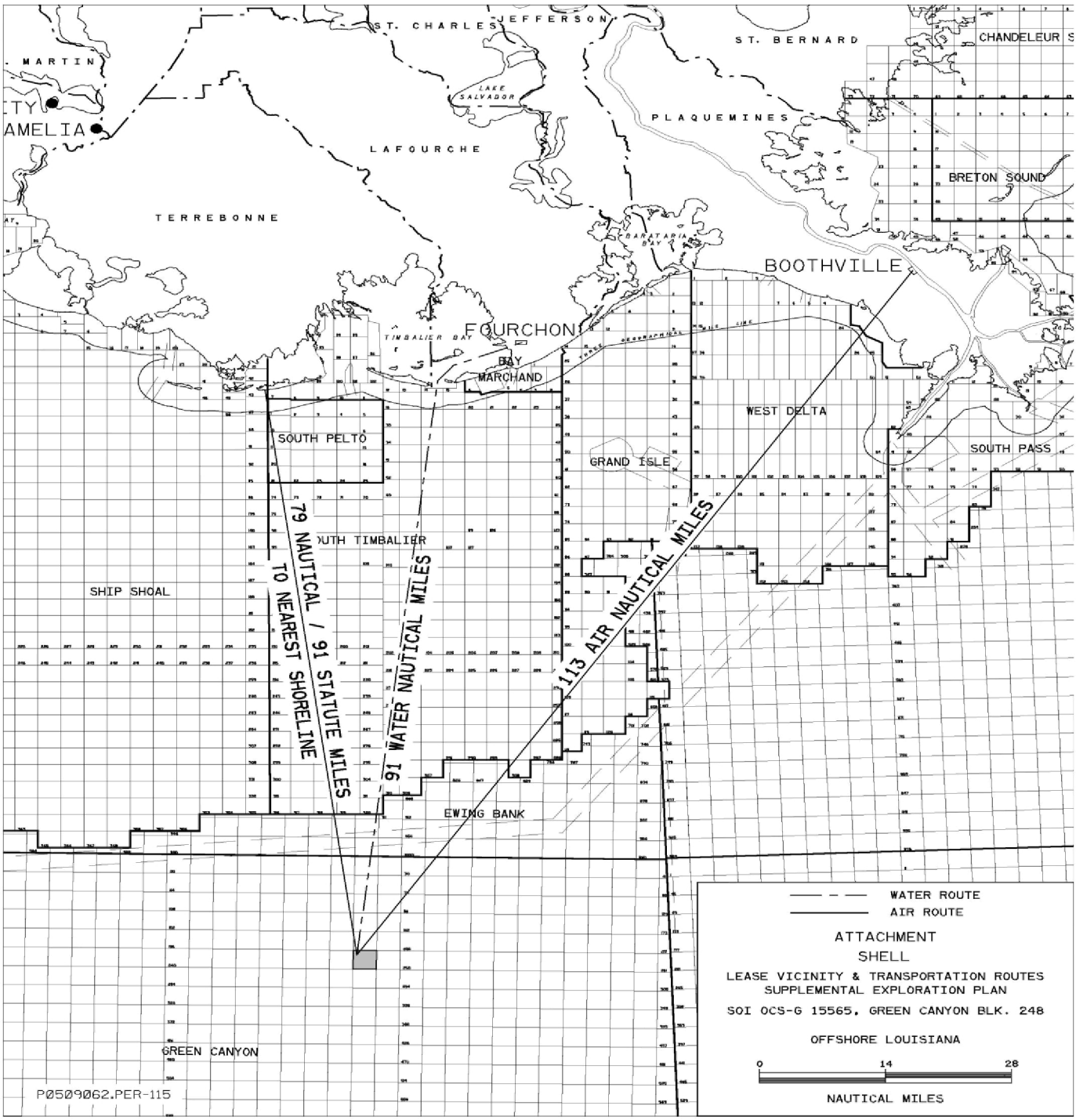
See Section 7B

E. Vicinity Map

See attached

Vicinity Map

91 statute miles to shore
98 statute miles to Port Fourchon
131 statute miles to Boothville



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SECTION 15: ONSHORE SUPPORT FACILITIES INFORMATION

A. General

Name	Location	Existing/New/Modified
Fourchon	Port Fourchon, LA	Existing
PHI 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 Boothville heliport is operated by PHI and is located on La State Highway 23 in Boothville, La.

B. Support Base Construction or Expansion

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

C. Support Base Construction or Expansion Timetable

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

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 SDOCD as we are not proposing to conduct sulphur operations.

SECTION 17: COASTAL ZONE MANAGEMENT ACT (CZMA) INFORMATION

Louisiana Coastal Zone Management (CZMA) consistency was obtained in Plan N-07841, approved by BOEM on December 15, 2003. Louisiana CZMA consistency is not required for revised or supplemental plans.

Environmental Impact Analysis

SUPPLEMENTAL DEVELOPMENT OPERATIONS COORDINATION DOCUMENT
for
Green Canyon Block 248 (OCS-G 15565)
Offshore Louisiana

August 2012

Prepared for:

Shell Offshore Inc.
P.O. Box 61933
New Orleans, Louisiana 70161
Telephone: (504) 728-6021

Prepared by:

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

Acronyms and Abbreviations

ADIOS	Automated Data Inquiry for Oil Spills
bbl	barrels
BOEM	Bureau of Ocean Energy Management
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
BOP	blowout preventers
BOPD	barrels of oil per day
BSEE	Bureau of Safety and Environmental Enforcement
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
DOCD	Development Operations Coordination Document
DPS	distinct population segment
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIA	Environmental Impact Analysis
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FAD	fish-attracting device
GC	Green Canyon
$g\ C\ m^{-2}$	grams of carbon per square meter
GEMS	Geoscience Earth and Marine Services
GMFMC	Gulf of Mexico Fishery Management Council
H_2S	hydrogen sulfide
HAPC	Habitat Area of Particular Concern
IPF	impact-producing factor
MARPOL	International Convention for the Prevention of Pollution from Ships
MMC	Marine Mammal Commission
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
NA	Natural Area
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRC	National Research Council
NTL	Notice to Lessees and Operators
NWR	National Wildlife Refuge
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
OSAT	Operational Science Advisory Team
OSRA	Oil Spill Risk Analysis
OSRP	Oil Spill Response Plan
PAH	polycyclic aromatic hydrocarbon
PM	particulate matter
PSD	Prevention of Significant Deterioration
ROV	remotely operated vehicle
SBM	synthetic-based mud
SEA	Site-Specific Environmental Assessment
Shell	Shell Offshore Inc.
SO_x	sulfur oxides
SO_2	sulfur dioxide
SWSS	Sperm Whale Seismic Study
TLP	tension leg platform
U.S.C.	United States Code
USCG	U.S. Coast Guard
USDOI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WCD	worst case discharge
WCEP	Whooping Crane Eastern Partnership
WMA	Wildlife Management Area

Introduction

Project Summary

Shell Offshore Inc. (Shell) is submitting a Supplemental Development Operations Coordination Document (SDOCD) for Green Canyon Block 248 (GC 248) that includes the drilling and completion of four development wells (GL006, GL007, GL008, GL009) in GC 248 and installation and tieback of subsea facilities to the existing Brutus tension leg platform (TLP) located in GC 158. A subsea production manifold, well trees, and flowline jumpers will be installed and production from the proposed wells in GC 248 will commence to the existing TLP.

Shell submitted a Supplemental DOCD for development wells and subsea tieback facilities in GC 248 on July 9, 2009, which was approved by the former Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) on July 29, 2009 (Plan Control No. S-7337).

The lease area is 91 miles (146 km) from the nearest shoreline, 98 miles (158 km) from the onshore support base at Port Fourchon, Louisiana, and 131 miles (211 km) from the helicopter base at Boothville, Louisiana. All miles in this Environmental Impact Analysis (EIA) are statute miles. Water depths at the proposed wellsites in GC 248 are approximately 3,233 ft (985 m) to 3,350 ft (1,021 m).

The installation of subsea facilities and drilling of wells will commence in 2013. Transocean's *Deepwater Nautilus*, a moored semisubmersible rig, or an equivalent rig will be used to drill and complete the wells. First production of GL006 and GL007 is anticipated during the first quarter of 2014; GL008 and GL009 first production is anticipated during the first quarter of 2016.

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 CFR 550.242(s) and 550.261. The EIA is a project- and site-specific analysis of Shell's planned activities under this Supplemental DOCD. On October 1, 2011, the BOEMRE reorganized into two separate agencies: Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE). 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 Notice to Lessees and Operators (NTLs) issued by the former Minerals Management Service (MMS) and 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 by BOEM and/or 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 Supplemental DOCD. The EIA also analyzes the potential environmental impacts of the revised blowout scenario and worst case discharge (WCD) information included with the Supplemental DOCD.

The BOEM has 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 Statement (EIS) for the OCS Oil and Gas Leasing Program (MMS, 2007a; BOEM, 2012a) and in multi-lease-sale EISs for the Western, Central, and Eastern Gulf of Mexico Planning Areas (MMS, 2001, 2003, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b), as well as the Environmental Assessment (EA) for Gulf of Mexico deepwater operations and activities (MMS, 2000) and a Grid EA for the Phoenix Project in Green Canyon Blocks 236 and 239 (Grid 9) (MMS, 2008b).

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 Supplemental DOCD 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.

OCS Regulatory Framework

The regulatory framework for OCS activities in the Gulf of Mexico has been summarized by MMS (2010). 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 and 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) applicable to this Environmental Impact Analysis (EIA).

Table 1. (Continued).

NTL	Title	Summary
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.
2012-BSEE-G01	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.
2010-N06	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 worst case discharge (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.

Table 1. (Continued).

NTL	Title	Summary
2009-G06	Military Warning and Water Test Areas	Provides contact links to individual command headquarters for the military warning and water test areas in the Gulf of Mexico. Lease stipulations require lessees or designated operators to enter into an agreement with the appropriate individual military command headquarters concerning the control of electromagnetic emissions and use of boats and aircraft in the applicable warning area or water test area before commencing such traffic.
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 and development program that certifies Shell's capability to respond to the maximum extent practicable to a WCD (30 CFR §254.2) (see **SDOCD Section 7**). 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 meets 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 §550 for DOCDs. 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 Transocean's *Deepwater Nautilus* or a similar moored semisubmersible rig, which will be on site for an estimated 135 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 drilling rig in the ocean can attract pelagic fishes and other marine life, as discussed in **Section C.5.1**. A semisubmersible rig maintains buoyancy using ballasted, watertight pontoons located below the sea surface. The operating deck is located above the tops of passing waves. Structural columns connect the pontoons and operating deck. When the rig moves its location, the pontoons are de-ballasted so that the rig can float on the sea surface. The *Deepwater Nautilus* uses anchors to hold or adjust its position.

Drilling operations produce noise that includes strong tonal components at low frequencies, including infrasonic frequencies in at least some cases (MMS, 2000). Drilling noise from semisubmersibles is not particularly intense and is strongest at low frequencies, averaging 10 to 500 Hz (Richardson et al., 1995). From a semisubmersible, sound and vibration are transmitted to the water either through the air or the risers (MMS, 2000). Drilling rigs also maintain exterior lighting for navigational and aviation safety in accordance with federal regulations.

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 or near any marine sanctuary, topographic feature, or no-activity zone. There are no submarine banks in the 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 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 as 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 or within 500 ft (152 m) of seafloor anchoring disturbances or subsea equipment locations.

(5) *Exploration or production activities where H_2S concentrations greater than 500 ppm might be encountered.*
   SDOCD 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. The lease is on the list of archaeology survey blocks (BOEM, 2012c). An archaeological survey has been conducted and four marine avoidance areas have been identified that will be avoided. The lease area is beyond the 60-m depth contour and therefore prehistoric archaeological sites are not likely.

(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

Non-anchored vessels will be used for manifold, jumper, and subsea hardware installation. There will be no anchoring impacts. Placement of the subsea equipment on the seafloor will directly disturb a small area of seafloor estimated to be less than 1 ac (0.4 ha).

The semisubmersible rig will be held in place by either suction pile anchors or variable load anchors that will be deployed with an anchor radius of 12,000 ft (3,658 m) around each wellsite. According to the MMS (2007b) semisubmersible rigs disturb about 5 to 7 ac (2 to 3 ha), depending on their mooring configurations. In taking the more conservative approach of 7 ac (3 ha) the total seafloor disturbance area is estimated to be 28 ac (11 ha) for the four wellsites. In light of the proximity of the proposed GL006/GL009 and GL007/GL008 wells, the impact area could be reduced. During anchor deployment, cables will be resting on the seafloor only during the pre- and post-installation phase; once the rig arrives on location, cables are pulled taut towards the rig. The cables do not sweep the seafloor or cross any sensitive features, and therefore are expected to have little or no physical impact on the seafloor.

A.3 Air Pollutant Emissions

Estimates of air pollutant emissions are provided in **SDOCD Section 8**. Offshore air pollutant emissions will result from subsea equipment installation activities and operations of the drilling rig, service vessels and helicopters. These emissions occur mainly from combustion of diesel fuel. 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 **SDOCD Section 8**) prepared in accordance with BOEM requirements shows that the projected emissions from 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).

A.4 Effluent Discharges

Effluent discharges are summarized in **SDOCD Section 7**. Support vessel discharges will be in accordance with USCG regulations and, as applicable, the National Pollutant Discharge Elimination System (NPDES) Vessel General Permit, and therefore are not expected to cause significant impacts on water quality. Discharges from the semisubmersible rig will be in compliance with and monitored as required by the NPDES permit (GMG290000).

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 NPDES permit limitations for SBM fluid retained on cuttings. The estimated volume of SBM cuttings to be discharged is provided in **SDOCD Section 7**.

Well treatment fluids, completion fluids, and workover fluids may be discharged overboard via a downpipe below the water surface, after treatment that complies with NPDES permit limitations for these fluids. Other effluent discharges may include excess cement, non-contact cooling water, treated sanitary and domestic wastes, deck drainage, desalination unit brine, uncontaminated fire water, and ballast water. All effluents will comply with monitoring and limitations of the NPDES permit.

A.5 Water Intake

Seawater will be drawn from several meters below the ocean surface for various services, including firewater, utility water, and once-through non-contact cooling of machinery (**SDOCD 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. GMG290000 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 drilling rig does not trigger the cooling water intake permit requirements of the NPDES permit because the rig was constructed prior to the July 17, 2006 applicability date.

A.6 Onshore Waste Disposal

Wastes generated during subsea installation as well as drilling and completion activities are tabulated in **SDOCD Section 7**. Non-hazardous trash and debris and non-recyclable waste will be transported to the Newpark Environmental in Ingleside, Texas, or Bridge City, Texas. Recyclable trash and debris will be recycled at Omega Waste Management in Patterson, Louisiana, or ARC of New Iberia, Louisiana. Hazardous waste such as paints, solvents, and unused chemicals will be disposed of at Safety Kleen Systems, Inc. in Denton, Texas, or Lamp Environmental in Hammond, Louisiana. Used oil will be sent to Omega Waste Management in Patterson, Louisiana, or ARC of New Iberia, Louisiana for recycling. At the 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 mammals, turtles, and birds 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

Construction and offshore support vessels will be in the vicinity during the subsea installation activities and will generate noise of variable duration and intensity from machinery. Underwater noise from floating vessels is generally weak due to positioning of machinery above the water and the relatively small surface area that comes into contact with the water (MMS, 2000).

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.

During installation, drilling, and completion activities the project will be supported by crew boats, offshore supply vessels, tugboats, installation vessels, utility vessels, and helicopters (see **SDOCD Section 14**). There will likely be at least one support vessel in the field at all times. The supply vessels will normally move to the project area via the most direct route from the shorebase. Helicopters will be used to transport personnel and small supplies and 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).

The duration of drilling and installation activities is limited (several months); therefore, impacts from this additional traffic is expected to be minimal.

A.9 Accidents

A.9.1 Types of Accidents Evaluated

The analysis in this EIA focuses on two potential accidents:

- a small fuel spill, which is the most likely type of spill during OCS development 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 as detailed in **SDOCD 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**.

The lease sale EIS (MMS, 2007b) analyzes three other types of accidents: 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

Spill Size. According to the analysis in MMS (2007b; BOEMRE, 2011; 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 (MMS, 2007b). The average size for spills <1 bbl is 0.07 bbl, and the median size for spills of 1 to 10 bbl is 3 bbl (MMS, 2007b; BOEMRE, 2011; 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.

Spill Fate. 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, the duration of a small spill and 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 (National Research Council [NRC], 2003).

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 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, 2003) 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 over 90% of a small diesel spill would be evaporated or dispersed within 24 hours. The area of the sea surface with diesel fuel on it 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 below for a large spill, indicate that a small fuel spill would not affect coastal or shoreline resources. The lease area (GC 248) is approximately 91 miles (146 km) from the nearest coastline (Louisiana). Modeling results discussed below indicate that a spill in the lease area would have no shoreline contact within 3 days and a 1% probability of contacting the nearest Louisiana shorelines (Terrebonne Parish and Plaquemines Parish) within 10 days after a spill. After 3 days, essentially 100% of a small fuel spill would have dispersed or evaporated by natural processes, even if no response measures were implemented. MMS (2007b) similarly concluded that spills <1,000 bbl are not expected to persist as a slick on the surface of the water beyond a few days and are unlikely to make landfall or reach coastal waters prior to breaking up. MMS (2007b) noted that this conclusion is supported by a previous analysis of 3-day trajectory model runs, previous weathering analyses, and historical records of spill incidents.

Spill Response. In the event of a small 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. **SDOCD Section 9b** provides a detailed discussion of Shell's response to a spill.

A.9.3 Large Oil Spill

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 **SDOCD Section 2j**. Blowouts are rare events and most do not result in oil spills. Holand (1997) estimated a probability of 0.00142 for a blowout during deep development drilling based on U.S. Gulf of Mexico data. An updated analysis using the SINTEF database estimates a blowout frequency of 0.00035 per development well for non-North Sea locations (International Association of Oil & Gas Producers, 2010). As noted by MMS (2007b), from 1992 to 2005, half the blowouts in the Gulf of Mexico lasted less than half a day, and fewer than 10% of blowouts resulted in spilled oil.

Spill Size. Shell has calculated a WCD for this Supplemental DOCD using the requirements prescribed by NTL 2010-N06. The WCD is 398,981 bbl for the first day with a 30-day average of 398,000 barrels of oil per day (BOPD). The detailed analysis of this calculation can be found in **SDOCD Section 2j**. The WCD scenario for this Supplemental DOCD, in terms of both initial and the sustained rates, has a low probability of being realized. 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 **SDOCD Sections 2j** and **9b** is Shell's response to NTL 2010-N06, 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 Interim 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 44, the launch area nearest to the lease area) are presented in **Table 3**. The OSRA results presented 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. The model predicts no shoreline contact within 3 days. After 10 days, two Louisiana parishes may be contacted. After 30 days, three Texas counties and six Louisiana parishes may be contacted. Terrebonne Parish and Plaquemines Parish, Louisiana, have a 1% probability of shoreline contact within 10 days; Cameron Parish has a 5% probability of shoreline contact within 30 days.

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 44) 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
C08	Matagorda, Texas	--	--	1
C10	Galveston, Texas	--	--	2
C12	Jefferson, Texas	--	--	1
C13	Cameron, Louisiana	--	--	5
C14	Vermilion, Louisiana	--	--	2
C17	Terrebonne, Louisiana	--	1	2
C18	Lafourche, Louisiana	--	--	1
C19	Jefferson, Louisiana	--	--	1
C20	Plaquemines, Louisiana	--	1	4

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%).

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.

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, 2003).

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 (APD) 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 **SDOCD Section 9b** for a detailed description of spill response measures.

A.9.4 Other Accidents Not Analyzed in Detail

The lease sale EIS (MMS, 2007b) discusses three other types of accidents: chemical spills, vessel collisions, and loss of well control. These accidents are discussed briefly below. No hydrogen sulfide (H_2S) is expected at this site, and no other site-specific issues have been identified for this Supplemental DOCD. 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: zinc bromide and ammonium chloride (Boehm et al., 2001). The project addressed by this Supplemental DOCD does not anticipate the use of ammonium chloride but will use zinc bromide during well completion. As

zinc bromide is used during well completion and is not in continuous use, the risk of a spill is small (BOEM, 2012b). Spill response capabilities are addressed in the OSRP. No significant impacts are expected from chemical spills. In summary, these chemicals are not a significant risk in the event of a spill because they are either nontoxic, used in minor quantities, or are only used on a non-continuous basis (BOEM, 2012b).

Vessel Collisions. As summarized in MMS (2007b) and BOEMRE (2011), 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 percent of these collisions have caused spills of diesel fuel or chemicals (BOEMRE, 2011). 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 are considered to be a subset of more serious incidents with greater risk of oil spill or human injury (MMS, 2007b). Loss of well control may result in the release of oil. Shell has a robust system in place to prevent loss of well control. Included in this Supplemental DOCD is Shell's response to NTL 2010-N06, 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 Interim Final Drilling Safety Rule, which specify additional safety measures for OCS activities. See **SDOCD Sections 2j** and **9b** for further information.

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

B. Affected Environment

The lease area is on the continental slope in the northwestern Gulf of Mexico, 91 miles (146 km) from the nearest shoreline, 98 miles (158 km) from the onshore support base at Port Fourchon, Louisiana, and 131 miles (211 km) from the helicopter base at Boothville, Louisiana.

The wellsites in GC 248 are at a water depth of approximately 3,233 to 3,350 ft (985 to 1,021 m) (**SDOCD Figure 1b**). The seafloor is undulating and dominated by a north-south trending scarp of hemipelagic sediment which mutes the sharpness of the gullies. There are existing wells and subsea facilities (flowline termination sleds, flowlines, jumpers, umbilicals, and flying leads) near the proposed development locations. There are a number of large fluid expulsion features above the escarpment; however, no high-density areas of chemosynthetic communities will be disturbed.

The archaeological assessment and seafloor surveys (C&C Technologies, Inc., 2008; GEMS, 2009) reported four side-scan sonar contacts in proximity to the proposed well locations. One contact was identified as the location of the GC 248 #1 borehole. The other two contacts were identified as simple debris and are not archaeologically significant. According to the survey results, the proposed wellsite locations as well as locations for the subsea facilities in GC 248 appear suitable for the planned activity (C&C Technologies, Inc., 2008; GEMS, 2009).

A detailed description of the regional affected environment is provided in recent EISs (MMS, 2001, 2003, 2007b, 2008a; BOEMRE, 2011; 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 below, and brief descriptions of each potentially affected resource are presented in **Section C**, including site-specific and/or new information if available.

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 recent lease sale EISs (MMS, 2001, 2003, 2007b, 2008a; BOEMRE, 2011; 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, Central, and Eastern Gulf of Mexico Planning Areas (MMS, 2001, 2003, 2007b, 2008a) as well as the EA for Gulf of Mexico deepwater operations and activities (MMS, 2000) and supplemental EISs for the Western and Central Gulf of Mexico Planning Areas (BOEMRE, 2011; 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).

As of July 20, 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.

Winds in the region are driven by the clockwise circulation around the Bermuda High (MMS, 2007b). 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 potentially affecting air quality are air pollutant emissions and two types of accidents: a small fuel spill and a large oil spill.

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 subsea equipment installation vessels and operation of the drilling rig, helicopters, and service vessels. 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 EIS (MMS, 2007b; BOEM, 2012b),

emissions of air pollutants from routine activities in the Central Gulf of Mexico 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 **SDOCD Section 8**) prepared in accordance with BOEM requirements shows that the projected emissions from 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). Because projected emissions are below the BOEM exemption criteria, Shell does not expect impacts to onshore air quality from routine operations.

The Breton Wilderness Area, which is part of the Breton National Wildlife Refuge (NWR), is designated under the Clean Air Act as a Prevention of Significant Deterioration (PSD) Class I air quality area. The BOEM coordinates with the National Park Service (NPS) and the USFWS if emissions from proposed projects may affect the Breton Class I area. Additional review and mitigation measures may be required for sources within 186 miles (300 km) of the Breton Class I area that exceed emission limits agreed upon by the administering agencies (NPS, 2010). The lease area is approximately 145 miles (234 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.

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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b). 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. **SDOCD 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 the sea surface with diesel fuel on it 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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b).

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 (91 miles [146 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**), Terrebonne, Plaquemines, and Cameron Parishes, 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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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 potentially affecting 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 limitations 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). There will be no persistent impacts on water quality in the lease area, according to analyses in the most recent Supplemental EIS (BOEM, 2012b).

Treated sanitary and domestic wastes may have a slight transient effect on water quality in the immediate vicinity of these discharges. NPDES permit limitations and requirements will be met; negligible impact on water quality is anticipated. Support vessel discharges will comply with USCG regulations and, as applicable, the NPDES Vessel General Permit, and therefore are not expected to cause significant impacts on water quality.

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 construction and support vessels and the rig will flow overboard through deck scuppers. Negligible impact on water quality is anticipated.

Other discharges, such as uncontaminated cooling water, fire water, and ballast water, are expected to be diluted rapidly and have little or no impact 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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b). 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. **SDOCD 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 the sea surface briefly affected by diesel fuel 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, 2003). 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 solid loads (NRC, 2003) 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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b). 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). A report by Kujawinski et al. (2011) indicates that 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). While dispersants were detectable in 353 of the 4,114 total water samples, concentrations in the samples were significantly below the chronic screening level (BOEM, 2012b).

Once oil enters the ocean, a variety of physical, chemical, and biological processes act to disperse the oil. 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, 2003). 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 methane (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) (OSAT, 2010). Stations revisited around the Macondo wellhead in October 2010 showed no measurable oxygen depressions (OSAT, 2010).

Due to the lease area location (91 miles [146 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 Terrebonne, Plaquemine, and Cameron Parishes, Louisiana, are the most likely coastal areas 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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD Sections 9b** provide 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 in GC 248 range from 3,233 to 3,350 ft (985 to 1,021 m). See **SDOCD Section 6a** for further information.

According to the BOEM (2011), existing information for the deepwater Gulf of Mexico indicates that the seafloor is composed primarily of soft sediments; hard bottom communities are rare. GC 248 is within deepwater Grid 9 where remotely operated vehicle (ROV) 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 predominantly clay (53%) and silt (36% to 38%).

Table 4. Benthic community data from stations near the lease area and 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)
C-7	36 mi (58 km) E	1,066	542,119	3,293	625
C-4	52 mi (68 km) ESE	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 220,000 to 890,000 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 3,200 individuals/m^2 similar to stations 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 on the mid Texas-Louisiana Slope ranging in depth from 2,050 to 5,997 ft (625 to 1,828 m). The five most abundant species in Zone 2E are the polychaetes *Litocorsa antennata*, *Aricidea suecica*, *Tharyx marioni*, and *Paralacydonia paradoxa* and the bivalve *Heterodonta* sp. Megafaunal density from nearby stations C-7 and C-4 was 625 and 743 individuals/ha, respectively (**Table 4**). Densities of 200 to 2,000 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 also 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 potentially affecting benthic communities are physical disturbance to the seafloor, 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

There will be minimal disturbance to soft bottom communities on the seafloor during positioning and anchoring of Transocean's semisubmersible rig, *Deepwater Nautilus*. Shell proposes anchor radii of 12,000 ft (3,658 m) for the wellsites. Cables may initially be laid on the seafloor anywhere within the anchor radius (except for avoidance zones based on the hazards survey as detailed in **SDOCD Section 6a**). According to the MMS (2007b) semisubmersible rigs disturb about 5 to 7 ac (2 to 3 ha), depending on their mooring configurations. The total seafloor disturbance area is estimated to be 28 ac (11 ha) for the four wellsites. In light of the proximity of proposed GL006/GL009 and GL007/GL008 wells, the impact area could be reduced. During anchor deployment, cables will be resting on the seafloor only during the pre- and post-installation phase; once the rig arrives on location, cables are pulled taut towards the rig. The cables do not sweep the seafloor or cross any sensitive features, and therefore they are expected to have little or no physical impact on benthic communities.

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 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 four surface locations in this exploration-drilling program, the total impact area would be 766 ac (314 ha). In light of the proximity of the proposed GL006/GL009 and GL007/GL008 wells, the 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

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 45% silt (Rowe and Kennicutt, 2009). Distances of closest sediment stations evaluated were 25 to 52 miles (40 to 68 km) from the project site.

Previous analyses (MMS, 2007a, 2008a) 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 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, 2008a), depending on its extent, trajectory, and persistence. 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, 2003).

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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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; Ross et al., 2012). 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 chemosynthetic community site is located approximately 5 miles (8 km) southeast of GC 248 in GC 293 (Brooks et al., 2009).

IPFs potentially affecting high-density deepwater benthic communities are physical disturbance to the seafloor, 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 Physical Disturbance to the Seafloor

The seafloor assessment by C&C Technologies, Inc. (2008) and Geoscience Earth and Marine Services (GEMS, 2009) did not identify features that could support high-density deepwater benthic communities within 2,000 ft (610 m) of the proposed drilling mud and cuttings discharge or within 500 ft (152 m) of seafloor disturbances resulting from anchors or proposed subsea equipment (see **SDOCD Section 6a** for additional information).

Impacts of Effluent Discharges

The chemosynthetic community assessment included in this Supplemental DOCD did not identify features that could support high-density deepwater benthic communities within 2,000 ft (610 m) of the proposed drilling mud and cuttings discharge locations (C&C Technologies, Inc., 2008; GEMS, 2009). 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 any distant expulsion features 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

Previous analyses (MMS, 2007a, 2008a) 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 MMS (2007a, 2008a), depending on its extent, trajectory, and persistence. The chemosynthetic community assessment by C&C Technologies, Inc. (2009) did not identify high-density deepwater benthic communities that would be affected by this development activity within 2,000 ft (610 m) of the proposed drilling mud and 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 rate compared to 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 in 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, 2012b).

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) and 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 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 142 miles (229 km) southwest 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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD Section9b** 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 lease block is not located 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 South Timbalier South 317, located 26 miles (42 km) north-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 about 165 miles (265 km) northeast of the lease area, along the shelf edge south of Alabama.

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 applies to Eastern Gulf of Mexico Planning Area leases in water depths of 328 ft (100 m) or less. The nearest blocks covered by the live bottom stipulation, as defined by NTL 2009-G39, are about 206 miles (331 km) northeast from the project area.

There are no IPFs associated with either routine operations or accidents that could cause impacts to eastern Gulf 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		Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Lease Area		
Marine Mammals					
Sperm whale	*Physeter macrocephalus*		X		None
Florida manatee	*Trichechus manatus latirostris*		--		Florida (Peninsular)
Blue whale	*Balaenoptera musculus*		X[a]		None
Fin whale	*Balaenoptera physalus*		X[a]		None

Table 5. (Continued).

Species	Scientific Name		Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Lease Area		
Humpback whale	*Megaptera novaeangliae*		X[a]		None
North Atlantic right whale	*Eubalaena glacialis*		X[a]		None
Sei whale	*Balaenoptera borealis*		X[a]		None
Sea Turtles					
Loggerhead turtle	*Caretta caretta*		X		None
Green turtle	*Chelonia mydas*		X		None
Leatherback turtle	*Dermochelys coriacea*		X		None
Hawksbill turtle	*Eretmochelys imbricata*		X		None
Kemp's ridley turtle	*Lepidochelys kempii*		X		None
Birds					
Piping Plover	*Charadrius melodus*		--		Coastal Texas, Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Whooping Crane	*Grus americana*		--		Coastal Texas (Aransas National Wildlife Refuge)
Fishes					
Gulf sturgeon	*Acipenser oxyrinchus desotoi*		--		Coastal Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Terrestrial Mammals					
Beach mouse (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus*		--		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) also have been reported to have been sighted in 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 by MMS (2007b) are no longer 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 a recent lease sale EIS (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., 2011). 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 (SWSS) 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). SWSS results show 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).

IPFs potentially affecting sperm whales include construction vessel and 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 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 from routine drilling activities as well as installation of subsea facilities has the potential to disturb sperm whales. Sperm whales appear to have good low-frequency hearing, but the available data do not indicate a consistent response to anthropogenic noise (Jochens et al., 2008). Noise associated with drilling is relatively weak in intensity, and an individual animal's noise exposure would be transient. There are other OCS facilities and activities near the lease area, and the region as a whole has a large number of similar noise sources. Due to limited scope, timing, and geographic extent, drilling and installation activities would represent a small temporary contribution to the overall noise regime.

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). Any impacts from noise emitted during platform operations are not expected to be biologically significant to marine mammal populations (NMFS, 2007).

Although offshore lighting and presence of drilling rigs and OCS vessels were considered potential factors affecting sperm whales, NMFS's 2007 Biological Opinion, and recent lease sale EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b) 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 three (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 animals. 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). 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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b) 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 Supplemental DOCD 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. **SDOCD Section9b** 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 over 90% would be evaporated or dispersed naturally within 24 hours. The area of the sea surface with diesel fuel on it 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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012a,b) and in NMFS (2007). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990). For this Supplemental DOCD, 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. 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).

Studies have shown that the cetacean epidermis functions as an effective barrier to noxious substances found in petroleum (Geraci and St. Aubin, 1985). Unlike other mammals, penetration of such substances in cetacean skin is impeded by tight intercellular bridges, the vitality of the superficial cells, the thickness of the epidermis, and the lack of sweat glands and hair follicles. In addition, cetacean skin is free from hair or fur, which in other marine mammals not found in the Gulf of Mexico (e.g., pinnipeds and otters) tend to collect oil and/or tar.

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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD Sections 2j** and **9b** provide 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 a recent lease sale EIS (MMS, 2007b) and in the recovery plan for this species (USFWS, 2001).

IPFs potentially affecting manatees include support vessel and helicopter traffic and a large oil spill. A small fuel spill and effluent discharge in the lease area would be unlikely to affect manatees because the lease area is approximately 91 miles (146 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). 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 and Louisiana shorelines could be contacted by a spill within 10 to 30 days. There is no critical habitat designated for manatees 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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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) also have been reported to have been sighted in 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 recent lease sale EISs (MMS, 2007b, 2008a;

BOEMRE, 2011; BOEM, 2012a,b) are incorporated by reference. If any of these whales were present in the area, potential impacts would be the same as those discussed below 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 mysticete whales, dwarf and pygmy sperm whales, 4 species of beaked whales, and 14 species of delphinids (see **SDOCD Section 6**). 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 below; additional information on these groups is presented in a recent lease sale EIS (MMS, 2007b).

Mysticete whales. 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 (Waring et al., 2009). 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.

Dwarf and pygmy sperm whales. At sea, it is difficult to differentiate dwarf sperm whales (*Kogia sima*) from pygmy sperm whales (*Kogia breviceps*), and sightings are often grouped together as "*Kogia* spp." Both species have a worldwide distribution in temperate to tropical waters. In the Gulf of Mexico, both species occur primarily along the continental shelf edge and in deeper waters off the continental shelf (Mullin et al., 1991; Mullin, 2007; Waring et al., 2009). Either species could occur in the lease area.

Beaked whales. 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., 2009).

Delphinids. Fourteen species of delphinids are known from the Gulf of Mexico, including Atlantic spotted dolphin (*Stenella frontalis*), bottlenose dolphin (*Tursiops truncatus*), Clymene dolphin (*Stenella clymene*), false killer whale (*Pseudorca crassidens*), Fraser's dolphin (*Lagenodelphis hosei*), killer whale (*Orcinus orca*), melon-headed whale (*Peponocephala electra*), pantropical spotted dolphin (*Stenella attenuata*), pygmy killer whale (*Feresa attenuata*), short-finned pilot whale (*Globicephala macrorhynchus*), Risso's dolphin (*Grampus griseus*), rough-toothed dolphin (*Steno bredanensis*), spinner dolphin (*Stenella longirostris*), and striped dolphin (*Stenella coeruleoalba*). 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., 2011).

IPFs potentially affecting non-endangered marine mammals include drilling rig presence, noise, and lights; installation and support vessels 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 use higher frequency sounds than those produced by OCS drilling activities (Richardson et al., 1995). Noise intensity associated with drilling is relatively weak, and the noise exposure of an individual animal would be transient. There are other OCS facilities and activities in the lease area, and the region as a whole has a large number of similar sources. Due to limited scope, timing, and geographic extent, drilling and installation activities 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 recent lease sale EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012a,b). Therefore, no significant impacts are expected.

Impacts of Support Vessel and Helicopter Traffic

Vessel traffic supporting routine operations and installation activities 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). This altitude will minimize the potential for disturbing marine mammals, and no significant impacts are expected (BOEM, 2012a).

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals are discussed in recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b), and oil impacts on marine mammals in general are discussed by Geraci and St. Aubin (1990). For this Supplemental DOCD, 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 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. **SDOCD 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 over 90% would be evaporated or dispersed naturally within 24 hours. The area of the sea surface with diesel fuel on it 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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012a,b) and by Geraci and St. Aubin (1990). For this Supplemental DOCD, there are no unique site-specific issues.

Impacts of oil spills on marine mammals can include direct impacts from oil exposure, as well as indirect impacts due to response activities and materials (e.g., vessel traffic, 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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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 **SDOCD 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 a recent lease sale EIS (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 – Loggerheads 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 Kemp's ridley nesting site 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 Kemp's ridleys nesting in Alabama (Share the Beach, 2010); and
- Hawksbill turtles – Hawksbills typically do not nest anywhere near the project area.

IPFs potentially affecting 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 and installation activities, these short-term impacts are not expected to be biologically significant to sea turtle populations.

Artificial lighting can disrupt the nocturnal orientation of sea turtle hatchlings (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.

Impacts of Support Vessel and Helicopter Traffic

Vessel traffic that supports installation and routine drilling activities 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 has 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).

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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b) and by the 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 Supplemental DOCD, 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 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. **SDOCD 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 over 90% would be evaporated or dispersed naturally within 24 hours. The area of the sea surface with diesel fuel on it 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; BOEMRE, 2011; BOEM, 2012b). 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, as the lease area is 91 miles (146 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, and dispersants). 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, 2010e). 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. **SDOCD 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 10 to 30 days. The nearest nesting area of loggerhead turtles is found in St. Bernard Parish, Louisiana, on beaches within the Breton NWR. Loggerhead turtles also nest to a lesser extent in Okaloosa County, Florida. St. Bernard Parish, Louisiana, and Okaloosa County, Florida, are not identified in **Table 3**, which is an indication that contact probabilities are less than 0.5% after 30 days. 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, 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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD Section 9b** provides detail on spill response measures. Therefore, no significant spill impacts on sea turtles are expected.

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 1**). 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 a recent lease sale EIS (MMS, 2007b).

A large oil spill is the only IPF potentially affecting 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 91 miles (146 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 habitat for the wintering Piping Plover could be contacted by a spill within 10 to 30 days. Terrebonne Parish and Plaquemines Parish, Louisiana, which has the highest probability of contact for the 10-day interval (1%) and Cameron Parish, Louisiana with the highest probability for the 30-day interval (5%), includes Piping Plover critical habitat.

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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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 (Whooping Crane Eastern Partnership [WCEP], 2010). 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 270 at Aransas NWR in December 2008 (WCEP, 2010). A non-migrating population has been reintroduced in central Florida, and another reintroduced population summers in Wisconsin and migrates to the southeastern United States 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 1**). A species description is presented in a recent lease sale EIS (MMS, 2007b).

A large oil spill is the only IPF potentially affecting 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 363 miles (584 km) from its critical habitat (Aransas NWR, Texas).

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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD Section9b** provides detail on spill response measures. Therefore, no significant spill impacts on Whooping Cranes are expected.

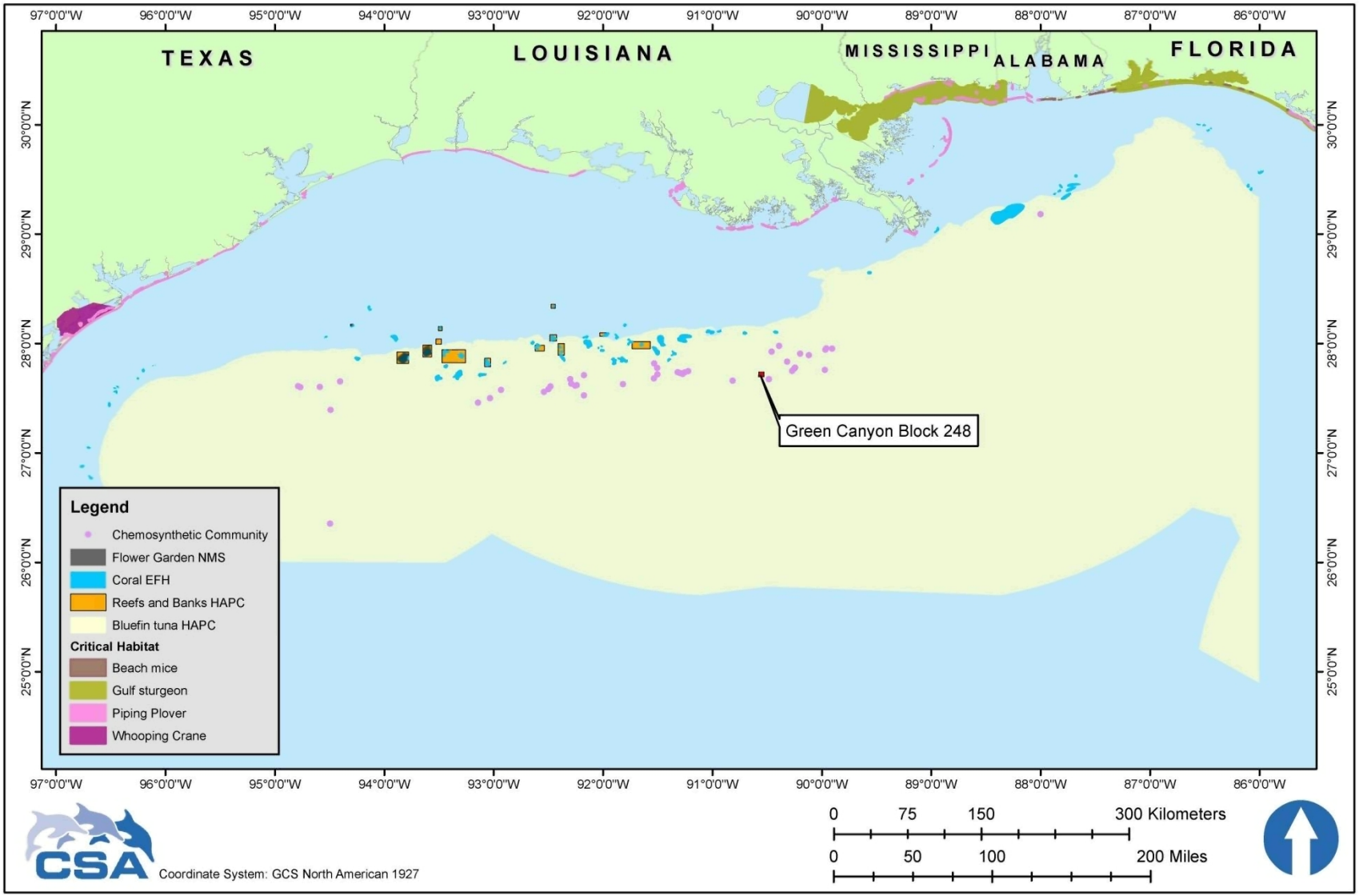

Figure 1. Location of selected environmental features in relation to the lease area.

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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, 2010c) (**Figure 1**). A species description is presented in a recent lease sale EIS (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 potentially affecting 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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b) and by the 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 Supplemental DOCD, there are no unique site-specific issues with respect to this species.

The lease area is about 157 miles (253 km) from the nearest Gulf sturgeon critical habitat. OSRA modeling predicts no contact with coastal areas inhabited by Gulf sturgeon 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 **SDOCD 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. **SDOCD 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: the Alabama, Choctawhatchee, Perdido Key, and St. Andrew beach mice. Critical habitat has been designated for all four subspecies; **Figure 1** shows the critical habitat combined for all four subspecies. Species descriptions are provided in a recent lease sale EIS (MMS, 2007b).

A large oil spill is the only IPF potentially affecting 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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b). For this Supplemental DOCD, there are no unique site-specific issues with respect to these species.

The lease area is about 231 miles (371 km) from the nearest beach mouse critical habitat. The OSRA modeling predicts that a spill in the lease area would not contact beach mouse critical habitat 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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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 (e.g., shearwaters, storm petrels, and boobies); summer residents that breed in the Gulf (e.g., Sooty Tern, Least Tern, Sandwich Tern, and Magnificent Frigatebird); winter residents (e.g., gannets, gulls, and jaegers); and permanent resident species (e.g., Laughing Gull, Royal Tern, and 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 potentially affecting 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 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 and rigs 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). A study in the Gulf of Mexico also noted the phenomenon, but did not recommend mitigation (Russell, 2005). Factors 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. Due to the limited scope and short duration of installation, drilling and completion activities proposed in this Supplemental DOCD, lighting impacts, collisions, or other adverse effects are unlikely, and no significant impacts are expected during the drilling and completion phase of this project. Any impacts on populations of either seabirds or trans-Gulf migrant birds are not expected to be significant.

Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters for installation and routine drilling rig activities 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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b). For this Supplemental DOCD, 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. **SDOCD 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 over 90% would be evaporated or dispersed naturally within 24 hours. The area of the sea surface with diesel fuel on it 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 toxic fumes. Due to the limited areal extent and short duration of water quality impacts from a small fuel spill, secondary impacts due to ingestion of oil via contaminated prey or reductions in prey abundance are unlikely. Due to the low densities of birds in open ocean areas, the small area affected, and the brief duration of the surface slick, no significant impacts on pelagic birds would be expected.

Impacts of a Large Oil Spill

Potential spill impacts on marine and pelagic birds are discussed in recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b). For this Supplemental DOCD, there are no unique site-specific issues with respect to spill impacts on these animals.

Pelagic seabirds could be exposed to oil from a spill at the project area. 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 **DOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **DOCD 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 breed on beaches, flats, dunes, bars, barrier islands, and similar 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 recent lease sale EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b).

The Brown Pelican (*Pelecanus occidentalis*) was delisted from federal endangered status in 2009 (USFWS, 2010c). However, this species is listed as a species of greatest conservation need by the State of Mississippi (Mississippi Department of Wildlife, Fisheries and Parks, 2011) and 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 potentially affecting shorebirds and coastal nesting birds include support vessel and helicopter traffic and a large oil spill. 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 and installation activities, any short-term impacts are not expected to be biologically 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 for some species (Bélanger and Bédard, 1989). However, Federal Aviation Administration Advisory Circular No. 91-36D recommends that pilots maintain a minimum altitude of 2,000 ft (610 m) when flying over noise-sensitive areas such as wildlife refuges, parks, and areas with wilderness characteristics. This is greater than the distance (slant range) at which aircraft overflights have been reported to cause behavioral effects on most species of birds studied (Efroymson et al., 2000). With these guidelines in effect, it is likely that individual birds would experience, at most, only short-term behavioral disruption.

Impacts of Large Oil Spill

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

The Macondo spill provides additional information regarding impacts on species of coastal and shorebirds that may be affected in the event that a large oil spill reached coastal habitats. While 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). Impacts to birds from the Macondo spill are being modeled as part of the Natural Resource Damage Assessment, but results have not yet been released. Antonio et al. (2011) modeled bird-mortality from the Macondo spill showing cumulative carcass numbers and mortality rate increasing exponentially from the start of the

Macondo spill until the mortality rate began to decline after the 97th day of the spill. Note that the collected animals are a small subset of the total number of impacted birds; therefore, the collected animals represent an underestimate of the overall impact of the Macondo spill (BOEM, 2012b).

Coastal birds can be exposed to oil as they float on the water's 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, 2010e). Oil interferes with the water repellency of feathers and can cause hypothermia under certain conditions. As birds groom themselves, they can ingest and inhale the oil on their bodies. Scavengers such as Bald Eagles and gulls can be exposed to oil by feeding on carcasses of contaminated fish and wildlife. While ingestion can kill animals immediately, more often it results in lung, liver, and kidney damage, which can lead to death. Bird eggs may be damaged if an oiled adult sits on the nest or if oil covers the eggs.

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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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 potentially affecting 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 limitations 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, utility water, and once-through non-contact cooling of machinery on the drilling rig (**SDOCD Table 7a**). Section 316(b) of the Clean Water Act requires NPDES permits to ensure that the location, design, construction, and capacity of CWISs reflect the best technology available to minimize adverse environmental impact from impingement and entrainment of aquatic organisms. Construction of the rig planned for use in this DOCD, Transocean's *Deepwater Nautilus* , started prior to July 17, 2006, and therefore the rig is not subject to the cooling water intake permit requirements of NPDES Permit GMG460000. If a different rig is selected, it will also comply with applicable NPDES requirements.

Impacts of a Small Fuel Spill

Potential spill impacts on fisheries resources are discussed in recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012a,b). For this Supplemental DOCD, 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. **SDOCD 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 over 90% would be evaporated or dispersed naturally within 24 hours. The area of the sea surface with diesel fuel on it 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

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 **SOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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 Diaphus Bank, located 26 miles (42 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, 2009):

- Atlantic bluefin tuna (spawning, eggs, larvae, adults)
- Atlantic skipjack tuna (spawning)
- Atlantic yellowfin tuna (spawning, juveniles, adults)
- Bigeye tuna (juveniles)
- Atlantic swordfish (larvae, juveniles, adults)
- Blue marlin (juveniles, adults)
- White marlin (juveniles, adults)
- Longbill spearfish (juveniles, adults)
- Oceanic whitetip shark (all)
- Sailfish (adults)
- Silky shark (all)
- Shortfin mako shark (all)
- Longfin mako shark (all)
- Tiger shark (adults)
- Whale shark (all)
- Bigeye thresher shark (all)

Research indicates the central and western Gulf of Mexico may be important spawning habitat for Atlantic bluefin tuna, and NMFS (2009) 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 1**). 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, 2009).

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 1**). The nearest of these is Jakkula Bank, located 21 miles (34 km) north of the lease area.

Routine IPFs potentially affecting 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. Impacts on EFH for highly migratory pelagic fishes are considered minor.

Impacts of Effluent Discharges

Other effluent discharges potentially 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 water quality have been discussed previously. 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 and installation 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

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. **SDOCD Section** 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.

Potential spill impacts on EFH are discussed in recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012a,b). For this Supplemental DOCD, there are no unique site-specific issues with respect to spill impacts.

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 the sea surface with diesel fuel on it 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.

A small fuel spill would not affect EFH for corals and coral reefs; the nearest coral EFH is Diaphus Bank, located 26 miles (42 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.

Impacts of a Large Oil Spill

Potential spill impacts on EFH are discussed in recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012a,b). For this Supplemental DOCD, there are no unique site-specific issues with respect to EFH.

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

The nearest feature designated as EFH for corals is located 26 miles (42 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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD Section9b** provides detail on spill response measures. Therefore, no significant spill impacts on EFH are expected.

C.6 Archaeological Resources

C.6.1 Shipwreck Sites

GC 248 is on the list of archaeological survey blocks (BOEM, 2012c). No shipwrecks were detected in the surveys conducted by C&C Technologies, Inc. (2008) and GEMS (2009). There are four marine avoidance zones identified in the vicinity of GC 248.

Because there are no historic shipwreck sites in the lease area (see **SDOCD 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 and Louisiana, shorelines could be contacted by a spill within 10 to 30 days.

Previous analyses (MMS, 2007a, 2008a) 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, 2008a), depending on its extent, trajectory, and persistence.

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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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).

C.6.2 Prehistoric Archaeological Sites

With water depths ranging from approximately 3,233 to 3,350 ft (985 to 1,021 m), the proposed well surface locations and subsea installations in GC 248 are well beyond the 197 ft (60 m) depth contour used by the BOEM as the seaward extent for prehistoric archaeological site potential in the Gulf of Mexico. 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 197 ft (60 m) 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. The 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 and Louisiana shorelines could be contacted by a spill within 10 to 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).

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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD Section 9b** provides details 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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012a,b) 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 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 are not located in a wildlife refuge or a wilderness area. Potential impacts of support vessel traffic are briefly addressed below.

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, and vessels supporting installation activities 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 and installation support vessels as detailed in **SDOCD Section 14**, and 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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012a,b). Coastal habitats inshore of the project area include barrier

beaches and dunes, wetlands, and submerged seagrass beds. For this Supplemental DOCD, there are no unique site-specific issues with respect to coastal habitats.

The OSRA results summarized in **Table 3** predict that shorelines of Texas and Louisiana could be affected within 30 days. Terrebonne Parish and Plaquemines Parish, Louisiana, have the highest probability of contact for the 10-day interval (1%) and Cameron Parish has the highest probability of contact for the 30-day interval (5%). After 30 days, 9 counties or parishes may be contacted from Matagorda, Texas, to Plaquemines, Louisiana.

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 EIS (MMS, 2007b) 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:

- Aransas National Wildlife Refuge
- Mad Island Wildlife Management Area (WMA)
- Big Boggy NWR
- San Bernard NWR
- Brazoria NWR
- Galveston Island State Park
- *Appfel Park*
- Seawolf Park
- Old Fort Travis Park
- Atkinson Island WMA
- Fort Anahuac Park
- Anahuac NWR
- McFaddin NWR
- Candy Abshier WMA
- Sea Rim State Park
- Murphree WMA
- Texas Point NWR
- Sabine NWR
- Cameron Prairie NWR
- La Cassine NWR
- Little Pecan Island Natural Area (NA)
- Peveto Woods NA
- Lower Neches WMA
- Rockefeller WMA
- Paul J. Rainey WMA
- Atchafalaya Delta WMA
- Mandalay NWR
- Isles Dernieres Barrier Islands Refuge
- Pointe Au Chien WMA
- Wisner WMA
- Grand Isle State Park
- Salvador WMA
- Jean Lafitte National Historical Park and Preserve
- Lafitte Woods NA
- Delta NWR
- Pass A Loutre WMA
- Breton NWR
- *St. Bernard State Park*

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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD Section9b** 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

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 3,233 to 3,350 ft (985 to 1,021 m) of water. No conflict with commercial fishing activity 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 only routine IPF potentially affecting fisheries is drilling rig presence (including noise and lights). Two potential types of accidents are also addressed below – 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. **SDOCD 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 the sea surface with diesel fuel on it 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 recent EISs (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b). For this Supplemental DOCD, 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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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 below.

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. **SDOCD Sections 2j** and **9b** provide 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 91 miles (146 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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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 will be supported 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 below.

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. **SDOCD 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 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 in recent EISs (MMS, 2007b, 2008a, BOEM, 2012b). For this Supplemental DOCD, 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 that 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 91 miles (146 km) from the nearest shoreline. Based on the OSRA modeling predictions (**Table 3**), Terrebonne Parish, Plaquemines Parish, and Cameron 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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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

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 installation vessel or 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. **SDOCD 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 recent EISs (MMS, 2007b, 2008a; BOEM, 2012b). For this Supplemental DOCD, there are no unique site-specific issues with respect to these impacts.

Impacts on recreation and tourism would vary depending on the duration of the spill and its fate including the effectiveness of response measures. A large spill that reached coastal waters and shorelines could adversely affect recreation and tourism by contaminating beaches and wetlands, resulting in negative publicity that encourages people to stay away. Based on OSRA modeling as summarized in **Table 3**, Terrebonne, Plaquemines, and Cameron parishes, Louisiana, are the area most likely to be contacted by a spill. However, shorelines from Matagorda, Texas, to Plaquemines, Louisiana, could be contacted. These areas include popular beaches and recreational sites along the coast.

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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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 recent lease sale EISs (MMS, 2007b, 2008a, BOEM, 2012b). 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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD Section 9** 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. GC 248 is in Military Warning Area W-92. Shell will comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft.

There are no IPFs from routine project activities that are likely to affect 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 lease 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 **SDOCD Section 2j**. In the unlikely event of a spill, implementation of Shell's OSRP will mitigate and reduce the impacts. **SDOCD 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 Supplemental DOCD in several documents. The level and types of activities planned in Shell's Supplemental DOCD 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 2008 Final Supplemental EIS for Gulf of Mexico OCS Oil and Gas Lease Sales 2009-2012: Central Planning Area Sales 208, 213, 216, and 222 and Western Planning Area Sales 210, 215, and 218 (MMS, 2008a) and further updated by a 2011 Final Supplemental EIS for Gulf of Mexico OCS Oil and Gas Lease Sale: 2011 Western Planning Area Lease Sale 218 (BOEMRE, 2011) and a 2012 Final Supplemental EIS for Gulf of Mexico OCS Oil and Gas Lease Sale: 2012 Central Planning Area Lease Sale 216/222 (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 Supplemental EISs (MMS, 2007b, 2008a; BOEMRE, 2011; 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 GC 248. Shell does not anticipate other projects in the vicinity of the project area beyond the types of projects analyzed in the Multisale and Supplemental EIS (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b).

Cumulative Impacts of Activities in the Supplemental DOCD. The MMS (2007b) multi-lease-sale 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 impacts projected to result from past, proposed, and future lease sales during the 40-year period of 2007 to 2046 (see MMS, 2007b). The EIS considered exploration, delineation, and development wells; platform installation; service vessel trips; and oil spills. The EIS examined the potential cumulative effects on each specific resource for the entire Gulf of Mexico.

The level and type of activity proposed in Shell's Supplemental DOCD 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 Supplemental DOCD, in conjunction with the other reasonably foreseeable activities expected to occur and currently occurring 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 Supplemental DOCD is limited in geographic scope, 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 national ambient air quality standard (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b). In addition, the cumulative contribution to visibility impairment is also very small (MMS, 2007b, 2008a; BOEMRE, 2011; BOEM, 2012b). Since the BOEM completed the multi-lease-sale EISs, the USEPA has adopted a new short-term NAAQS for nitrogen dioxide (NO_2) and sulfur dioxide (SO_2). As mentioned in previous sections, projected emissions meet the BOEM exemption criteria and would not contribute to cumulative impacts on air quality.

Climate Change. Carbon dioxide (CO_2) and methane (CH_4) emissions from the project would constitute a small incremental contribution to greenhouse gas emissions from all OCS activities. According to the EIS (MMS, 2007a), estimated CO_2 emissions from all OCS activities in the 2007-2012 leasing program are about 0.08% to 0.016% of the global CO_2 emissions from fossil fuel combustion. 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 Supplemental DOCD 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). Shell's ongoing efforts to reduce greenhouse gas emissions should offset any incremental contribution from the Supplemental DOCD.

Water Quality. Shell's project will cause 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. GC 248 is on the list of archaeology survey blocks (BOEM, 2012c). No shipwrecks were detected in the surveys conducted by C&C Technologies, Inc. (2008) and GEMS (2009). There are four marine avoidance zones identified in the vicinity of GC 248.

New Information. New information included in the most recent Supplemental EISs (BOEMRE, 2011; BOEM, 2012b) has been incorporated into the EIA, where applicable.

C.9.2 Cumulative Impacts to Biological Resources

The work planned in this Supplemental DOCD is limited in geographic scope, 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, 2008a; BOEMRE, 2011; BOEM, 2012b).

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 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 project activities, collisions or other adverse effects are unlikely, and no significant cumulative impacts are expected.

Fisheries Resources. Exploration and production structures occur in the GC lease blocks proposed for the development activities. The additional effect of the proposed drilling activity would be negligible.

Coastal Habitats. Due to the distance of GC 248 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 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 Supplemental EISs (BOEMRE, 2011; BOEM, 2012b) has been incorporated into the EIA, where applicable.

C.9.3 Cumulative Impacts to Socioeconomic Resources

The work planned in this Supplemental DOCD is limited in geographic scope, and the impacts on socioeconomic resources will be correspondingly limited.

The multi-lease-sale and supplemental 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; BOEMRE, 2011; BOEM, 2012b). 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 Supplemental EISs (BOEMRE, 2011; BOEM, 2012b) has been incorporated into the EIA, where applicable.

D. Environmental Hazards

D.1 Geologic Hazards

The archaeological and geophysical surveys concluded that the project areas are suitable for the proposed activities (C&C Technologies, Inc., 2008; GEMS, 2009). See **SDOCD 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 (e.g., 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 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 **SDOCD 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

The EIA was prepared at the direction of Shell Offshore Inc. by its contractor, CSA International, Inc. Contributors included the following:

- Sylvia Bellone (Regulatory Specialist, Shell Exploration & Production Co.);
- Tracy Albert (Regulatory Specialist, Regulatory Compliance Consultants of LA, LLC);
- Lori Downs (Environmental Team Leader, Shell Exploration & Production Co.);
- Jeffrey McMenis (Environmental Engineer, Shell Exploration & Production Co.);
- Pete Bilinski (Senior Staff Geological Engineer, Shell Exploration & Production Co.);
- Joseph Sabrier (Well Engineer, Shell International Exploration & Production Co.);
- Saratu Mohammed (Subsea Engineer, Shell International Exploration & Production Co.);
- Suzy Jiang (Subsea Engineer, Shell International Exploration & Production Co.);
- Andrea Stancin (Geologist, Shell Exploration & Production Co.);
- June Mire, Ph.D. (Senior Ecologist and Project Manager, Tetra Tech EM, Inc.);
- Carlyle Kalloo (Senior Scientist, CSA International, Inc.);
- John Thompson (Senior Scientist, CSA International, Inc.);
- Neal Phillips, Ph.D. (Senior Scientist, CSA International, Inc.);
- Deborah Fawcett (Project Scientist II, CSA International, Inc.);
- Stephen Viada (Senior Scientist, CSA International, Inc.);
- Keith VanGraafeiland (GIS/Remote Sensing Specialist, CSA International, Inc.); and
- Kim Dunleavy (Technical Editor, CSA International, Inc.).

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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:

1b. OCS Plan Information form – Bottom hole locations & proposed total depth
2j. Blowout Scenario – confidential information for NTL 2010-N06 calculation
3a. Geologic Description
3b. Structure Contour Maps
3c. Interpreted 2D or 3D seismic line(s)
3d. Cross Section(s)
3e. Shallow Hazards Report
3f. Shallow Hazards Assessment – confidential data
3g. High-Resolution Seismic Lines & Top Hole Progs

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