UNITED STATES GOVERNMENT August 5, 2019
MEMORANDUM

To: Public Information (MS 5030)
From: Plan Coordinator, FO, Plans Section (MS 5231)

Subject: Public Information copy of plan

Control #	-	S-07968
Type	-	Supplemental Exploration Plan
Lease(s)	-	OCS-G36134 Block - 629 Mississippi Canyon Area
Operator	-	LLOG Exploration Offshore, L.L.C.
Description	-	Subsea Well C and C-ALT
Rig Type	-	Not Found

Attached is a copy of the subject plan.

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

Leslie Wilson
Plan Coordinator

Site Type/Name	**Botm Lse/Area/Blk**	**Surface Location**	**Surf Lse/Area/Blk**
WELL/C	G36134/MC/629	6100 FNL, 5062 FEL	G36134/MC/629
WELL/C-ALT	G36134/MC/629	6100 FNL, 5112 FEL	G36134/MC/629

LLOG EXPLORATION OFFSHORE, L.L.C.
1001 Ochsner Boulevard, Suite 100
Covington, Louisiana 70433

SUPPLEMENTAL EXPLORATION PLAN

OCS-G 36134 LEASE

MISSISSIPPI CANYON BLOCK 629

PUBLIC INFORMATION COPY

Prepared By:

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Date: July 10, 2019

LLOG EXPLORATION OFFSHORE, L.L.C.
SUPPLEMENTAL EXPLORATION PLAN
OCS-G 36134
MISSISSIPPI CANYON BLOCK 629

APPENDIX A
PLAN CONTENTS
(30 CFR Part 550.211 and 550.241)

A. Plan information

In accordance with 30 CFR 550.211 and 550.241(a),and NTL No. 2008-G04 and NTL 2015-N01, LLOG Exploration Offshore, LLC proposes the drilling, completion, testing and installation of subsea wellhead and/or manifold for two (2) supplemental proposed locations, two being twinned locations, with surface and bottom holes on OCS-G-36134 Lease, located in Mississippi Canyon Block 629. This plan supplements initial exploratory plan, N-10043, approved on January 30, 2019.

Included as ***Attachment A-1*** is Form BOEM 137 "OCS Plan Information Form", which provides for the drilling, sub-sea completion and testing of all well locations.

B. Location

Attachment A-2 – *Well Location Plat*
Attachment A-3 – *Bathymetry Map – Seafloor disturbance area*

C. Safety & Pollution Features

LLOG will utilize a DP semi-submersible rig or a drillship for the proposed operations. A description of the drilling unit is included on the OCS Plans Information Form. Rig specifications will be made part of the Application for Permit to Drill.

Safety features on the drilling unit will include well control, pollution prevention, and blowout prevention equipment as described in Title 30 CFR Part 250, Subparts C, D, E and G; and further clarified by BOEM's Notices to Lessees, and currently policy making invoked by BOEM, EPA and USCG. Appropriate life rafts, life jackets, ring buoys, etc., will be maintained on the facility at all times.

Pollution prevention measures include installation of curbs, gutters, drip pans, and drains on the drilling deck areas to collect all contaminants and debris.

D. Storage Tanks and Vessels

The following tables detail the storage tanks and/or production vessels that will store oil (capacity greater than 25 bbls. or more) and be used to support the proposed activities (MODU, barges, platforms, etc.):

Type of Storage Tank	Type of Facility	Tank Capacity (bbls)	Number of tanks	Total Capacity (bbls)	Fluid Gravity (API)
Fuel Oil Storage Tank	Drillship	16,564	1	16,564	No. 2 Diesel - 43
Fuel Oil Storage Tank		16,685.5	1	16,685.5	No. 2 Diesel - 43
Fuel Oil Settleing Tank		836.6	2	1,673.2	No. 2 Diesel - 43
Fuel Oil Day Tanks		836.6	2	1,673.2	No. 2 Diesel - 43

Type of Storage Tank	Type of Facility	Tank Capacity (bbls)	Number of tanks	Total Capacity (bbls)	Fluid Gravity (API)
Fuel Oil (Marine Diesel)	DP Semi-Submersible	164	1	164	30
Fuel Oil Day		367	2	734	30
Emergency Generator		31	1	31	30
Forward Hull Fuel Oil		4634	2	9268	30
Lower Aft Hull Fuel Oil		3462	2	6924	30
Lube Oil Services		117 10.5 4.6	1 1 1	132.1	45
Dirty Lube Oil		38 28	1 1	66	45
Dirty Bilge		190	4	760	10

E. Pollution Prevention Measures: Not applicable. The State of Florida is not an affected State by the proposed activities in this plan.

F. Additional measures: LLOG does not propose any additional safety, pollution prevention, or early detection measures, beyond those required in 30 CFR 250 and per December 13, 2010 – Guidance for Deepwater Drillers to Comply with Strengthened Safety and Environmental Standards.

OCS Plan Information Form

Attachment A-1
(Public Information)

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

OMB Control Number: 1010-0151
OMB Approval Expires: 12/31/18

OCS PLAN INFORMATION FORM

General Information

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

Company Name: LLOG EXPLORATION OFFSHORE, L.L.C.	BOEM Operator Number: 02058
Address:	Contact Person: Sue Sachitana
1001 OCHSNER BOULEVARD	Phone Number: 985-801-4300
COVINGTON, LA 70447	E-Mail Address: sue.sachitana@llog.com

If a service fee is required under 30 CFR 550.125(a), provide the	Amount paid $3,673		Receipt No. 75790729084	

Project and Worst Case Discharge (WCD) Information

Lease(s): OCS-G-36134		Area: MC		Block(s): 629		Project Name (If Applicable): Valhalla			
Objective(s)	X	Oil	X	Gas		Sulphur		Salt	Onshore Support Base(s): Fourchon, LA
Platform/Well Name: A		Total Volume of WCD: 21.63 MMBO							API Gravity: 28°
Distance to Closest Land (Miles): 40 miles		Volume from uncontrolled blowout: 309,000 BOPD							

Have you previously provided information to verify the calculations and assumptions for your WCD?	X	Yes		No
If so, provide the Control Number of the EP or DOCD with which this information was provided	N-10043			
Do you propose to use new or unusual technology to conduct your activities?		Yes	X	No
Do you propose to use a vessel with anchors to install or modify a structure?		Yes	X	No
Do you propose any facility that will serve as a host facility for deepwater subsea development?		Yes	X	No

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

Proposed Activity	Start Date	End Date	No. of Days
Exploration drilling			See attached schedule
Development drilling			
Well completion			
Well test flaring (for more than 48 hours)			
Installation or modification of structure			
Installation of production facilities			
Installation of subsea wellheads and/or manifolds			
Installation of lease term pipelines			
Commence production			
Other (Specify and attach description)			

Description of Drilling Rig

	Jackup	X	Drillship
	Gorilla Jackup		Platform rig
	Semisubmersible		Submersible
X	DP Semisubmersible		Other (Attach Description)

Drilling Rig Name (If Known):

Description of Structure

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

Description of Lease Term Pipelines

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

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): C					Previously reviewed under an approved EP or DOCD?		Yes		No X	
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.					
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?			X	Yes			No			
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 309,000				For structures, volume of all storage and pipelines (Bbls):			API Gravity of fluid 28°		

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G 36134	OCS	OCS OCS
Area Name	MISSISSIPPI CANYON		
Block No.	629		
Blockline Departures (in feet)	N/S Departure: F N L 6,100.00	N/S Departure: F L	N/S Departure: F L N/S Departure: F L N/S Departure: F L
	E/W Departure: F E L 5,062.00'	E/W Departure: F E L	E/W Departure: F L E/W Departure: F L E/W Departure: F L
Lambert X-Y coordinates	X: 897,818.00	X:	X: X: X:
	Y: 10,289,900.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28° 20' 08.036"N	Latitude	Latitude Latitude Latitude
	Longitude 89° 18' 31.913"W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 2431'		MD (Feet): / TVD (Feet):	MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet):
Anchor Radius (if applicable) in feet:		N/A	

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

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

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

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): Alt C (TWINNED LOCATION)					Previously reviewed under an approved EP or DOCD?		Yes		No X	
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.					
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?		X	Yes		No					
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 309,000			For structures, volume of all storage and pipelines (Bbls):			API Gravity of fluid 28°			

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G 36134	OCS	OCS OCS
Area Name	MISSISSIPPI CANYON		
Block No.	629		
Blockline Departures (in feet)	N/S Departure: F N L 6,100.00'	N/S Departure: F___ L	N/S Departure: F___ L N/S Departure: F___ L N/S Departure: F___ L
	E/W Departure: F E L 5,112.00'	E/W Departure: F___ L	E/W Departure: F___ L E/W Departure: F___ L E/W Departure: F___ L
Lambert X-Y coordinates	X: 897,768.00	X:	X: X: X:
	Y: 10,289,900.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28° 20' 08.026"N	Latitude	Latitude Latitude Latitude
	Longitude 89° 18' 32.472"W	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 2,433'	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A			

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

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

WELL / EVENT	SPUD	TD	COMPL START	COMPL FINISH	DESCRIPTION
MC 629-C	15-Jan-20	26-Feb-20			DTA
MC 629-C'	26-Feb-20	8-Apr-20			DTA
MC 629-C			1-Nov-20	9-Dec-20	COMPLETION
MC 629-C'			9-Dec-20	16-Jan-21	COMPLETION

Well Location Plats

Attachment A-2
(Public Information)

Y= 10,296,000.00

LLOG EXPLORATION OFFSHORE, INC.

OCS-G 36134

SURFACE LOCATION C:
X: 897,818.00 Y: 10,289,900.00
Lat: 28 deg, 20min, 08.036 sec
Long: 89 deg, 18 min, 31.913 sec
5062 FEL 6100 FNL
(NAD27)

SURFACE LOCATION ALT C:
X: 897,768.00 Y: 10,289,900.00
Lat: 28 deg, 20min, 08.026 sec
Long: 89 deg, 18 min, 32.472 sec
5112 FEL 6100 FNL
(NAD27)

Public

LLOG exploration

Mississippi Canyon Block 629

Gulf of Mexico

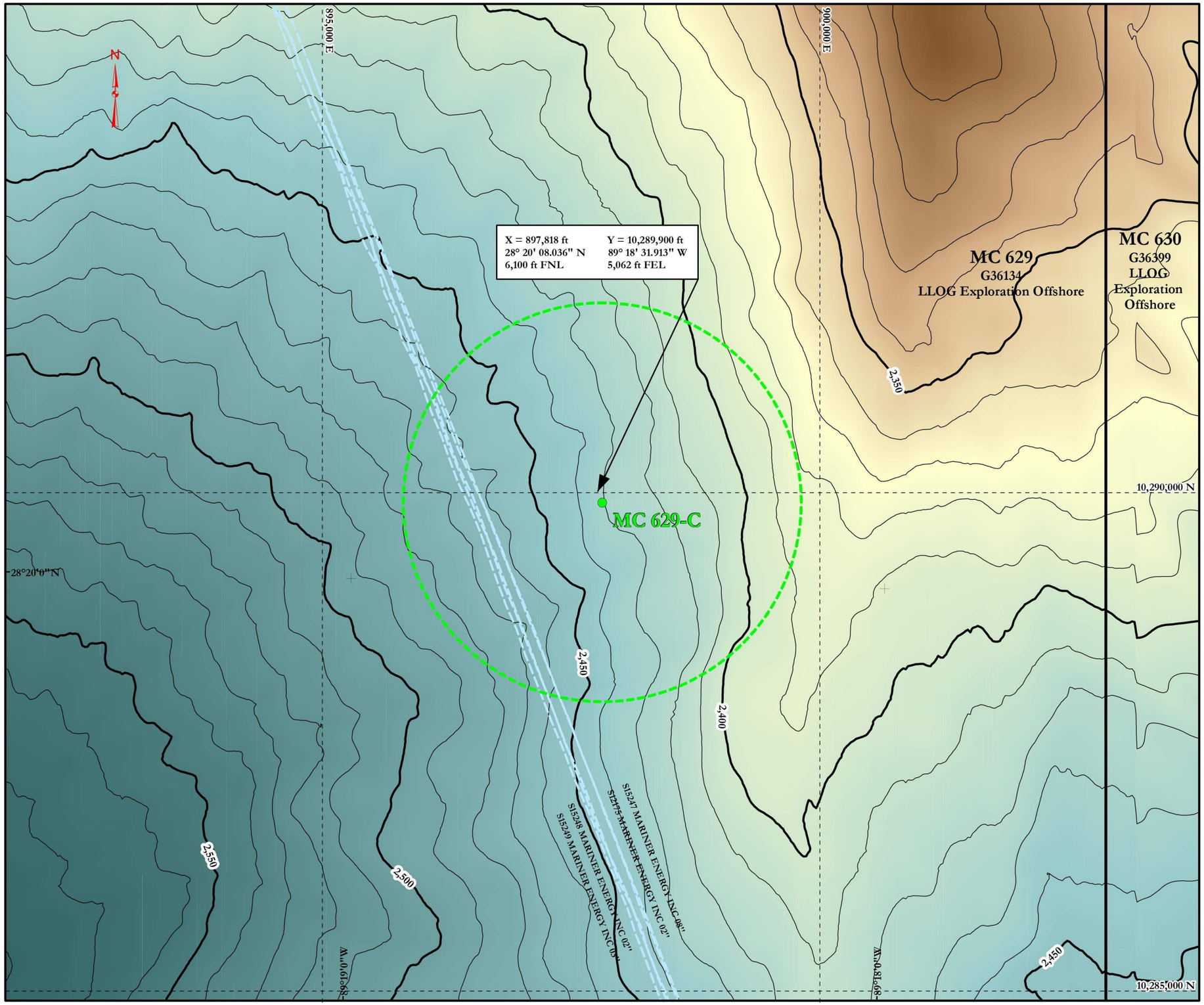
Location Map

0' 1000' 2000'

7/19
Geo: Cody Lewis

Bathymetry Map

Attachment A-3
(Public Information)



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Inactive Pipelines/Umbilicals
- Proposed Well
- 2,000 ft Radius
- 10-ft Contours
- 50-ft Index Contours

Depths
(Below Sea Level)

2,301 ft

2,581 ft

Grid Information:
Data Source: 3-D Seismic
Method: Kriging
Spacing: 100 ft
Search Radius: 150 ft

Data Source: AUV Multibeam
Method: Kriging
Spacing: 10 ft
Search Radius: 30 ft

IMPORTANT NOTICE
This map is not intended for navigation purposes.
Public information obtained from BOEM database (June 2019).

Geodetic Datum: NAD27 Projection: UTM Zone: 16N Grid Units: Feet	Interpretation By: J. Keenan Cartography: T. Nguyen Project No.: 19-05-29 Date: June 2019

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

Scale =1:12,000

LLOG exploration

Block 629
Mississippi Canyon Area
Gulf of Mexico

Map W-1
Bathymetry
Proposed Well MC 629-C
Lease No. G36134

Map Prepared by:
Berger Geosciences, LLC.

B-geO

APPENDIX B
GENERAL INFORMATION
(30 CFR Part 550.213 and 550.243)

A. Applications and Permits

There are no Federal/State applications to be submitted for the activities provided for in this Plan (exclusive to BOEM permit applications and general permits issued by the EPA and COE)

Application/Permit	Issuing Agency	Status
Application to Drill	BSEE	As Needed
Application to Modify	BSEE	As Needed

B. Drilling Fluids

Type of Drilling Fluid	Estimated Volume of Drilling Fluid to be used per Well
Water Based (seawater, freshwater, barite)	**See Appendix F, Table 1 of this Plan**
Oil–based (diesel, mineral oil)	**N/A**
Synthetic-based (internal olefin, ester)	**See Appendix F, Table 2 of this Plan**

C. New Or Unusual Technology

LLOG does not propose using any new and/or unusual technology for the operations proposed in this Initial Plan.

D. Bonding Statement

The bond requirements for the activities and facilities proposed in this Initial Exploration Plan are satisfied by an area wide bond, furnished and maintained according to 30 CFR Part 556.53(a); NTL No. 2015-N04, "General Financial Assurance" and additional security under 30 CFR 556.901(d)-(f) and NTL No. 2016-N01, "Requiring Additional Security".

E. Oil Spill Responsibility (OSFR)

LLOG Exploration Offshore, L.L.C (MMS Co. No. 02058) will demonstrate oil spill financial responsibility for the facilities proposed in this Initial EP according to 30 CFR Part 553, and NTL No. 2008-N05 "Guidelines for Oil Spill Financial Responsibility (OSFR) for Covered Facilities."

F. Deepwater Well Control Statement

LLOG Exploration Offshore, L.L.C. (MMS Co. No. 02058) has the financial capability to drill a relief well and conduct other emergency well control operations.

G. Blowout Scenario

The Worst Case Discharge Calculations (Proprietary) were submitted and approved in the Initial Exploration Plan N-10043 approved January 30, 2019. The Blowout Scenario, including Site Specific Proposed Relief Well and Intervention Planning and Relief Well Response Time Estimate (Public Information) - ***Attachment B-1.***

NTL 2015-N01 Data

Blowout Scenario

Attachment B-1
(Public Information)

BLOWOUT SCENARIO

Pursuant with 30 CFR 550.213(g), 550.243(h), 550.219, 550.250 and NTL 2015-N01 the following attachment provides a blowout scenario description, information regarding any oil spill, WCD results and assumptions of potential spill and additional measures taken to firstly enhance the ability to prevent a blowout and secondly to manage a blowout scenario if it occurred.

INFORMATION REQUIREMENTS

A) Blowout scenario

Well(s) to be drilled to potential objectives are outlined in the Geological and Geophysical Information Section of this plan utilizing a typical subsea wellhead system, conductor, surface and intermediate casing strings utilizing a MODU rig with marine riser and a subsea BOP system. A hydrocarbon influx and a well control event occurring from the objective sand were modeled with no drill pipe or obstructions in the wellbore followed by a failure of the subsea BOPs and loss of well control at the seafloor. The simulated flow and worst case discharge (WCD) results for all wells are calculated and the highest WCD is used for this unrestricted blowout scenario.

B) Estimated flow rate of the potential blowout

Category	EP
Type of Activity	Drilling
Facility Location (area / block)	MC 629 (surface location)
Facility Designation	MODU
Maximum Estimated Flow Rate (Volume per day)	309,000 BOPD
Type of Fluid	Oil

C) Total volume and maximum duration of the potential blowout

Maximum Duration of Flow (days)	**70** days total **(see Relief Well Response Estimate below)**
Total Volume of Spill (bbls)	**21.63 ~ MMBO** based on max duration of flow at max rate (no depletion)

D) 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, pressure differentials, and fluid velocities 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 a span of a few days, significantly reducing the WCD rates. **For this blowout scenario, no bridging is considered.**

E) Likelihood for intervention to stop blowout

The likelihood of surface intervention to stop a blowout is based on some of the following equipment specific to potential MODU's to be contracted for this well. It is reasonable to assume that the sooner you are able to respond to the initial blowout, the better likelihood there is to control and contain the event due to reduced pressures at the wellhead, less exposure of well fluids to erode and

compromise the well control equipment, and less exposure of hydrocarbons to the surface to safeguard personnel and equipment in an emergency situation. This equipment includes:

- ROV Intervention BOP Control System – includes one or more ROV intervention panels mounted on the subsea BOP's located on the seabed allows a ROV utilizing standard ROV stabs to access and function the specific BOP controls. These functions will be tested at the surface as part of the required BOP stump test and selectively at the seafloor to ensure proper functionality. These function include the following (at a minimum):

    - Blind/shear ram close
    - Pipe ram close
    - LMRP disconnect
    - WH disconnect

- Deadman / Autoshear function – equipment allows for an automated pre-programmed sequence of functions to close the casing shear rams and the blind/shear rams in the event of an inadvertent or emergency disconnect of the LMRP or loss of both hydraulic and electrical supply from the surface control system.

In the event that the intervention systems for the subsea BOPs fail, LLOG will initiate call out of a secondary containment / surface intervention system supported by the Helix Well Containment Group (HWCG) of which LLOG is a member. This system incorporates a capping stack capable of being deployed from the back of a vessel of opportunity equipped with an ROV or from the Helix Q4000 DP MODU. Based on the potential integrity concerns of the well, a "cap and flow" system can be deployed which may include the Helix Producer 1 capable of handling up to 55,000 BOPD flowback. The vertical intervention work is contingent upon the condition of the blowing out well and what equipment is intact to access the wellbore for kill or containment operations. The available intervention equipment may also require modifications based on actual wellbore conditions. Standard equipment is available through the Helix Deepwater Containment System to fit the wellhead and BOP stack profiles used for the drilling of the above mentioned well.

F) Availability of rig to drill relief well, rig constraints and timing of rigs

LLOG currently has two deepwater MODU's under contract **(Rowan Resolute – DP drillship, and Seadrill West Neptune – DP drillship)**. In the event of a blowout scenario that does not involve loss or damage to the rig such as an inadvertent disconnect of the BOP's, then the existing contracted rig may be available for drilling the relief well and vertical intervention work. If the blowout scenario involves damage to the rig or loss of the BOP's and riser, a replacement rig or rigs will be required. LLOG is also a member of the Helix Well Containment Group which has the Helix Q4000 under contract for emergency intervention work such as an "Emergency Capping Stack" installation which for this well could include a quick response operation and installation of a capping stack which could be shut-in to control the well.

With the current activity level in the GOM, 10 to 20 deepwater MODU'S are potentially available to support the relief well drilling operations. Rig share and resource sharing agreements are in place between members of the Helix Well Containment Group. The ability to negotiate and contract an appropriate rig or rigs to drill relief wells is highly probable in a short period of time. If the rig or rigs are operating, the time to properly secure the well and mobilize the rig to the relief well site location is estimated to be about 14 to 21 days. Dynamically positioned (DP) MODU's would be the preferred option due to the logistical advantage versus a moored MODU which may add complications due to the mooring spread.

VESSELS OF OPPORTUNITY

Based on the water depth restrictions for the proposed locations the following "Vessels of Opportunity" are presently available for utilization for intervention and containment and relief well operations. These may include service vessels and drilling rigs capable of working in the potential water depths and may include moored vessels and dynamically positioned vessels. The specific conditions of the intervention or relief well operations will dictate the "best fit" vessel to efficiently perform the desired results based on the blowout scenario. The list included below illustrates specific option that may vary according to the actual timing / availability at the time the vessels are needed.

OPERATION	SPECIFIC VESSEL OF OPPORTUNITY
Intervention and Containment	• Helix Q4000 (DP Semi) • Helix Producer 1 (DP FPU)
Relief Well Drilling Rigs	• Seadrill West Neptune (DP Drillship) • Sevan LA (DP Semi) • Transocean Discoverer Clear Leader (DP Drillship) • Rowan Renaissance (DP Drillship) • Rowan Reliance (DP Drillship)
ROV / Multi-Purpose Service Vessels	• Oceaneering (numerous DP ROV vessels) • HOS Achiever, Iron Horse 1 and 2 (DP MPSV) • Helix Pipe Lay Vessel (equipped w/ 6" PL – 75,000') • Other ROV Vessels – (Chouest, HOS, Fugro, Subsea 7)
Shuttle Tanker / Barge Support	• OSG Ship Management

G) Measures taken to enhance ability to prevent blowout

Pursuant to BOEM-2010-034 Final Interim Rules, measures to enhance the ability to prevent or reduce the likelihood of a blowout are largely based on proper planning and communication, identification of potential hazards, training and experience of personnel, use of good oil field practices and proper equipment that is properly maintained and inspected for executing drilling operations of the proposed well or wells to be drilled.

When planning and designing the well, ample time is spent analyzing offset data, performing any needed earth modeling and identifying any potential drilling hazards or well specific conditions to safeguard the safety of the crews when well construction operations are underway. Once the design criteria and well design is established, the well design is modeled for the lifecycle of the wellbore to ensure potential failure modes are eliminated. Pursuant to BOEM-2010-0034 Interim Final Rules implemented additional considerations of a minimum of 2 independent barriers for both internal and external flow paths in addition to proper positive and negative testing of the barriers.

The proper training of crew members and awareness to identify and handle well control event is the best way prevent a blowout incident. Contractor's personnel and service personnel training requirements are verified per regulatory requirements per guidelines issued in BOEM-2010-034 Interim Final Rules. Drills are performed frequently to verify crew training and improve reaction times.

Good communication between rig personnel, office support personnel is critical to the success of the operations. Pre-spud meetings are conducted with rig crews and service providers to discuss, inform and as needed improve operations and well plans for safety and efficiency considerations. Daily

meetings are conducted to discuss planning and potential hazards to ensure state of preparedness and behavior is enforced to create an informed and safe culture for the operations. Any changes in the planning and initial wellbore design is incorporated and communicated in a Management of Change (MOC) process to ensure continuity for all personnel.

Use of established good oil field practices that safeguard crews and equipment are integrated to incorporate LLOG's, the contractor and service provider policies.

Additional personnel and equipment will be used as needed to elevate awareness and provide real time monitoring of well conditions while drilling such as MWD/LWD/PWD tools used in the bottom hole assemblies. The tool configuration for each open hole section varies to optimize information gathered including the use of Formation-Pressure-While-Drilling (FPWD) tools to establish real time formation pressures and to be used to calibrates pore pressure models while drilling. Log information and pressure data is used by the drilling engineers, geologist and pore pressure engineers to maintain well control and reduced potential events such as well control events and loss circulation events.

Mud loggers continuously monitor return drilling fluids, drill gas levels and cuttings as well as surface mud volumes and flow rates, rate of penetration and lithology/paleo to aid in understanding trends and geology being drilled. Remote monitoring of real time drilling parameters and evaluation of geologic markers and pore pressure indicators is used to identify potential well condition changes.

Proper equipment maintenance and inspection program for same to before the equipment is required. Programmed equipment inspections and maintenance will be performed to ensure the equipment operability and condition. Operations will cease as needed in order to ensure equipment and well conditions are maintained and controlled for the safety of personnel, rig and subsurface equipment and the environment.

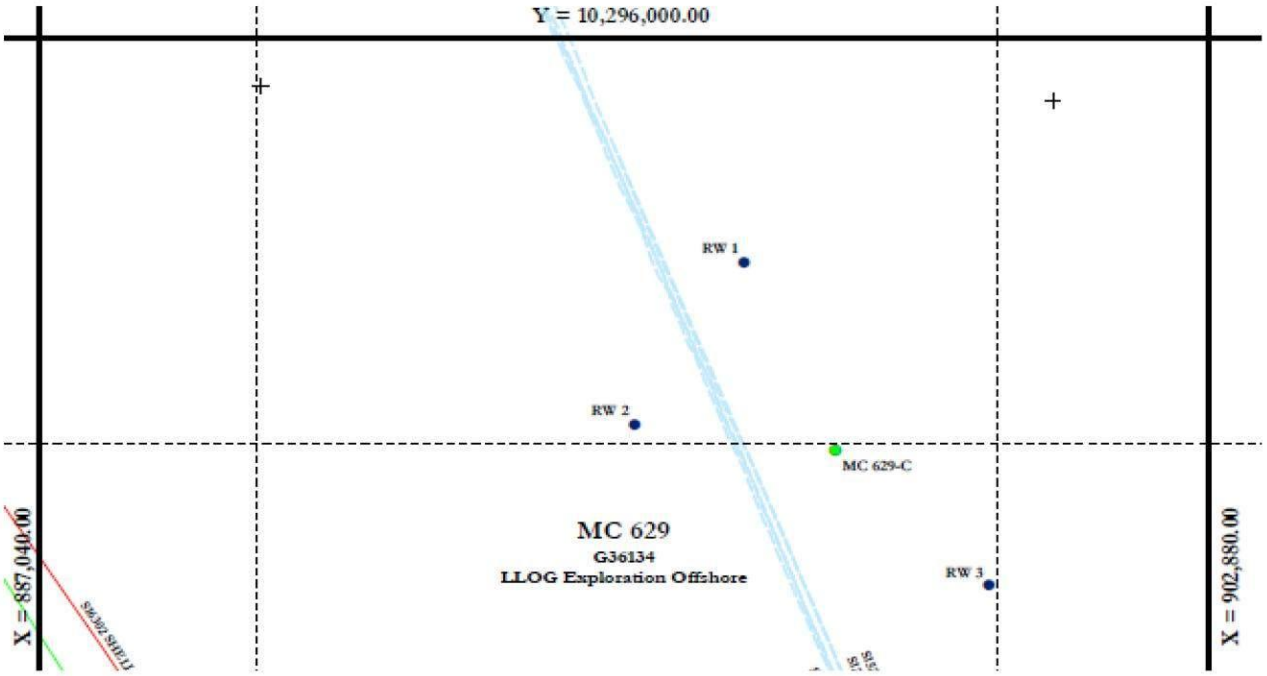
H) Measures to conduct effective and early intervention in the event of a blowout

In conjunction with the LLOG Exploration's "Well Control Emergency Response Plan" and as required by NTL 2010-N06, the following is provided to demonstrate the potential time needed for performing secondary intervention and drilling of a relief well to handle potential worst case discharge for the proposed prospect. Specific plans are integrated into the Helix Well Containment Groups procures to be approved and submitted with the Application for Permit to Drill. Equipment availability, backup equipment and adaptability to the potential scenarios will need to be addressed based on the initial site assessment of the seafloor conditions for intervention operations. Relief well equipment such as backup wellhead equipment and tubulars will be available in LLOG's inventory for immediate deployment as needed to address frilling the relief well(s).

SITE SPECIFIC PROPOSED RELIEF WELL AND INTERVENTION PLANNING

No platform was considered for drilling relief wells for this location due to location, water depth and lack of appropriate platform within the area. For this reason a moored or DP MODU will be preferred / required.

The surface location for a relief well(s) is a function of seabed bottom and shallow hazard conditions, current, wind direction and wellbore access. The relief well surface locations for the MC 629-1 well would be drilled from an appropriately cleared-of-hazards surface location. Well site locations are below.



Proposed Relief Well Locations

Well Name	Surface X (ft)	Surface Y (ft)	Latitude	Longitude	Block	Block Call (E-W)	Block Call (N-S)	WD (ft)
RW 1	896,580.00	10,292,700.00	28° 20' 35.513"	89° 18' 46.361"	MC 629	6,300 ft FEL	3,300 ft FNL	2,437
RW 2	895,100.00	10,290,300.00	28° 20' 11.479"	89° 19' 02.401"	MC 629	7,780 ft FEL	5,700 ft FNL	2,486
RW 3	899,895.00	10,287,900.00	28° 19' 48.634"	89° 18' 08.253"	MC 629	2,985 ft FEL	7,740 ft FSL	2,390

RELIEF WELL RESPONSE TIME ESTIMATE

OPERATION	TIME ESTIMATE (DAYS)
IMMEDIATE RESPONSE • safeguard personnel, render first-aid • make initial notifications • implement short term intervention (if possible) • implement spill control • develop Initial Action Plan	1
INTERIM REPSONSE • establish Onsite Command Center and Emergency Management Team • assess well control issues • mobilize people and equipment (Helix DW Containment System) • implement short term intervention and containment (if possible) • develop Intervention Plan • initiate relief well planning • continue spill control measures	4
INTERVENTION AND CONTAIMENT OPERATIONS • mobilize equipment and initiate intervention and containment operations • perform TA operations and mobilize relief wells rig(s) • finalize relief well plans, mobilize spud equipment, receive approvals • continue spill control measures	15
RELIEF WELL(S) OPERATIONS • continue intervention and containment measures • continue spill control measures • drill relief well (s)	30
PERFORM HYDRAULIC KILL OPERATIONS / SECURE BLOWNOUT WELL • continue intervention and containment measures • continue spill control measures • perform hydraulic kill operations, monitor well, secure well	20
ESTIMATED TOTAL DAYS OF UNCONTROLLED FLOW	**70**
SECURE RELIELF WELL(S) / PERFORM P&A / TA OPERATIONS / DEMOBE	30
TOTAL DAYS	**100**

APPENDIX C
GEOLOGICAL AND GEOPHYSICAL INFORMATION
(30 CFR Part 550.214 and 550.244)

A. Geological Description

Included as ***Attachment C-1*** are the geological targets and a narrative of trapping features proposed in this Plan.

B. Structure Contour Maps

Included as ***Attachment C-2*** are current structure maps (depth base and expressed in feet subsea) depicting the entire lease coverage area; drawn on top of the prospective hydrocarbon sands. The maps depict each proposed bottom hole location and applicable geological cross section.

C. Interpreted Seismic Lines

Included as ***Attachment C-3*** is a copy of the migrated and annotated (shot points, time lines, well paths) deep seismic line within 500 feet of the surface location being proposed in this Plan.

D. Geological Structure Cross-Sections

An interpreted geological cross section depicting the proposed well locations and depth of the proposed wells is included as ***Attachment C-4***. Such cross section corresponds to each seismic line being submitted.

E. Shallow Hazards Report

Shallow Hazards Assessment and Benthic Communities Evaluation, Mississippi Canyon Block 629, OCS-G 36134 Lease, Berger Geosciences, L.L.C. prepared for LLOG Exploration, dated November 7, 2018, being submitted to BOEM under separate cover with the Initial Exploration Plan, N-10043.

F. Shallow Hazards Assessment

Wellsite Clearance Letters were prepared by Echo Offshore dated July 3, 2019 for the proposed surface locations, evaluating seafloor and subsurface geologic and manmade features and conditions, and is included as ***Attachment C-5***.

G. High Resolution Seismic Lines

LLOG provided exploration 3-D seismic data for the evaluation of the proposed surface disturbance operations.

H. Stratigraphic Column

A generalized biostratigraphic/lithostratigraphic column from the seafloor to the total depth of the proposed wells is included as ***Attachment C-6***.

I. Time vs Depth Tables

LLOG has determined that there is existing sufficient well control data for the target areas proposed in this Plan; therefore, tables providing seismic time versus depth for the proposed well locations are not required.

Geological Description

Attachment C-1
(Proprietary Information)

Structure Maps

Attachment C-2
(Proprietary Information)

Deep Seismic Lines

Attachment C-3
(Proprietary Information)

Cross Section Maps

Attachment C-4
(Proprietary Information)

Shallow Hazards Assessment

Attachment C-5
(Public Information)

BERGER GEOSCIENCES, LLC.
13100 NORTHWEST FWY, STE 600
HOUSTON, TEXAS 77040
PHONE: 713-341-0397
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03 July 2019

Ms. Carol Eaton
LLOG Exploration Company, LLC.
1001 Ochsner Blvd. #100
Covington, LA 70433

RE: Wellsite Clearance Letter for Proposed Well MC 629-C, Mississippi Canyon Area, Block 629 (Lease No. G36134)

Dear Ms. Eaton,

Berger Geosciences, LLC. (Berger) is pleased to provide LLOG Exploration Company, LLC. (LLOG), with the following Wellsite Clearance Letter for Proposed Well MC 629-C with a surface location in Mississippi Canyon (MC) Area, Block 629 (Lease No. G36134). The proposed well deviates to the northwest below the limit of this assessment. The letter describes the seafloor, shallow geologic conditions, shallow hazards, and benthic community potential at the proposed location. LLOG has submitted an Exploration Plan for MC 629 (Control No. 10043) which includes a shallow hazards assessment and benthic communities investigation of Block MC 629 completed by Berger on 7 November 2018. This letter is an amendment to the existing Exploration Plan for LLOG to include the Proposed Well MC 629-C. This report includes a wellsite clearance letter and updated maps and figures featuring the proposed well location.

This letter, in conjunction with the Shallow Hazards Assessment (Berger, 2018), is intended to satisfy requirements set forth by the Notice-to-Lessees (NTL) Nos. 2008-G05 (Shallow Hazards Program) and the shallow hazards portions of NTL No. 2008-G04 (Information Requirements for EPs and DOCDs). The Bureau of Ocean Energy Management NTL No. 2015-N02 provides indefinite extension to MMS NTLs 2008-G04 and 2008-G05. This letter is intended to comply with NTL No. 2009-G40 (Deepwater Benthic Communities).

The block of interest is located within an area of high archaeological potential as described in NTL Nos. JOINT 2011-G01, 2005-G07 (Archaeological Resource Surveys and Reports), and supplemental guidelines. An archaeological survey and report for block MC 629 was submitted under separate cover by Echo Offshore, LLC. (2018).

We appreciate the opportunity to be of service to LLOG on this project and look forward to working with you in the future. Please contact us if you have any questions or need further information.

Sincerely,

James F. Keenan
Manager, Geohazards Services

William J. Berger III, P.G.
President and CEO

Distribution: 2 copies

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Wellsite Clearance Letter

Proposed Well MC 629-C

Mississippi Canyon Area
Block 629 (Lease No. G36134)
Gulf of Mexico

Berger Geosciences Project No. 19-05-29

Prepared for:

LLOG Exploration Company, LLC.
1001 Ochsner Blvd. #100
Covington, LA 70433

July 2019

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Introduction

LLOG Exploration Company, LLC. (LLOG) contracted Berger Geosciences, LLC. (Berger) to provide this letter to assess the shallow hazards and benthic communities potential for Proposed Well MC 629-C with surface location in the northwest Mississippi Canyon (MC) Area, Block 629 (Lease No. G36134). The proposed well is planned to deviate below the investigation limit for shallow hazards assessment with an intended bottom hole location in north-central MC 629. All geologic interpretations presented in this report are based on the shallow hazards assessment entitled:

- *Shallow Hazards Assessment and Benthic Communities Evaluation, Block 629 (Lease No. G36134), Mississippi Canyon Area, Gulf of Mexico* prepared by Berger (2018).

This report was prepared for LLOG and submitted to the Bureau of Ocean Energy Management (BOEM) under a different cover.

This letter is intended to update the previous shallow hazards report (Berger, 2018) and is compliant with Notice-to-Lessees (NTL) Nos. 2008-G04 and 2008-G05 (Shallow Hazards; MMS, 2008a and 2008b) and NTL No. 2009-G40 (Deepwater Benthic Communities; MMS, 2009). Bureau of Ocean Energy Management NTL 2015-N02 (BOEM, 2015) eliminates the expiration of MMS NTLs 2008-G04 and 2008-G05. Mississippi Canyon Block 629 is located within an area of high archaeological potential as described in NTL No. 2011 JOINT-G01 (BOEM/BSEE, 2011), NTL No. 2005-G07 (Archaeological Resource Surveys and Reports; MMS, 2005), and supplemental NTLs. For avoidances and sonar contacts, please refer to the Echo Offshore, LLC. AUV Archaeological Assessment (2018).

Four maps and four figures were generated for the proposed wellsite. The maps show the bathymetry (Map W-1), topographic features (Map W-2), the variation in seafloor amplitude response (Map W-3), and the geologic features (Map W-4) near the proposed well location. Figure W-1 displays the power spectrum extracted from the seismic data at the well location. A rendering of the Seafloor Assessment Area and the location of the vertical subbottom profiler line is shown on Figure W-2. Figure W-3 shows the nearest subbottom profiler line, Line 17, to the well. Figure W-4 is a tophole prognosis for the Proposed Well MC 629-C. All of the maps and figures provided are intended to be reviewed in conjunction with the Wellsite Discussion section.

Wellsite Discussion

This section contains an assessment of the shallow hazards and tophole prognosis for Proposed Well MC 629-C located within Mississippi Canyon Area, Block 629.

The seafloor and benthic community assessments consider surface conditions within a 2,000-ft muds and cuttings discharge radius from the proposed well location. The wellsite assessment for the proposed location considers the subsurface conditions within a 500-ft radius of a presumed vertical wellbore from the seafloor to 1.741 seconds two-way travel time BML (approximately 5,231 ft BML). The archaeological assessment considers surface conditions and has previously been presented under separate cover by Echo Offshore, LLC (Echo, 2018).

Maximum Anchor Radius Criteria

LLOG anticipates using a dynamically positioned Mobile Offshore Drilling Unit (MODU) in the seafloor assessment area; therefore, no anchor pattern has been analyzed.

Tophole Prognosis Criteria

The following sections specify the criteria used to develop the tophole prognosis for the proposed well. The assessment is based on 3-D seismic data and comparison to regional stratigraphic units as available. The tophole assessment is restricted to the specific proposed well location.

Gas Hydrates. The base of the gas hydrate stability zone (BGHSZ) is calculated based on Maekawa et al. (1995) or an identifiable bottom-simulating reflector. The potential for solid gas hydrates was evaluated for the proposed well. The criteria include:

- Is water depth conducive for gas hydrate formation?
- What is the depth to the base of the gas hydrate stability zone (BGHSZ) at the proposed well?
- Is a bottom-simulating reflector (BSR) present between the seafloor and BGHSZ?
- Is a BSR present within 500 ft of the proposed well?
- Does the proposed well intersect a BSR?
- Have gas hydrates been identified in the region of the proposed well?

HIGH	The wellsite conditions meet ALL of the above stated criteria, and correlates to an existing well that encountered gas hydrates.
MODERATE	The wellsite conditions meet SEVERAL of the above stated criteria. There is no direct evidence of gas hydrates at nearby wells.
LOW	The wellsite conditions meet SOME of the above stated criteria, and does not correlate to nearby wells.
NEGLIGIBLE	The wellsite conditions meet FEW to NONE of the above stated criteria, and there is no evidence of gas hydrates at nearby wells.

Shallow Gas. The potential for shallow gas was evaluated for the proposed well. The criteria used to evaluate the proposed well include:

- Does an anomalous amplitude event exist in proximity of the proposed well, and is there evidence for connectivity to the proposed wellbore?
- Is there supporting geophysical evidence for shallow gas associated with the anomalous amplitude?
- Is the anomalous amplitude within a sequence that may be sand-prone?
- Is there evidence of migration of fluid (including hydrocarbons) from depth, such as along a fault plane?
- Does the sequence correlate to other wells within the area that encountered shallow gas?
- Is the proposed well located in a frontier area with little or no offset well control?

HIGH	The amplitude event meets ALL of the above stated criteria, or correlates to an existing well that encountered shallow gas.
MODERATE	The amplitude event meets SEVERAL of the above stated criteria. There is no direct evidence of shallow gas from nearby wells.
LOW	The amplitude event meets SOME of the above stated criteria, and does not correlate to nearby wells.
NEGLIGIBLE	The amplitude event meets FEW to NONE of the above stated criteria, and there is no evidence of shallow gas from nearby wells.

Shallow Water Flow. The potential for shallow water flow (SWF) was assessed for the proposed well. The potential for SWF is based on the following criteria:

- Does the stratigraphic unit correlate to a regional sand-prone sequence?
- Is the area subject to high sedimentation rates and rapid overburden deposition?
- Is the sequence composed of high-amplitude, chaotic reflectors indicative of sand?
- Is there a potential seal (perhaps clay-prone) above the sand-prone sequence?
- Does the sequence correlate to other wells within the area that encountered SWF?
- Is the proposed well located in a frontier area with little or no offset well control?

HIGH	The stratigraphic unit meets ALL of the above stated criteria, and correlates to an existing well that encountered SWF.
MODERATE	The stratigraphic unit meets SEVERAL of the above stated criteria. There is no direct evidence of SWF from nearby wells.
LOW	The stratigraphic unit meets SOME of the above stated criteria, and does not correlate to nearby wells
NEGLIGIBLE	The stratigraphic unit meets FEW to NONE of the above stated criteria, and there is no evidence of SWF from nearby wells.

Proposed Well MC 629-C

The water depth at Proposed Well MC 629-C is 2,431 ft below sea level (BSL; Map W-1). The proposed well is within an area of relatively smooth seafloor that slopes to the southwest at 3.8° (Figures W-2, W-3, and W-4). The proposed location provided by LLOG is as follows:

Table W-1. Location, block calls, and seismic lines for Proposed Well MC 629-C

NAD27 UTM Zone 16 North, US Survey ft		Geographic Coordinates	
X	Y	Latitude	Longitude
897,818	10,289,900	28° 20' 08.036" N	89° 18' 31.913" W
Block Calls		3-D Seismic Line Reference	
		Line	Trace
6,100' FNL	5,062' FEL	12468	16964

Twinned Location

Proposed Well MC 629-Alt-C is 50 ft west from the Proposed MC 629-C Well with the same well path, and is intended to be used as an alternate drilling location. Seafloor and subsurface conditions at the twinned well location are approximately equivalent and no separate illustrations of the subsurface conditions were prepared. The proposed alternate drilling location is as follows:

Table W-2. Location and block calls for Proposed Well MC 629-Alt-C

NAD27 UTM Zone 16 North, US Survey ft		Geographic Coordinates	
X	Y	Latitude	Longitude
897,768	10,289,900	28° 20' 08.026" N	88° 18' 32.472" W
Block Calls			
6,100' FNL	5,112' FEL		

Power Spectrum Analysis

The power spectrum for the proposed well was derived through the use of IHS Kingdom Suite's Trace Calculator tools. For Proposed Well MC 629-C, the power spectrum was extracted from a subset that ranges from Inline 12368 to 12568 and Crossline 16864 to 17064, and is limited to the upper one second below the seafloor. The frequency content within the upper one second below the seafloor is of sufficient quality for shallow hazards analysis.

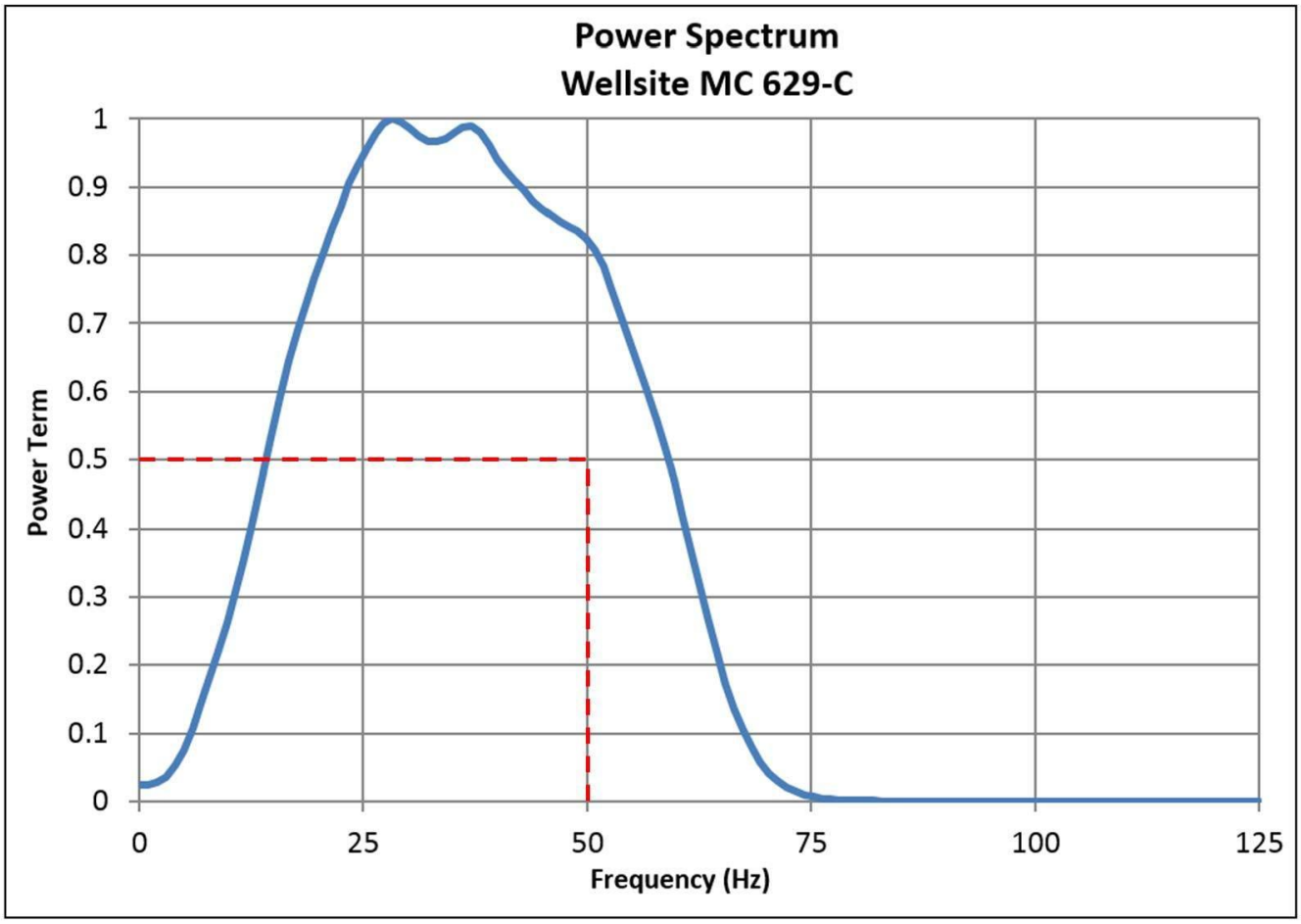

Figure W-1. Power spectrum at Proposed Well MC 629-C

Seafloor Conditions

The following paragraphs summarize the seafloor morphology, benthic communities potential, and archaeological potential at the proposed well location.

Seafloor Morphology. Proposed Well MC 629-C is located in the northeast quadrant of MC 629. Water depths near the proposed well range from 2,301 ft to 2,581 ft BSL (Maps W-1 and W-2). The seafloor near the proposed well is relatively smooth and gently dips to the southwest. No seafloor faults are within the 2,000-ft muds and cuttings radius for the proposed wellsite (Map W-4).

There are no obvious seafloor faults within 2,000 ft of Proposed Well MC 629-C.

Benthic Communities Assessment. There are no water bottom anomalies identified by the BOEM (2019a) within 2,000 ft of the proposed well location. There are no high-amplitude seafloor anomalies identified in the 3-D seismic data within 2,000 ft of the proposed well location (Map W-3). Features or areas that could support high-density benthic communities are not anticipated within 2,000 ft of the proposed location.

Features or areas that could support high-density chemosynthetic or other benthic communities are not anticipated within 2,000 ft of Proposed Well MC 629-C.

Infrastructure. Pursuant to the public information in the BOEM database (2019b), within 2,000 ft of the proposed well there are four inactive pipelines/umbilicals (Maps W-2, W-3, and W-4). All of these are operated by Mariner Energy, Inc. All of these pipelines and umbilicals trend southeast to northwest across the western portion of the 2,000 ft muds and cuttings discharge radius (Maps W-2, W-3, and W-4).

There are four inactive pipelines/umbilicals within 2,000 ft of Proposed Well MC 629-C.

Archaeologic Assessment. All blocks in the Mississippi Canyon Protraction Area are regarded as being in a high probability zone for historic shipwrecks based on Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE) NTL No. 2011-JOINT-G01 (BOEM/BSEE, 2011), including MC 629. Pursuant to the public information in the NOAA Automated Wreck and Obstruction Information System and Navigational Charts (NOAA, 2019); there are no reported shipwrecks within the seafloor assessment area. The required archaeological survey and report was completed by Echo and was submitted under a separate cover (Echo, 2018). For avoidances and sonar contacts please refer to the Echo report (2018).

There are no reported cultural resources for MC 629. For details about sonar contacts and avoidances please refer to the Echo AUV Archaeological Assessment.

Wellsite Assessment

The wellsite assessment covers the subsurface conditions within a 500-ft radius of the proposed wellpath from the seafloor to the Top of Salt at 1.741 seconds two way travel time BML (approximately 5,231 ft BML).

Stratigraphy and Tophole Prognosis. Eight 3D seismic marker horizons (Horizons 10, 20, 30, 40, 50, 60, 70, and 80) and the Top of Salt were interpreted at Proposed Well MC 629-C. A generalized description of the stratigraphic sequences can be found in Section 1.4 of the previous Berger (2018) Shallow Hazards Assessment. The following is a synopsis of the conditions that will be encountered directly below the surface location.

Faults. The wellbore at Proposed Well MC 629-C will not penetrate any apparent seafloor faults. The proposed wellbore will penetrate three buried faults at approximately 2,950 ft, 3,881 ft, and 4,825 ft BML (Figure W-4). These faults dip to the east and terminate at or below Horizon 50 and therefore are considered to be inactive.

A vertical wellbore will not intersect apparent seafloor faults, but will penetrate three buried faults within the investigation limit.

Seafloor to Horizon 10. The sequence between the Seafloor and Horizon 10 consists of low-amplitude, parallel and continuous reflectors interpreted to represent a hemipelagic clay drape over stratified clays and silts (Figure W-4). Horizon 10 is expected to be encountered at 197 ft BML (Figure W-4).

Details of this sequence are also provided by the subbottom profiler images (Echo, 2018), which shows 18 ft of hemipelagic clay drape overlying stratified clays to a depth of around 38 ft BML and stratified silts and clays to the data limit of approximately 183 ft BML (Figure W-3).

This sequence is assessed as having a ***low*** potential for gas hydrates (Figure W-4). There is a ***negligible*** potential for shallow gas and SWF within this sequence (Figure W-4).

Horizon 10 to Horizon 20. The sequence between Horizon 10 and the Horizon 20 consists of low- to moderate-amplitude, parallel to chaotic, and continuous to discontinuous reflectors that represent turbidites and channelized clays, silts and sands (Figure W-4).

The sediment thickness between Horizon 10 and Horizon 20 is 779 ft at the proposed location. Horizon 20 is mapped at 976 ft BML and marks the transition from the overlying channelized deposits to the stratified interval below.

The theoretical base of the gas hydrate stability zone (BGHSZ) at this water depth is estimated to be 932 ft BML based on Maekawa et al. (1995) and occurs within this sequence.

This sequence is assessed as having a ***low*** potential for gas hydrates from Horizon 10 at 197 ft BML to the BGHSZ at 932 ft BML and a ***negligible*** potential for hydrates from the BGHSZ at 932 ft BML to Horizon 20 at 976 ft BML (Figure W-4). There is a ***negligible*** potential for shallow gas and SWF from Horizon 10 at 197 ft BML to the BGHSZ at 932 ft BML and a ***low*** potential for shallow gas and SWF from the BGHSZ at 932 ft BML to Horizon 20 at 976 ft BML (Figure W-4).

Horizon 20 to Horizon 30. The Horizon 20 to Horizon 30 sequence has low-amplitude, parallel, and continuous reflectors (Figure W-4). The interval is interpreted to consist of stratified clays and silts.

The unit is 161 ft thick at the proposed well location. Horizon 30 is estimated to be encountered at 1,137 ft BML (Figure W-4).

This sequence is assessed as having a ***negligible*** potential for gas hydrates (Figure W-4). There is a ***low*** potential for shallow gas and SWF within this sequence.

Horizon 30 to Horizon 40. The sequence between Horizon 30 and Horizon 40 contains low- to moderate-amplitude, parallel to chaotic, continuous to discontinuous reflectors (Figure W-4). The interval is interpreted to consist of silty channel-levee deposits and MTDs of clays, silts, and sands. The thickness of sediment within this sequence is 737 ft. Horizon 40 is mapped at 1,874 ft BML (Figure W-4).

There is a ***negligible*** potential for gas hydrates, there is a ***low*** potential for shallow gas and SWF within this sequence (Figure W-4).

Horizon 40 to Horizon 50 (Blue Unit). The Blue Unit consists of low- to high-amplitude, chaotic, and discontinuous reflectors (Figure W-4). The interval is 507 ft thick and consists of clay- and silt-dominated MTDs with interbedded sheet sands and isolated sands. Horizon 50 is expected to be encountered at 2,381 ft BML.

Three amplitude anomalies are within 500 ft of the wellbore in this sequence (Map W-4). The nearest is located 280 ft to the south of the proposed well location and the remaining two are located 295 ft to the northeast and 400 ft to the southeast (Map W-4). These anomalies may be related to lithology variation, imaging the transition from sands to more silty clays, however, the potential for shallow gas cannot be ruled out.

There is a ***negligible*** potential for gas hydrates, a ***moderate*** potential for shallow gas, and a ***high*** potential for SWF from this sequence.

Horizon 50 to Horizon 60. The sequence between Horizon 50 and Horizon 60 consists of low- to moderate-amplitude, sub-parallel to chaotic, continuous to discontinuous reflectors (Figure W-4). The sequence is 575 ft thick and is interpreted to represent alternating intervals of MTDs of clays, silts, and sands and silt- and clay-dominated turbidite deposits.

An inactive, buried fault will be crossed within this sequence at 2,590 ft BML. Horizon 60 is mapped at 2,956 ft BML at the proposed well location (Figure W-4).

There is a ***negligible*** potential for gas hydrates, a ***low*** potential for shallow gas and SWF within this sequence (Figure W-4).

Horizon 60 to Horizon 70 (Green Unit). The Green Unit consists of two intervals at the proposed location separated by an interface at 3,418 ft BML (Figure W-4). The upper interval is 462 ft thick and consists of low- to high-amplitude, parallel to sub-parallel, and continuous to discontinuous reflectors. This interval is interpreted to include sand-dominated levee-overbank deposits underlain by stratified clays and silts. The lower interval contains low- to high-amplitude, chaotic, discontinuous reflectors representing sand-rich channel and levee-overbank deposits interbedded with clays, silts, and sands. This lower interval is 291 ft thick (Figure W-4). Horizon 70 is interpreted at 3,709 ft BML.

There is a ***negligible*** potential for gas hydrates, a ***moderate*** potential for shallow gas and SWF within this sequence (Figure W-4).

Horizon 70 to Horizon 80. The Horizon 70 to Horizon 80 sequence contains low- to moderate-amplitude, parallel, and continuous reflectors interpreted as clay- and silt-dominated MTDs (Figure W-4). The sediments within this sequence are 172 ft thick. Horizon 80 is faulted out at the proposed well location and the base of this sequence is represented by an inactive, buried fault mapped at 3,881 ft BML.

There is a ***negligible*** potential for gas hydrates, a ***negligible*** potential for shallow gas, and a ***negligible*** potential for SWF within this sequence (Figure W-4).

Horizon 80 to Top of Salt (Limit of Investigation). The Horizon 80 to the limit of investigation/Top of Salt sequence includes low- to high-amplitude, parallel to chaotic, and continuous to discontinuous reflectors with two interfaces (Figure W-4). The lower-amplitude, near amorphous reflectors of the upper unit represent clay- and silt-dominated MTDs with a basal interface at 3,998 ft BML. The middle interval contains higher-amplitude, parallel to chaotic reflectors that represent sand-dominated channel deposits interbedded with MTDs of clays, silts, and sands with a basal interface at 4,386 ft BML. The lower unit consists of low- to moderate-amplitude reflectors interpreted to be clay- and silt-dominated MTDs interbedded with normally deposited clays, silts, and sands. The sediments within this sequence are 1,350 ft thick and the base of this sequence is the Top of Salt at 5,231 ft BML.

One amplitude anomaly is within 500 ft of the wellbore in this sequence. The anomaly is located 300 ft to the south-southwest of the proposed well (Map W-4). This anomaly may be related to lithology variation from sands to more silty clays, however, the potential for shallow gas cannot be ruled out.

Two inactive, buried faults will be crossed within this sequence at 3,881 ft and 4,825 ft BML (Figure W-4).

There is a ***negligible*** potential for gas hydrates from this sequence. There is a ***negligible*** potential for shallow gas and SWF from Horizon 80 (3,881 ft BML) to the interface at 3,998 ft BML. There is a ***low*** potential for shallow gas and SWF from 3,998 ft to 4,386 ft BML and a ***negligible*** potential for shallow gas and SWF from 4,386 ft to the Top of Salt at 5,231 ft BML (Figure W-4).

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National Oceanic and Atmospheric Administration, 2019. Office of Coast Survey, Wrecks and Obstructions Database Website. Available online at: http://www.nauticalcharts.noaa.gov/hsd/wrecks_and_obstructions.html

Stratigraphic Column

Attachment C-6
(Proprietary Information)

APPENDIX D

HYDROGEN SULFIDE (H2S) INFORMATION

(30 CFR Part 550.215 and 550.245)

A. Concentration

LLOG does not anticipate encountering H2S while conducting the proposed exploratory operations provided for under this plan.

B. Classification

In accordance with 30 CFR 250.490 (c) and NTL No. 2009-G31 "Hydrogen Sulfide", BOEM designated Mississippi Canyon Block 629 Locations A & B as "H_2S absent" in the approval letter for N-10043 dated January 30, 2019.

APPENDIX E
BIOLOGICAL, PHYSICAL AND SOCIOECONOMIC INFORMATION
(30 CFR Part 550.216 and 550.247)

A. High-Density Deepwater Benthic Communities Information

There is no evidence of fluid migration to the seafloor within 2,000' of Proposed Well MC 629 C. There are no seafloor amplitude anomalies or signs of gas migration within 2,000' of the proposed well. There are no BSRs or other seismic indicators of gas hydrates within 2,000' of the proposed well.

Features or areas that could support high-density chemosynthetic or other benthic communities are not anticipated within 2,000' of proposed location.

B. Topographic Features Map

The activities proposed in this Plan are not affected by a topographic feature.

C. Topographic Features Statement (Shunting)

The activities proposed in this Plan are not affected by a topographic feature; therefore, LLOG is not required to shunt drill cuttings and drill fluids.

D. Live Bottoms (Pinnacle Trend) Map

Mississippi Canyon Block 629 is not located within the vicinity of a proposed live bottom (Pinnacle trend) area.

E. Live Bottoms (Low Relief) Map

Mississippi Canyon Block 629 is not located within the vicinity of a proposed live bottom (Low Relief) area.

F. Potentially Sensitive Biological Features Map

Mississippi Canyon Block 629 is not located within the vicinity of a proposed sensitive biological feature area.

G. Threatened or Endangered Species, Critical Habitat, and Marine Mammal Information.

Proposed activities in Mississippi Canyon Block 629 are not located in a critical habitat designated under ESA and marine mammals protected under the MMPA. In the event federally listed species become present on MC 629, LLOG will mitigate impact through compliance with NTL 2012-G01, G02 and NTL 2012 BSEE-G01. See ***Attachment E-1*** for a list of the NOAA Species known in the Gulf of Mexico.

H. Archaeological Report

A Deep Tow Survey was conducted by Tesla Offshore in August 2008 for Mississippi Canyon Block 672 and surrounding Blocks 628, 629, 671, 673, 674, 716, 717 & 770 for LLOG which was submitted to BOEM on August 13, 2015. AUV Archaeological Investigation, Block 629, Mississippi Canyon Area, prepared by Echo Offshore in August, 2018, submitted to BOEM under separate cover on November 7, 2018.

I. Air and Water Quality Information

Not applicable to proposed operations.

J. Socioeconomic Information

Not applicable to proposed operations.

NOAA Species Known in GOM

Attachment E-1
(Public Information)

NOAA FISHERIES
Southeast Region
Protected Resources Division

Gulf of Mexico's Threatened and Endangered Species

For more information on listed species please visit:
http://www.nmfs.noaa.gov/pr/species/esa/listed.htm
http://sero.nmfs.noaa.gov/protected_resources/index.html

Marine Mammal Species	Scientific Name	Status
fin whale	*Balaenoptera physalus*	Endangered
humpback whale	*Megaptera novaeangliae*	Endangered
sei whale	*Balaenoptera borealis*	Endangered
sperm whale	*Physeter macrocephalus*	Endangered
Sea Turtle Species		
green sea turtle	*Chelonia mydas*	Threatened[1]
hawksbill sea turtle	*Eretmochelys imbricata*	Endangered
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered
leatherback sea turtle	*Dermochelys coriacea*	Endangered
loggerhead sea turtle	*Caretta caretta*	Threatened[2]
Fish Species		
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Threatened
smalltooth sawfish	*Pristis pectinata*	Endangered
Invertebrate Species		
lobed star coral	*Orbicella annularis*	Threatened
mountainous star coral	*Orbicella faveolata*	Threatened
boulder star coral	*Orbicella franksi*	Threatened
elkhorn coral	*Acropora palmata*	Threatened[3]

Critical Habitat Designations

For final rules, maps, and GIS data please visit:
http://sero.nmfs.noaa.gov/maps_gis_data/protected_resources/critical_habitat/index.html

Loggerhead sea turtle: There are 38 designated marine areas that occur throughout the Southeast Region.

Gulf sturgeon: There are 14 marine and estuarine units located in Northwest Florida, Alabama, Mississippi, and eastern Louisiana.

Smalltooth sawfish: There are two habitat units located in Charlotte Harbor and in the Ten Thousand Islands/Everglades, Florida.

[1] Florida's breeding population is listed as endangered.
[2] Northwest Atlantic distinct population segment.
[3] Colonies located at Flower Garden Banks National Marine Sanctuary.

APPENDIX F
WASTE AND DISCHARGE INFORMATION
(30 CFR PART 550.217 AND 550.248)

A. Projected Generated Wastes

See the following tables:

TABLE 1. Wastes you will generate, treat and downhole dispose or discharge to the GOM

TABLE 2. Wastes you will transport and /or dispose of onshore

B. Modeling

Not applicable. Proposed activities will be covered by U.S. EPA NPDES General Permit.

TABLE 1. WASTES YOU WILL GENERATE, TREAT AND DOWNHOLE DISPOSE OR

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

Projected generated waste			Projected ocean discharges		Downhole Disposal
Type of Waste	**Composition**	**Projected Amount**	**Discharge rate**	**Discharge Method**	**Answer yes or no**
Will drilling occur ? If yes, fill in the muds and cuttings.					
EXAMPLE: Cuttings wetted with synthetic based fluid	*Cuttings generated while using synthetic based drilling fluid.*	*X bbl/well*	*X bbl/day/well*	*discharge overboard*	*No*
Water-based drilling fluid	Water based mud additives, barite and gel used for WBM	199,734 bbls/well	11,148 bbls/day/well	Discharge overboard	No
Cuttings wetted with water-based fluid	Cuttings generated while using water based drilling fluid.	9,544 bbls/well	533 bbls/day/well	Discharge overboard	No
Cuttings wetted with synthetic-based fluid	Cuttings generated while using synthetic based drilling fluid.	10,086 bbls/well	194 bbls/day/well	Discharge overboard	No
Will humans be there? If yes, expect conventional waste					
EXAMPLE: Sanitary waste water	Sanitary waste from living quarters	X bbl/well	X bbl/hr/well	chlorinate and discharge overboard	No
Domestic waste	Misc waste for living quarters	26,371 bbls/well	3.9 bbls/hr/well	Discharge overboard (no free oil)	No
Sanitary waste	Processed sanitary waste from living quarters	17,581 bbls/well	2.6 bbls/hr/well	Chlorinate and discharge overboard per USCG approved MSD	No
Is there a deck? If yes, there will be Deck Drainage					
Deck Drainage	Accumulated drainage due to rainfall	0 to 47,261 bbls/well	0 to 167 bbls/hr/well	Test for oil and grease and discharge overboard	No
Will you conduct well treatment, completion, or workover?					
Well treatment fluids - chemical product waste	Ethylene glycol, methonal	300 bbls/well	20 bbls/hr/well	Transported to shore on vessels in DOT approved containers to Fourchon base for pick-up	No
Well completion fluids	Brines: NaCL, KCl, CaBr2, CaCl2, spent acids (hydroflouric and hydrochloric), prop sand, debris from potential flowback operations	500 bbls/well	100 bbls/hr/well	Non-pollutant brines - tested for oil and grease for discharge overboard. This excludes clear brines containing Zinc, spent acids, prop sand and debris. These will be transported to shore on vessels in DOT approveed containers to Fourchon base and on to Newpark Base for disposal.	No
Workover fluids	Brines: NaCL, KCl, CaBr2, CaCl2, spent acids (hydroflouric and hydrochloric), prop sand, debris from potential flowback operations	500 bbls/well	100 bbls/hr/well	Non-pollutant brines - tested for oil and grease for discharge overboard. This excludes clear brines containing Zinc, spent acids, prop sand and debris. These will be transported to shore on vessels in DOT approveed containers to Fourchon base and on to Newpark Base for disposal.	No
Miscellaneous discharges. If yes, only fill in those associated with your activity.					
Desalinization unit discharge	Uncontaminated spent seawater used for potable water generation unit	0 to 100,000 bbls/well	60 bbls/hr/well	Discharge overboard	No
Blowout prevent fluid	Stack Magic 200/0/5% glycol based on 2% mixture with potable water	0 to 100 bbls/well	5 bbls/hr/well	Discharge at seafloor	No
Ballast water	Uncontaminated seawater used for ballast control	0 to 100,000 bbls/well	16,350 bbls/hr/well	Discharge overboard	No
Bilge water	Uncontaminated freshwater and seawater overflow / leakage accumuated from machinery operations	200 bbls/well	0 to 2 bbls/hr/well	Discharge overboard	No
Excess cement at seafloor	Excess cement slurry and mixwater used for cementing operation - NPDES allowed	1000 bbls/well	360 bbls/hr/well	Discharge at mudline	No
Fire water	Uncontaminated seawater used for fire control system - no additives	0 to 10,000 bbls/well	16,350 bbls/hr/well	Discharge overboard	No
Cooling water	Uncontaminated seawater used for heat exchanger operations used to cool machinery	0 to 400,000 bbls/well	0 to 1600 bbls/hr/well	Discharge overboard	No
Will you produce hydrocarbons? If yes fill in for produced water.					
Produced water	NA	NA	NA	NA	No
Will you be covered by an individual or general NPDES permit ?		**General NPDES**			
			Comply with the requirements of the NPDES permit.		

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

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

Please specify whatever the amount reported is a total or per well

	Projected generated waste		Solid and Liquid Wastses Transportation	Waste Disposal		
Type of Waste	**Composition**		**Transport Method**	**Name/Location of Facility**	**Amount**	**Disposal Method**
				Newport Environmental Services Inc., Ingleside, TX	*X bbl/well*	*Recycled*
Oil-based drilling fluid or mud	Inverted diesel based mud		NA	Newpark Transfer Station, Fourchon, LA	NA	NA
Synthetic-based drilling fluid or mud	Internal olifin, ester nbased mud		Barged in 25 bbls cutting boxes and / or liquid mud tanks for supply vessels	Newpark Transfer Station, Fourchon, LA	6750 bbls / well	Recycled
Cuttings wetted with Water-based fluid	Drill cuttings wetted with WBM generated while drilling		NA	Newpark Transfer Station, Fourchon, LA	NA	NA
Cuttings wetted with Synthetic-based fluid	Drill cuttings wetted with SBM generated while drilling.		NA	Newpark Transfer Station, Fourchon, LA	NA	NA
Cuttings wetted with oil-based fluids	Drill cuttings wetted with inverted diesel based mud		NA	Newpark Transfer Station, Fourchon, LA	NA	NA
Will you produce hydrocarbons? If yes fill in for produced sand.						
Produced sand						
Will you have additional wastes that are not permitted for discharge? If						
EXAMPLE: trash and debris (recylables)	*Plastic, paper, aluminum*		*barged in a storage bin*	*ARC, New Iberia, LA*	*X lb/well*	*Recycled*
Trash and debris	Plastic, paper, aluminum		Barged in a storage bin	Blanchard Landfill, Golden Meadows, LA	4000 lbs / well	Recycled
Used oil	Spent oil from machinery		Barged in USCG approved transfer tote tanks.	L&L Services, Fourchon, LA	200 bbls / well	Recycled
Wash water	Wash water w/ SBM residue and surfactants		Barged in 25 bbls cutting boxes and / or liquid mud tanks for supply vessels	Newpark Transfer Station, Fourchon, LA	2000 bbls / well	Approved disposal well injection or land farm
Chemical product wastes	Spent treatment and / or damaged chemicals used in operations		Barged in 25 bbls cutting boxes and / or cutting boxes	L&L Services, Fourchon, LA	10 bbls / well	Recycled

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

APPENDIX G
AIR EMISSIONS INFORMATION
(30 CFR PART 550.218AND 550.249)

A. Emissions Worksheets and Screening Questions

The Projected Quality Emissions Report (Form MMS-138) addresses the proposed drilling, completion and potential testing operations utilizing a typical DP semi-submersible drilling unit or a drillship, with related support vessels and construction barge information.

Screening Questions for EP's	*Yes*	*No*
Is any calculated Complete 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
Does your emission calculations include any emission reduction measures or modified emission factors?		X
Are your proposed exploration activities located east of 87.5 degrees W longitude?		X
Do you expect to encounter H2S at concentrations greater than 20 parts per million (ppm)?		X
Do you propose to flare or vent natural gas for more than 48 continuous hours from any proposed well?		X
Do you propose to burn produced hydrocarbon liquids?		X

B. Emissions Reduction Measures

The projected air emissions are within the exemption level; therefore, no emission reduction measures are being proposed.

C. Verification of Nondefault Emissions Factors

LLOG has elected to use the actual emission factors from the drillship as provided in ***Attachment G-1.***

D. Non-Exempt Activities

The proposed activities are within the exemption amount as provided in ***Attachment G-1.***

E. Modeling Report

This section of the Plan is not applicable to the proposed operations.

Air Quality Emissions Report

Attachment G-1
(Public Information)

OMB Control No. 1010-0151
OMB Approval Expires: 12/31/2014

EXPLORATION PLAN (EP)
AIR QUALITY SCREENING CHECKLIST

COMPANY	LLOG Exploration Offshore, L.L.C.
AREA	Mississippi Canyon
BLOCK	629
LEASE	OCS-G-36134
PLATFORM	N/A
WELL	Loc. C and Alt C
COMPANY CONTACT	Sue Sachitana, Regulatory Specialist
TELEPHONE NO.	985-801-4300
REMARKS	DP Drillship

EMISSIONS FACTORS

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

Equipment/Emission Factors	units	PM	SOx	NOx	VOC	CO	REF.	DATE
NG Turbines	gms/hp-hr		0.00247	1.3	0.01	0.83	AP42 3.2-1& 3.1-1	10/96
NG 2-cycle lean	gms/hp-hr		0.00185	10.9	0.43	1.5	AP42 3.2-1	10/96
NG 4-cycle lean	gms/hp-hr		0.00185	11.8	0.72	1.6	AP42 3.2-1	10/96
NG 4-cycle rich	gms/hp-hr		0.00185	10	0.14	8.6	AP42 3.2-1	10/96
Diesel Recip. < 600 hp.	gms/hp-hr	1	0.005505	14	1.12	3.03	AP42 3.3-1	10/96
Diesel Recip. > 600 hp.	gms/hp-hr	0.32	0.005505	11	0.33	2.4	AP42 3.4-1	10/96
Diesel Boiler	lbs/bbl	0.084	0.009075	0.84	0.008	0.21	AP42 1.3-12,14	9/98
NG Heaters/Boilers/Burners	lbs/mmscf	7.6	0.593	100	5.5	84	P42 1.4-1, 14-2, & 14	7/98
NG Flares	lbs/mmscf		0.593	71.4	60.3	388.5	AP42 11.5-1	9/91
Liquid Flaring	lbs/bbl	0.42	6.83	2	0.01	0.21	AP42 1.3-1 & 1.3-3	9/98
Tank Vapors	lbs/bbl				0.03		E&P Forum	1/93
Fugitives	lbs/hr/comp.				0.0005		API Study	12/93
Glycol Dehydrator Vent	lbs/mmscf				6.6		La. DEQ	1991
Gas Venting	lbs/scf				0.0034			

Sulphur Content Source	Value	Units
Fuel Gas	3.33	ppm
Diesel Fuel[2]	0.0015	% weight
Produced Gas(Flares)	3.33	ppm
Produced Oil (Liquid Flaring)	1	% weight

EMISSIONS CALCULATIONS 1ST YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
LLOG Exploration Offsho	Mississippi Canyon	629	OCS-G-36134	N/A	Loc. C and Alt C		Sue Sachitana, Regulatory Spec	985-801-4300	

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	HP	GAL/HR	GAL/D												
	Nat. Gas Engines	HP	SCF/HR	SCF/D												
	Burners	MMBTU/HR	SCF/HR	SCF/D	HR/D	DAYS	PM	SOx	NOx	VOC	CO	PM	SOx	NOx	VOC	CO
DRILLING	PRIME MOVER>600hp diesel	61800	2984.94	17000.00	24	144	43.56	0.75	1497.36	44.92	326.70	17.86	0.31	614.00	18.42	133.96
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BURNER diesel	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	AUXILIARY EQUIP<600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	7200	347.76	8346.24	12	62	5.07	0.09	174.45	5.23	38.06	1.88	0.03	64.60	1.94	14.09
	VESSELS>600hp diesel(supply)	7200	347.76	8346.24	12	123	5.07	0.09	174.45	5.23	38.06	3.76	0.06	129.19	3.88	28.19
	VESSELS>600hp diesel(tugs)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	DERRICK BARGE diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	MATERIAL TUG diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(supply)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MISC.	BPD	SCF/HR	COUNT												
	TANK-	0			0	0				0.00					0.00	
DRILLING	OIL BURN	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	GAS FLARE		0		0	0		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00
2020	YEAR TOTAL						53.71	0.92	1846.26	55.39	402.82	23.50	0.40	807.79	24.23	176.25
EXEMPTION CALCULATION	DISTANCE FROM LAND IN MILES											1332.00	1332.00	1332.00	1332.00	39766.64
	40.0															

EMISSIONS CALCULATIONS 2ND YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
LLOG Exploration Offsho	Mississippi Canyon	629	OCS-G-36134	N/A	Loc. C and Alt C		Sue Sachitana, Regulatory Speci	985-801-4300	

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	**HP**	**GAL/HR**	**GAL/D**												
	Nat. Gas Engines	**HP**	**SCF/HR**	**SCF/D**												
	Burners	**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**DAYS**	**PM**	**SOx**	**NOx**	**VOC**	**CO**	**PM**	**SOx**	**NOx**	**VOC**	**CO**
DRILLING	PRIME MOVER>600hp diesel	61800	2984.94	17000.00	24.00	16	43.56	0.75	1497.36	44.92	326.70	1.98	0.03	68.22	2.05	14.88
	PRIME MOVER>600hp diesel	0	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BURNER diesel	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	AUXILIARY EQUIP<600hp diesel	0	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	7200	347.76	8346.24	12.00	7	5.07	0.09	174.45	5.23	38.06	0.21	0.00	7.18	0.22	1.57
	VESSELS>600hp diesel(supply)	7200	347.76	8346.24	12.00	14	5.07	0.09	174.45	5.23	38.06	0.42	0.01	14.35	0.43	3.13
	VESSELS>600hp diesel(tugs)	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	DERRICK BARGE diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MATERIAL TUG diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(supply)	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MISC.	**BPD**	**SCF/HR**	**COUNT**												
	TANK-	0			0	0				0.00					0.00	
DRILLING WELL TEST	OIL BURN	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	GAS FLARE		0		0	0		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00
2021	**YEAR TOTAL**						**53.71**	**0.92**	**1846.26**	**55.39**	**402.82**	**2.61**	**0.04**	**89.75**	**2.69**	**19.58**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**											**1332.00**	**1332.00**	**1332.00**	**1332.00**	**39766.64**
	40.0															

SUMMARY

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL
LLOG Exploratio	Mississippi Canyon	629	OCS-G-36134	N/A	Loc. C and Alt C

Year	Emitted Substance				
	PM	SOx	NOx	VOC	CO
2020	23.50	0.40	807.79	24.23	176.25
2021	2.61	0.04	89.75	2.69	19.58
2022	0.00	0.00	0.00	0.00	0.00
2023	0.00	0.00	0.00	0.00	0.00
2024	0.00	0.00	0.00	0.00	0.00
2025	0.00	0.00	0.00	0.00	0.00
2026	0.00	0.00	0.00	0.00	0.00
2027	0.00	0.00	0.00	0.00	0.00
2028	0.00	0.00	0.00	0.00	0.00
2029	0.00	0.00	0.00	0.00	0.00
Allowable	1332.00	1332.00	1332.00	1332.00	39766.64

Actual Fuel Usage for West Capricorn

Date	Fuel on Rig	Fuel Used	Fuel Received
5/1/2019			
5/2/2019			
5/3/2019			
5/4/2019			
5/5/2019			
5/6/2019			
5/7/2019			
5/8/2019			
5/9/2019			
5/10/2019			
5/11/2019			
5/12/2019			
5/13/2019			
5/14/2019			
5/15/2019			
5/16/2019			
5/17/2019			
5/18/2019			
5/19/2019			
5/20/2019	658,739	17,409	204,231
5/21/2019	644,342	14,397	
5/22/2019	635,413	8,929	
5/23/2019	626,510	8,903	
5/24/2019	617,740	8,771	
5/25/2019	608,600	9,140	
5/26/2019	598,376	10,224	
5/27/2019	733,553	17,488	152,665
5/28/2019	722,907	10,646	
5/29/2019	711,415	11,492	
5/30/2019	699,026	12,389	
5/31/2019	687,825	11,201	
		140,989	

Actual Fuel Usage for West Capricorn

Date	Fuel on Rig	Fuel Used	Fuel Received
6/1/2019	678,922	8903	
6/2/2019	667,193	11,729	
6/3/2019	652,743	14,450	
6/4/2019			
6/5/2019			
6/6/2019			
6/7/2019			
6/8/2019			
6/9/2019			
6/10/2019			
6/11/2019			
6/12/2019			
6/13/2019			
6/14/2019			
6/15/2019			
6/16/2019			
6/17/2019			
6/18/2019			
6/19/2019			
6/20/2019			
6/21/2019			
6/22/2019			
6/23/2019			
6/24/2019			
6/25/2019			
6/26/2019			
6/27/2019			
6/28/2019			
6/29/2019			
6/30/2019			
		35,082	

OMB Control No. 1010-0151
OMB Approval Expires: 12/31/2014

EXPLORATION PLAN (EP)
AIR QUALITY SCREENING CHECKLIST

COMPANY	LLOG Exploration Offshore, L.L.C.
AREA	Mississippi Canyon
BLOCK	629
LEASE	OCS-G-36134
PLATFORM	N/A
WELL	Location C & Alt C
COMPANY CONTACT	Sue Sachitana, Regulatory Specialist
TELEPHONE NO.	985-801-4300
REMARKS	DP Semisubmersible Rig

***LLOG is using actual fuel used by the Sevan LA rig - see attached fuel usage.**

EMISSIONS FACTORS

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

Equipment/Emission Factors	units	PM	SOx	NOx	VOC	CO	REF.	DATE
NG Turbines	gms/hp-hr		0.00247	1.3	0.01	0.83	AP42 3.2-1& 3.1-1	10/96
NG 2-cycle lean	gms/hp-hr		0.00185	10.9	0.43	1.5	AP42 3.2-1	10/96
NG 4-cycle lean	gms/hp-hr		0.00185	11.8	0.72	1.6	AP42 3.2-1	10/96
NG 4-cycle rich	gms/hp-hr		0.00185	10	0.14	8.6	AP42 3.2-1	10/96
Diesel Recip. < 600 hp.	gms/hp-hr	1	0.005505	14	1.12	3.03	AP42 3.3-1	10/96
Diesel Recip. > 600 hp.	gms/hp-hr	0.32	0.005505	11	0.33	2.4	AP42 3.4-1	10/96
Diesel Boiler	lbs/bbl	0.084	0.009075	0.84	0.008	0.21	AP42 1.3-12,14	9/98
NG Heaters/Boilers/Burners	lbs/mmscf	7.6	0.593	100	5.5	84	P42 1.4-1, 14-2, & 14	7/98
NG Flares	lbs/mmscf		0.593	71.4	60.3	388.5	AP42 11.5-1	9/91
Liquid Flaring	lbs/bbl	0.42	6.83	2	0.01	0.21	AP42 1.3-1 & 1.3-3	9/98
Tank Vapors	lbs/bbl				0.03		E&P Forum	1/93
Fugitives	lbs/hr/comp.				0.0005		API Study	12/93
Glycol Dehydrator Vent	lbs/mmscf				6.6		La. DEQ	1991
Gas Venting	lbs/scf				0.0034			

Sulphur Content Source	Value	Units
Fuel Gas	3.33	ppm
Diesel Fuel	0.0015	% weight
Produced Gas(Flares)	3.33	ppm
Produced Oil (Liquid Flaring)	1	% weight

EMISSIONS CALCULATIONS 1ST YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
LLOG Exploration Offsho	Mississippi Canyon	629	OCS-G-36134	N/A	Location C & Alt C		Sue Sachitana, Regulatory Spec	985-801-4300	

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	HP	GAL/HR	GAL/D												
	Nat. Gas Engines	HP	SCF/HR	SCF/D												
	Burners	MMBTU/HR	SCF/HR	SCF/D	HR/D	DAYS	PM	SOx	NOx	VOC	CO	PM	SOx	NOx	VOC	CO
DRILLING	PRIME MOVER>600hp diesel	61200	2955.96	17000.00	24	144	43.14	0.74	1482.82	44.48	323.52	17.86	0.31	614.00	18.42	133.96
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BURNER diesel	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	AUXILIARY EQUIP<600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	7200	347.76	8346.24	12	62	5.07	0.09	174.45	5.23	38.06	1.88	0.03	64.60	1.94	14.09
	VESSELS>600hp diesel(supply)	7200	347.76	8346.24	12	123	5.07	0.09	174.45	5.23	38.06	3.76	0.06	129.19	3.88	28.19
	VESSELS>600hp diesel(tugs)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	DERRICK BARGE diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MATERIAL TUG diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(supply)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MISC.	BPD	SCF/HR	COUNT												
	TANK-	0			0	0				0.00					0.00	
DRILLING WELL TEST	OIL BURN	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	GAS FLARE		0		0	0		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00
2020	YEAR TOTAL						53.29	0.92	1831.72	54.95	399.65	23.50	0.40	807.79	24.23	176.25
EXEMPTION CALCULATION	DISTANCE FROM LAND IN MILES											1332.00	1332.00	1332.00	1332.00	39766.64
	40.0															

EMISSIONS CALCULATIONS 2ND YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
LLOG Exploration Offsho	Mississippi Canyon	629	OCS-G-36134	N/A	Location C & Alt C		Sue Sachitana, Regulatory Speci	985-801-4300	

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	HP	GAL/HR	GAL/D												
	Nat. Gas Engines	HP	SCF/HR	SCF/D												
	Burners	MMBTU/HR	SCF/HR	SCF/D	HR/D	DAYS	PM	SOx	NOx	VOC	CO	PM	SOx	NOx	VOC	CO
DRILLING	PRIME MOVER>600hp diesel	61200	2955.96	17000.00	24	16	43.14	0.74	1482.82	44.48	323.52	1.98	0.03	68.22	2.05	14.88
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BURNER diesel	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	AUXILIARY EQUIP<600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	7200	347.76	8346.24	12	7	5.07	0.09	174.45	5.23	38.06	0.21	0.00	7.18	0.22	1.57
	VESSELS>600hp diesel(supply)	7200	347.76	8346.24	12	14	5.07	0.09	174.45	5.23	38.06	0.42	0.01	14.35	0.43	3.13
	VESSELS>600hp diesel(tugs)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	DERRICK BARGE diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MATERIAL TUG diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(supply)	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MISC.	BPD	SCF/HR	COUNT												
	TANK-	0			0	0				0.00					0.00	
DRILLING WELL TEST	OIL BURN	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	GAS FLARE		0		0	0		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00
2021	YEAR TOTAL						53.29	0.92	1831.72	54.95	399.65	2.61	0.04	89.75	2.69	19.58
EXEMPTION CALCULATION	DISTANCE FROM LAND IN MILES											1332.00	1332.00	1332.00	1332.00	39766.64
	40.0															

SUMMARY

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL
LLOG Exploratio	Mississippi Canyon	629	OCS-G-36134	N/A	Location C & Alt C

Year	Emitted Substance				
	PM	SOx	NOx	VOC	CO
2020	23.50	0.40	807.79	24.23	176.25
2021	2.61	0.04	89.75	2.69	19.58
2022	0.00	0.00	0.00	0.00	0.00
2023	0.00	0.00	0.00	0.00	0.00
Allowable	1332.00	1332.00	1332.00	1332.00	39766.64

Fuel Logs for Sevan Louisiana – DP Semisubmersible

July, August, September, October 2016

	Sevan Louisiana						
Date	Fuel on Rig	Fuel Used	Fuel Received	Fuel on Rig	Fuel Used	Fuel Received	Correct
	BCO Report	BCO Report	BCO Report	Drilling Rpt	Drilling Rpt	Drilling Rpt	Yes / No
7/1/2016	976108	5812		976108	5812		Yes
7/2/2016	957880	18228		957880	18228		Yes
7/3/2016	947049	10831		947049	10831		Yes
7/4/2016	935690	11359		935690	11359		Yes
7/5/2016	926444	9246		926444	9246		Yes
7/6/2016	914292	12152		914292	12152		Yes
7/7/2016	901084	13209		901084	13208		No - 1
7/8/2016	884177	16907		884177	16907		Yes
7/9/2016	919840	15586	51249	919840	15586	51249	Yes
7/10/2016	911122	8718		911122	8718		Yes
7/11/2016	1024980	16114	129972	1024980	16114	129972	Yes
7/12/2016	1011507	13473		1011507	13473		Yes
7/13/2016	994072	17435		994072	17435		Yes
7/14/2016	983505	10567		983505	10567		Yes
7/15/2016	971881	11623		971881	11623		No +1
7/16/2016	953918	17964		953918	17964		No -1
7/17/2016	937275	16643		937275	16643		Yes
7/18/2016	925123	12152		925123	12152		Yes
7/19/2016	911387	13737		911387	13737		No +1
7/20/2016	902669	8718		902669	8718		Yes
7/21/2016	888404	14265		888404	14265		Yes
7/22/2016	868063	20341		868063	20341		Yes
7/23/2016	853533	14529		853533	14529		Yes
7/24/2016	840589	12944		840589	12944		Yes
7/25/2016	829230	11359		829230	11359		Yes
7/26/2016	943879	14001	128651	943879	14001	128651	No +1
7/27/2016	929350	14529		929650	14529		No BCO -300
7/28/2016	914292	15058		914292	15358		No RPT +300

7/29/2016	903461	10831		903461	10831		Yes
7/30/2016	1028414	11888	136840	1028414	11888	136840	No -1
7/31/2016	1015205	13209		1015205	13209		Yes
Date	Fuel on Rig	Fuel Used	Fuel Received	Fuel on Rig	Fuel Used	Fuel Received	Correct
	BCO Report	BCO Report	BCO Report	Drilling Rpt	Drilling Rpt	Drilling Rpt	Yes / No
8/1/2016	1002789	12416		1002789	12416		Yes
8/2/2016	988788	14001		988788	14001		Yes
8/3/2016	973995	14793		973995	14793		Yes
8/4/2016	959201	14794		959201	14794		Yes
8/5/2016	947314	11888		947314	11887		No-1
8/6/2016	936483	10831		936483	10831		Yes
8/7/2016	1064077	10723	138317	1064077	10723		Yes
8/8/2016	1049019	15058		1049019	15058		Yes
8/9/2016	1033433	15586		1033433	15586		Yes
8/10/2016	1018375	15058		1018375	15058		Yes
8/11/2016	1001468	16907		1001468	16907		Yes
8/12/2016	989317	12152		989317	12152		No -1
8/13/2016	976372	12944		976372	12944		No +1
8/14/2016	1101061	10567	135255	1101061	10567		Yes
8/15/2016	1085739	15322		1085739	15322		Yes
8/16/2016	1068568	17171		1068568	17171		Yes
8/17/2016	1055359	13209		1055359	13209		Yes
8/18/2016	1041094	14265		1041094	14265		Yes
8/19/2016	1027621	13473		1027621	13473		Yes
8/20/2016	1016790	10831		1016790	10831		Yes
8/21/2016	1007809	8982		1007809	8981		Yes
8/22/2016	996978	10831		996978	10831		Yes
8/23/2016	981920	15058		981920	15058		Yes
8/24/2016	973731	8189		973731	8189		Yes
8/25/2016	959465	14265		959465	14266		Yes
8/26/2016	942030	17435		942030	17435		Yes

8/27/2016	934633	7397		934633	7397		Yes
8/28/2016	915877	18756		915877	18756		Yes
8/29/2016	908216	7661		908216	7661		Yes
8/30/2016	896065	12152		896065	12151		No -1
8/31/2016	1021810	12680	138425	1021810	12680	138425	Yes
Date	Fuel on Rig	Fuel Used	Fuel Received	Fuel on Rig	Fuel Used	Fuel Received	Correct
	BCO Report	BCO Report	BCO Report	Drilling Rpt	Drilling Rpt	Drilling Rpt	Yes / No
9/1/2016	1001204	20341		1001204	20606		No - Adj BCO -265
9/2/2016	984033	17171		984033	17171		Yes
9/3/2016	972674	11359		972674	11359		Yes
9/4/2016	958409	14265		958409	14265		Yes
9/5/2016	947578	10831		947578	10831		Yes
9/6/2016	935162	12416		935162	12416		Yes
9/7/2016	924331	10831		920368	2378		Yes
9/8/2016	913236	11095		913236	7132		Yes
9/9/2016	906367	6868		906367	6868		Yes
9/10/2016	894215	12152		894215	12152		Yes
9/11/2016	884441	9774		884441	9774		Yes
9/12/2016	872818	11623		872818	11623		Yes
9/13/2016	860402	12416		860402	12416		Yes
9/14/2016	846665	13737		846665	13737		Yes
9/15/2016	835570	11095		835570	11095		Yes
9/16/2016	824475	11095		824475	11095		Yes
9/17/2016	813644	10831		813644	10831		Yes
9/18/2016	934369	9510	130236	934369	9510	130236	No - Adj + 1
9/19/2016	917991	16378		917991	16378		Yes
9/20/2016	906367	11624		906367	11624		Yes
9/21/2016	893687	12680		893687	12680		Yes
9/22/2016	881535	12152		881535	12152		Yes

9/23/2016	867534	14001		867534	14001		Yes
9/24/2016	856967	10567		856967	10567		Yes
9/25/2016	849571	7397		849571	7396		Yes
9/26/2016	964221	16114	130764	964221	16114	130764	Yes
9/27/2016	951805	12416		951805	12416		Yes
9/28/2016	940445	11359		940445	11360		Yes
9/29/2016	927765	12680		927765	12680		Yes
9/30/2016	919576	8189		919576	8189		Yes
Date	Fuel on Rig	Fuel Used	Fuel Received	Fuel on Rig	Fuel Used	Fuel Received	Correct
	BCO Report	BCO Report	BCO Report	Drilling Rpt	Drilling Rpt	Drilling Rpt	Yes / No
10/1/2016	905839	13737		905839	13737		Yes
10/2/2016	1025772	15058	134991	1025772	15058	134991	Yes
10/3/2016	1013620	12152		1013620	12152		Yes
10/4/2016	1003053	10567		1003053	10567		Yes
10/5/2016	989317	13737		989317	13737		Yes
10/6/2016	976901	12416		976901	12416		Yes
10/7/2016	966070	10831		966070	10831		Yes
10/8/2016	951540	14529		951540	14529		No Adj +1
10/9/2016	941238	10303		941238	10303		Yes
10/10/2016	927765	13473		927765	13473		Yes
10/11/2016	919312	8453		919312	8453		Yes
10/12/2016	907952	11359		907952	11359		Yes
10/13/2016	895536	12416		895536	12416		Yes
10/14/2016	885498	10038		885498	10038		Yes
10/15/2016	992487	6868	113857	992487	6868	113857	Yes
10/16/2016	979542	12944		979542	12944		No Adj +1
10/17/2016	967391	12152		967391	12152		No Adj -1
10/18/2016	959465	7925		959465	7925		No Adj +1
10/19/2016	947842	11623		939917	11623		Yes
10/20/2016	931199	16643		931199	16643		2 reports - 7925 on other
10/21/2016	921161	10038		921161	10038		Yes
10/22/2016	908481	12680		908481	12680		Yes

10/23/2016	895272	13209		895272	13209		Yes
10/24/2016							
10/25/2016							
10/26/2016							
10/27/2016							
10/28/2016							
10/29/2016							
10/30/2016							
10/31/2016							

APPENDIX H
OIL SPILL INFORMATION
(30 CFR PART 550.219 AND 550.250)

A. Oil Spill Response Planning

All the proposed activities in this Exploration Plan will be covered by the Oil Spill Response Plan filed by LLOG (No. 02058) in accordance with 30 CFR 254, Biennial update found to be in compliance August 16, 2018 and revisions due to significant change to the greater than ten mile drilling worst case discharge scenario approved September 18, 2018.

The WCD proposed in this Plan does not exceed the WCD outlined in our OSRP.

B. Spill Response Sites

The following locations will be used in the event an oil spill occurs as a result of the proposed activities.

Primary Response Equipment Location	Pre-Planned Staging Location(s)
Houma, LA	Fort Jackson, LA

C. OSRO Information

The O'Brien Group (TOG) will provide trained personnel capable of providing supervisory management of the oil spill response in addition to contacting and deploying cleanup personnel and equipment

LLOG utilizes Clean Gulf Associates (CGA) as it's primary provider for equipment, which is an industry cooperative owning an inventory of oil spill clean-up equipment. CGA is supported by the Marine Spill Response Corporation's (MSRC), which is responsible for storing, inspecting, maintaining and dispatching CGA's equipment. The MSRC STARS network provides for the closest available personnel, as well as an MSRC supervisor to operate the equipment.

D. Worst-Case Scenario Information

Category	*Regional OSRP*	*EP*
Type of Activity	Exploratory MODU	Exploratory MODU
Facility Surface Location	Mississippi Canyon Block 386	Mississippi Canyon Block 629
Facility Description	Well Location Well No. 001 (Revised Location B)	Location A
Distance to Nearest Shoreline (Miles)	58 miles	40 miles
Volume: Storage Tanks (total) Facility Piping (total) Lease Term Pipeline Uncontrolled Blowout (day) Barging **Potential 24 Hour Volume (bbls)**	396,602 bbls	309,000 bbls
Type of Liquid Hydrocarbon	Crude	Crude
API Gravity	25°	28°

LLOG Exploration Offshore, L.L.C. (LLOG) has the capability to respond to the appropriate worst-case spill scenario included in its regional OSRP Plan, filed by LLOG (No. 02058) in accordance with 30 CFR 254, Biennial update found to be in compliance August 16, 2018 and revisions due to significant change to the greater than ten mile drilling worst case discharge scenario approved September 18, 2018.

Since LLOG Exploration Offshore, L.L.C. (LLOG) has the capability to respond to the appropriate worst-case spill scenario included in its regional OSRP Plan filed by LLOG (Operator No.02058) in accordance with 30 CFR 254 Biennial update modification approved on August 16, 2018 and since the worst case discharge determined in this Supplemental Exploration Plan for Mississippi Canyon Block 629 does not exceed our worst case discharge outlined in our Regional OSRP, I hereby certify that LLOG Exploration Offshore, L.L.C. has the capability to respond, to the maximum extent practicable, to a worst-case discharge, or a substantial threat of such a discharge, resulting from the activities proposed in this Exploration Plan.

LLOG Exploration Offshore, L.L.C., Company No. 02058, previously submitted the Regional OSRP Exploration WCD volume to be reviewed in Plan R-6763, Revised Exploration Plan.

The required proprietary data outlined in NTL 2015-N01 is being submitted to BOEM within the Confidential Copy of this Supplemental Exploration Plan.

E. Oil Spill Response Discussion

See the following Oil Spill Response Discussion.

SPILL RESPONSE DISCUSSION

For the purpose of NEPA and Coastal Zone Management Act analysis, the largest spill volume originating from the proposed activity would be a well blowout during drilling operations, estimated to be 309,000 barrels of crude oil with an API gravity of 28°.

Land Segment and Resource Identification

Trajectories of a spill and the probability of it impacting a land segment have been projected utilizing information in the BOEM Oil Spill Risk Analysis Model (OSRAM) for the Central and Western Gulf of Mexico available on the BOEM website. The results are shown in **Figure 1.** The BOEM OSRAM identifies an 8% probability of impact to the shorelines of Plaquemines Parish, Louisiana within 30 days. Plaquemines Parish includes Barataria Bay, the Mississippi River Delta, Breton Sound and the affiliated islands and bays. This region is an extremely sensitive habitat and serves as a migratory, breeding, feeding and nursery habitat for numerous species of wildlife. Beaches in this area vary in grain particle size and can be classified as fine sand, shell or perched shell beaches. Sandy and muddy tidal flats are also abundant.

Response

LLOG Exploration Offshore, L.L.C. will make every effort to respond to the Worst Case Discharge as effectively as practicable. A description of the response equipment under contract to contain and recover the Worst Case Discharge is shown in **Figure 2.**

Using the estimated chemical and physical characteristics of crude oil, an ADIOS weathering model was run on a similar product from the ADIOS oil database. The results indicate 11% or approximately 33,990 barrels of crude oil would be evaporated/dispersed within 24 hours, with approximately 275,010 barrels remaining.

Natural Weathering Data: MC 629, Well Location A	**Barrels of Oil**
WCD Volume	309,000
Less 11% natural evaporation/dispersion	33,990
Remaining volume	275,010

Figure 2 outlines equipment, personnel, materials and support vessels as well as temporary storage equipment available to respond to the worst case discharge. The volume accounts for the amount remaining after evaporation/dispersion at 24 hours. The list estimates individual times needed for procurement, load out, travel time to the site and deployment. **Figure 2** also indicates how operations will be supported.

LLOG Exploration Offshore, L.L.C.'s Oil Spill Response Plan includes alternative response technologies such as dispersants and in-situ burn. Strategies will be decided by Unified Command based on an operations safety analysis, the size of the spill, weather and potential impacts. If aerial dispersants are utilized, 8 sorties (9,600 gallons) from two of the DC-3 aircrafts and 4 sorties (8,000 gallons) from the Basler aircraft would provide a daily dispersant capability of 7,540 barrels. If the conditions are favorable for in-situ burning, the proper approvals have

been obtained and the proper planning is in place, in-situ burning of oil may be attempted. Slick containment boom would be immediately called out and on-scene as soon as possible. Offshore response strategies may include attempting to skim utilizing CGA and MSRC spill response equipment, with a total derated skimming capacity of 1,189,805 barrels. Temporary storage associated with skimming equipment equals 292,096 barrels. If additional storage is needed, various tank barges with a total of 1.33 million+ barrels of storage capacity may be mobilized and centrally located to provide temporary storage and minimize off-loading time. **Safety is first priority. Air monitoring will be accomplished and operations deemed safe prior to any containment/skimming attempts.**

If the spill went unabated, shoreline impact in Cameron and/or Plaquemines Parish, Louisiana would depend upon existing environmental conditions. Shoreline protection would include the use of CGA's and MSRC's near shore and shallow water skimmers with a totaled derated skimming capacity of 289,320 barrels. Temporary storage associated with skimming equipment equals 9,387 barrels. If additional storage is needed, various tank barges with a total of 281,000+ barrels of storage capacity may be mobilized and centrally located to provide temporary storage and minimize off-loading time. Onshore response may include the deployment of shoreline boom on beach areas, or protection and sorbent boom on vegetated areas. A Master Service Agreement with OMI Environmental will ensure access to 164,600 feet of 18" shoreline protection boom. **Figure 2** outlines individual times needed for procurement, load out, travel time to the site and deployment. Strategies would be based upon surveillance and real time trajectories that depict areas of potential impact given actual sea and weather conditions. Applicable Area Contingency Plans (ACPs), Geographic Response Plans (GRPs), and Unified Command (UC) will be consulted to ensure that environmental and special economic resources are correctly identified and prioritized to ensure optimal protection. Shoreline protection strategies depict the protection response modes applicable for oil spill clean-up operations. As a secondary resource, the State of Louisiana Initial Oil Spill Response Plan will be consulted as appropriate to provide detailed shoreline protection strategies and describe necessary action to keep the oil spill from entering Louisiana's coastal wetlands. The UC should take into consideration all appropriate items detailed in Tactics discussion of this Appendix. The UC and their personnel have the option to modify the deployment and operation of equipment to allow for a more effective response to site-specific circumstances. LLOG Exploration Offshore, L.L.C.'s contract Incident Management Team has access to the applicable ACP(s) and GRP(s).

Based on the anticipated worst case discharge scenario, LLOG Exploration Offshore, L.L.C. can be onsite with contracted oil spill recovery equipment with adequate response capacity to contain and recover surface hydrocarbons, and prevent land impact, to the maximum extent practicable, within an estimated 75 hours (based on the equipment's Effective Daily Recovery Capacity (EDRC)).

Initial Response Considerations
Actual actions taken during an oil spill response will be based on many factors to include but not be limited to:

- Safety
- Weather
- Equipment and materials availability
- Ocean currents and tides
- Location of the spill
- Product spilled
- Amount spilled
- Environmental risk assessments
- Trajectory and product analysis
- Well status, i.e., shut in or continual release

LLOG Exploration Offshore, L.L.C. will take action to provide a safe, aggressive response to contain and recover as much of the spilled oil as quickly as it is safe to do so. In an effort to protect the environment, response actions will be designed to provide an "in-depth" protection strategy meant to recover as much oil as possible as far from environmentally sensitive areas as possible. Safety will take precedence over all other considerations during these operations.

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

In addition, these activities will be monitored by the Incident Management Team (IMT) and Unified Command via a structured Common Operating Picture (COP) established to track resource and slick movement in real time.

Upon notification of a spill, the following actions will be taken:

- Information will be confirmed
- An assessment will be made and initial objectives set
- OSROs and appropriate agencies will be notified
- ICS 201, Initial Report Form completed
- Initial Safety plan will be written and published
- Unified Command will be established
    - Overall safety plan developed to reflect the operational situation and coordinated objectives
    - Areas of responsibility established for Source Control and each surface operational site
    - On-site command and control established

Offshore Response Actions

Equipment Deployment

Surveillance

- Surveillance Aircraft: within two hours of QI notification, or at first light
- Provide trained observer to provide on site status reports
- Provide command and control platform at the site if needed
- Continual surveillance of oil movement by remote sensing systems, aerial photography and visual confirmation
- Continual monitoring of vessel assets using vessel monitoring systems

Dispersant application assets

- Put ASI on standby
- With the FOSC, conduct analysis to determine appropriateness of dispersant application (refer to Section 18)
- Gain FOSC approval for use of dispersants on the surface
- Deploy aircraft in accordance with a plan developed for the actual situation
- Coordinate movement of dispersants, aircraft, and support equipment and personnel
- Confirm dispersant availability for current and long range operations
- Start ordering dispersant stocks required for expected operations

Containment boom

- Call out early and expedite deployment to be on scene ASAP
- Ensure boom handling and mooring equipment is deployed with boom
- Provide continuing reports to vessels to expedite their arrival at sites that will provide for their most effective containment
- Use Vessels of Opportunity (VOO) to deploy and maintain boom

Oceangoing Boom Barge

- Containment at the source
- Increased/enhanced skimmer encounter rate
- Protection booming

In-situ Burn assets

- Determine appropriateness of in-situ burn operation in coordination with the FOSC and affected SOSC
- Determine availability of fire boom and selected ignition systems
- Start ordering fire boom stocks required for expected operations
- Contact boom manufacturer to provide training & tech support for operations, if required
- Determine assets to perform on water operation
- Build operations into safety plan
- Conduct operations in accordance with an approved plan
- Initial test burn to ensure effectiveness

Dedicated off-shore skimming systems
General

- Deployed to the highest concentration of oil
- Assets deployed at safe distance from aerial dispersant and in-situ burn operations

CGA HOSS Barge

- Use in areas with heaviest oil concentrations
- Consider for use in areas of known debris (seaweed, and other floating materials)

CGA 95' Fast Response Vessels (FRVs)

- Designed to be a first vessel on scene
- Capable of maintaining the initial Command and Control function for on water recovery operations
- 24 hour oil spill detection capability
- Highly mobile and efficient skimming capability
- Use as far off-shore as safely possible

CGA FRUs

- To the area of the thickest oil
- Use as far off-shore as allowed
- VOOs 140' – 180' in length
- VOOs with minimum of 18' x 38' or 23' x 50' of optimum deck space
- VOOs in shallow water should have a draft of <10 feet when fully loaded

T&T Koseq Skimming Systems

- To the area of the thickest oil
- Use as far off-shore as allowed
- VOOs with a minimum of 2,000 bbls storage capacity
- VOOs at least 200' in length
- VOOs with deck space of 100' x 40' to provide space for arms, tanks, and crane
- VOOs for shallow water should be deck barges with a draft of <10 feet when fully loaded

Storage Vessels

- Establish availability of CGA contracted assets (See Appendix E)
- Early call out (to allow for tug boat acquisition and deployment speeds)
- Phase mobilization to allow storage vessels to arrive at the same time as skimming systems
- Position as closely as possible to skimming assets to minimize offloading time

Vessels of Opportunity (VOO)

- Use LLOG Exploration Offshore, L.L.C.'s contracted resources as applicable
- Industry vessels are ideal for deployment of Vessel of Opportunity Skimming Systems (VOSS)
- Acquire additional resources as needed
- Consider use of local assets, i.e. fishing and pleasure craft for ISB operations or boom tending
- Expect mission specific and safety training to be required
- Plan with the US Coast Guard for vessel inspections
- Place VOOs in Division or Groups as needed
- Use organic on-board storage if appropriate
- Maximize non-organic storage appropriate to vessel limitations
- Decant as appropriate after approval to do so has been granted
- Assign bulk storage barges to each Division/Group
- Position bulk storage barges as close to skimming units as possible
- Utilize large skimming vessel (e.g. barges) storage for smaller vessel offloading
- Maximize skimming area (swath) to the optimum width given sea conditions and available equipment
- Maximize use of oleophilic skimmers in all operations, but especially offshore
- Nearshore, use shallow water barges and shuttle to skimming units to minimize offloading time
- Plan and equip to use all offloading capabilities of the storage vessel to minimize offloading time

Adverse Weather Operations:

In adverse weather, when seas are $\geq$ 3 feet, the use of larger recovery and storage vessels, oleophilic skimmers, and large offshore boom will be maximized. KOSEQ Arm systems are built for rough conditions, and they should be used until their operational limit (9.8' seas) is met. Safety will be the overriding factor in all operations and will cease at the order of the Unified Command, vessel captain, or in an emergency, "stop work" may be directed by any crew member.

Surface Oil Recovery Considerations and Tactics
(Offshore and Near-shore Operations)

Maximization of skimmer-oil encounter rate

- Place barges in skimming task forces, groups, etc., to reduce recovered oil offloading time
- Place barges alongside skimming systems for immediate offloading of recovered oil when practicable
- Use two vessels, each with heavy sea boom, in an open-ended "V" configuration to funnel surface oil into a trailing skimming unit's organic, V-shaped boom and skimmer (see page 7, *CGA Equipment Guide Book and Tactic Manual* (CGATM)

- Use secondary vessels and heavy sea boom to widen boom swath beyond normal skimming system limits (see page 15, CGATM)
- Consider night-time operations, first considering safety issues
- Utilize all available advanced technology systems (IR, X-Band Radar, etc.) to determine the location of, and move to, recoverable oil
- Confirm the presence of recoverable oil prior to moving to a new location

Maximize skimmer system efficiency

- Place weir skimming systems in areas of calm seas and thick oil
- Maximize the use of oleophilic skimming systems in heavier seas
- Place less mobile, high EDRC skimming systems (e.g. HOSS Barge) in the largest pockets of the heaviest oil
- Maximize onboard recovered oil storage for vessels.
- Obtain authorization for decanting of recovered water as soon as possible
- Use smaller, more agile skimming systems to recover streamers of oil normally found farther from the source. Place recovered oil barges nearby

Recovered Oil Storage

- Smaller barges in larger quantities will increase flexibility for multi-location skimming operations
- Place barges in skimming task forces, groups, etc., to reduce recovered oil offloading time
- Procure and deploy the maximum number of portable tanks to support Vessel of Opportunity Skimming Systems if onboard storage is not available
- Maximize use of the organic recovered oil storage capacity of the skimming vessel

Command, Control, and Communications (C^3)

- Publish, implement, and fully test an appropriate communications plan
- Design an operational scheme, maintaining a manageable span of control
- Designate and mark C^3 vessels for easy aerial identification
- Designate and employ C^3 aircraft for task forces, groups, etc.
- Use reconnaissance air craft and Rapid Response Teams (RAT) to confirm the presence of recoverable oil

On Water Recovery Group
When the first skimming vessel arrives on scene, a complete site assessment will be conducted before recovery operations begin. Once it is confirmed that the air monitoring readings for O2, LEL, H2S, CO, VOC, and Benzene are all within the permissible limits, oil recovery operations may begin.

As skimming vessels arrive, they will be organized to work in areas that allow for the most efficient vessel operation and free vessel movement in the recovery of oil. Vessel groups will vary in structure as determined by the Operations Section of the Unified Command, but will generally consist, at a minimum, of the following dedicated assets:

- 3 to 5 – Offshore skimming vessels (recovery)
- 1 – Tank barge (temporary storage)
- 1 – Air asset (tactical direction)
- 2 – Support vessels (crew/utility for supply)
- 6 to 10 – Boom vessels (enhanced booming)

Example *(**Note:** Actual organization of TFs will be dependent on several factors including, asset availability, weather, spilled oil migration, currents, etc.)*

The 95' FRV Breton Island out of Venice arrives on scene and conducts an initial site assessment. Air monitoring levels are acceptable and no other visual threats have been observed. The area is cleared for safe skimming operations. The Breton Island assumes command and control (CoC) of on-water recovery operations until a dedicated non-skimming vessel arrives to relieve it of those duties.

A second 95' FRV arrives and begins recovery operations alongside the Breton Island. Several more vessels begin to arrive, including a third 95' FRV out of Galveston, the HOSS Barge (High Volume Open Sea Skimming System) out of Harvey, a boom barge (CGA 300) with 25,000' of 42" auto boom out of Leeville, and 9 Fast Response Units (FRUs) from the load-out location at C-Port in Port Fourchon.

As these vessels set up and begin skimming, they are grouped into task forces (TFs) as directed by the Operations Section of the Unified Command located at the command post.

Initial set-up and potential actions:

- A 1,000 meter safety zone has been established around the incident location for vessels involved in Source Control
- The HOSS Barge is positioned facing the incident location just outside of this safety zone or at the point where the freshest oil is reaching the surface
- The HOSS Barge engages its Oil Spill Detection (OSD) system to locate the heaviest oil and maintains that ability for 24-hour operations

- The HOSS Barge deploys 1,320' of 67" Sea Sentry boom on each side, creating a swath width of 800'
- The Breton Island and H.I. Rich skim nearby, utilizing the same OSD systems as the HOSS Barge to locate and recover oil
- Two FRUs join this group and it becomes TF1
- The remaining 7 FRUs are split into a 2 and 3 vessel task force numbered TF2 and TF3
- A 95' FRV is placed in each TF
- The boom barge (CGA 300) is positioned nearby and begins deploying auto boom in sections between two utility vessels (1,000' to 3,000' of boom, depending on conditions) with chain-link gates in the middle to funnel oil to the skimmers
- The initial boom support vessels position in front of TF2 and TF3
- A 100,000+ barrel offshore tank barge is placed with each task force as necessary to facilitate the immediate offload of skimming vessels

The initial task forces (36 hours in) may be structured as follows:

TF 1

- 1 – 95' FRV
- 1 – HOSS Barge with 3 tugs
- 2 – FRUs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 8 – 500' sections of auto boom with gates
- 8 – Boom-towing vessels
- 2 – Support vessels (crew/utility)

TF 2

- 1 – 95' FRV
- 4 – FRUs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 10 – 500' sections of auto boom with gates
- 10 – Boom-towing vessels
- 2 – Support vessels (crew/utility)

TF 3

- 1 – 95' FRV
- 3 – FRUs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 8 – 500' sections of auto boom with gates
- 8 – Boom-towing vessels
- 2 – Support vessels (crew/utility)

Offshore skimming equipment continues to arrive in accordance with the ETA data listed in figure H.3a; this equipment includes 2 AquaGuard skimmers and 11 sets of Koseq Rigid Skimming Arms. These high volume heavy weather capable systems will be divided into functional groups and assigned to specific areas by the Operations Section of the Unified Command.

At this point of the response, the additional TFs may assume the following configurations:

TF 4

- 2 – Sets of Koseq Rigid Skimming Arms w/ associated 200'+ PIDVs
- 1 – AquaGuard Skimmer
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 2 – Support vessels (crew/utility)
- 6 – 500' sections of auto boom with gates
- 6 – Boom-towing vessels

TF 5

- 3 – Sets of Koseq Rigid Skimming Arms w/ associated 200'+ PIDVs
- 1 – AquaGuard Skimmer
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 2 – Support vessels (crew/utility)
- 8 – 500' sections of auto boom with gates
- 8 – Boom-towing vessels

TF 6

- 3 – Sets of Koseq Rigid Skimming Arms w/ associated 200'+ PIDVs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 2 – Support vessels (crew/utility)
- 6 – 500' sections of auto boom with gates
- 6 – Boom-towing vessels

TF 7

- 3 – Sets of Koseq Rigid Skimming Arms w/ associated 200'+ PIDVs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 2 – Support vessels (crew/utility)
- 6 – 500' sections of auto boom with gates
- 6 – Boom-towing vessels

CGA Minimum Acceptable Capabilities for Vessels of Opportunity (VOO)
Minimum acceptable capabilities of Petroleum Industry Designed Vessels (PIDV) for conducting Vessel of Opportunity (VOO) skimming operations are shown in the table below. PIDVs are "purpose-built" to provide normal support to offshore oil and gas operators. They include but are not limited to utility boats, offshore supply vessels, etc. They become VOOs when tasked with oil spill response duties.

Capability	FRU	KOSEQ	AquaGuard
Type of Vessel	Utility Boat	Offshore Supply Vessel	Utility Boat
Operating parameters			
Sea State	3-5 ft max	9.8 ft max	3-5 ft max
Skimming speed	≤1 kt	≤3 kts	≤1 kt
Vessel size			
Minimum Length	100 ft	200 ft	100 ft
Deck space for: • Tank(s) • Crane(s) • Boom Reels • Hydraulic Power Units • Equipment Boxes	18x32 ft	100x40 ft	18x32 ft
Communication Assets	Marine Band Radio	Marine Band Radio	Marine Band Radio

Tactical use of Vessels of Opportunity (VOO): LLOG Exploration Offshore, L.L.C. will take all possible measures to maximize the oil-to-skimmer encounter rate of all skimming systems, to include VOOs, as discussed in this section. VOOs will normally be placed within an On-water recovery unit as shown in figures below.

Skimming Operations: PIDVs are the preferred VOO skimming platform. OSROs are more versed in operating on these platforms and the vessels are generally large enough with crews more likely versed in spill response operations. They also have a greater possibility of having on-board storage capacity and the most likely vessels to be under contract, and therefore more readily available to the operator. These vessels would normally be assigned to an on-water recovery group/division (see figure below) and outfitted with a VOSS suited for their size and capabilities. Specific tactics used for skimming operations would be dependent upon many parameters which include, but are not limited to, safety concerns, weather, type VOSS on board, product being recovered, and area of oil coverage. Planners would deploy these assets with the objective of safely maximizing oil- to-skimmer encounter rate by taking actions to minimize non-skimming time and maximizing boom swath. Specific tactical configurations are shown in figures below.

The Fast Response Unit (FRU): A self-contained, skid based, skimming system that is deployed from the right side of a vessel of opportunity (VOO). An outrigger holds a 75' long section of air inflatable boom in place that directs oil to an apex for recovery via a Foilex 250 weir skimmer. The outrigger creates roughly a 40' swath width dependent on the VOO beam. The lip of the collection bowl on the skimmer is placed as close to the oil and water interface as possible to maximize oil recovery and minimize water retention. The skimmer then pumps all fluids recovered to the storage tank where it is allowed to settle, and with the approval of the Coast Guard, the water is decanted from the bottom of the tank back into the water ahead of the containment boom to be recycled through the system. Once the tank is full of as much pure recovered oil as possible it is offloaded to a storage barge for disposal in accordance with an approved disposal plan. A second 100 barrel storage tank can be added if the appropriate amount of deck space is available to use as secondary storage.

Tactical Overview

Mechanical Recovery – The FRU is designed to provide fast response skimming capability in the offshore and nearshore environment in a stationary or advancing mode. It provides a rated daily recovery capacity of 4,100 barrels. An additional boom reel with 440' of offshore boom can be deployed along with the FRU, and a second support vessel for boom towing, to extend the swath width when attached to the end of the fixed boom. The range and sustainability offshore is dependent on the VOO that the unit is placed on, but generally these can stay offshore for extended periods. The FRU works well independently or assigned with other on-water recovery assets in a task force. In either case, it is most effective when a designated aircraft is assigned to provide tactical direction to ensure the best placement in recoverable oil.
Maximum Sea Conditions – Under most circumstances the FRU can maintain standard oil spill recovery operations in 2' to 4' seas. Ultimately, the Coast Guard licensed Captain in charge of the VOO (with input from the CGAS Supervisor assigned) will be responsible to determine when the sea conditions have surpassed the vessel's safe operating capabilities.

Possible Task Force Configuration (Multiple VOOs can be deployed in a task force)
1 – VOO (100' to 165' Utility or Supply Vessel)
1 – Boom reel w/support vessel for towing
1 – Tank barge (offshore) for temporary storage
1 – Utility/Crewboat (supply)
1 – Designated spotter aircraft

The VOSS (yellow) is being deployed and connected to an out-rigged arm. This is suitable for collection in both large pockets of oil and for recovery of streaming oil. The oil-to-skimmer encounter rate is limited by the length of the arm. Skimming pace is ≤ 1 knot.

Through the use of an additional VOO, and using extended sea boom, the swath of the VOSS is increased therefore maximizing the oil-to-skimmer encounter rate. Skimming pace is ≤ 1 knot.

The Koseq Rigid Sweeping Arm: A skimming system deployed on a vessel of opportunity. It requires a large Offshore or Platform Supply Vessel (OSV/PSV), greater than 200' with at least 100' x 50' of free deck space. On each side of the vessel, a 50' long rigid framed Arm is deployed that consists of pontoon chambers to provide buoyancy, a smooth nylon face, and a hydraulically adjustable mounted weir skimmer. The Arm floats independently of the vessel and is attached by a tow bridle and a lead line. The movement of the vessel forward draws the rubber end seal of the arm against the hull to create a collection point for free oil directed to the weir by the Arm face. The collection weir is adjusted to keep the lip as close to the oil water interface as possible to maximize oil recovery while attempting to minimize excess water collection. A transfer pump (combination of positive displacement, screw type and centrifuge suited for highly viscous oils) pump the recovered liquid to portable tanks and/or dedicated fixed storage tanks onboard the vessel. After being allowed to sit and separate, with approval from the Coast Guard, the water can be decanted (pumped off) in front of the collection arm to be reprocessed through the system. Once full with as much pure recovered oil as possible, the oil is transferred to a temporary storage barge where it can be disposed of in accordance with an approved disposal plan.

Tactical Overview

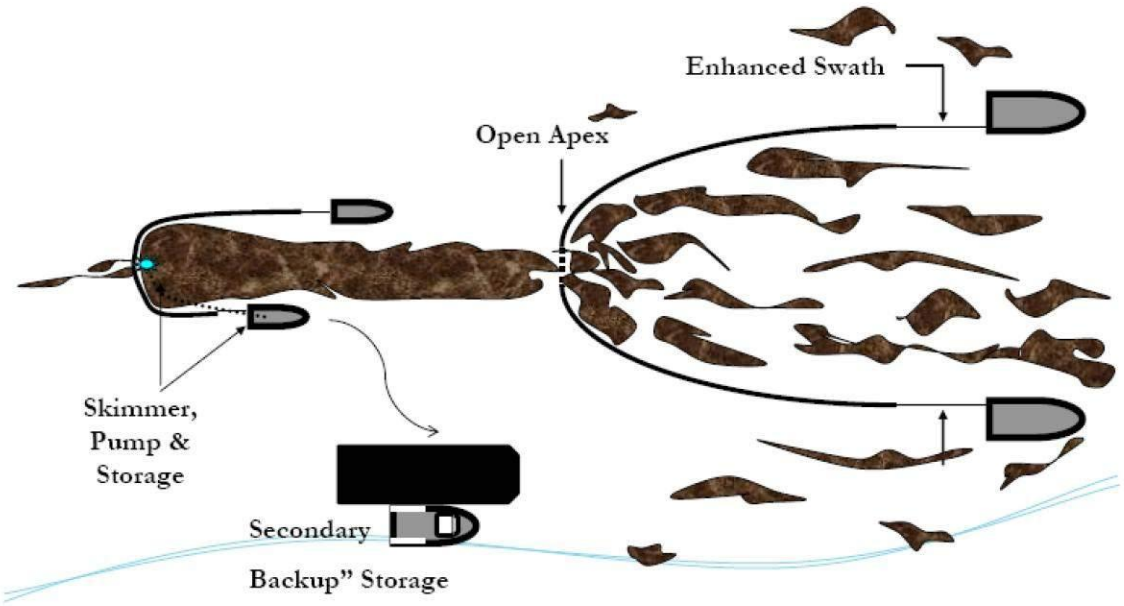
Mechanical Recovery – Deployed on large vessels of opportunity (VOO) the Koseq Rigid Sweeping Arms are high volume surge capacity deployed to increase recovery capacity at the source of a large oil spill in the offshore and outer nearshore environment of the Gulf of Mexico. They are highly mobile and sustainable in rougher sea conditions than normal skimming vessels (9.8' seas). The large Offshore Supply Vessels (OSV) required to deploy the Arms are able to remain on scene for extended periods, even when sea conditions pick up. Temporary storage on deck in portable tanks usually provides between 1,000 and 3,000 bbls. In most cases, the OSV will be able to pump 20% of its deadweight into the liquid mud tanks in accordance with the vessels Certificate of Inspection (COI). All storage can be offloaded utilizing the vessels liquid transfer system.

Maximum Sea Conditions - Under most circumstances the larger OSVs are capable of remaining on scene well past the Skimming Arms maximum sea state of 9.8'. Ultimately it will be the decision of the VOO Captain, with input from the T&T Supervisor onboard, to determine when the sea conditions have exceeded the safe operating conditions of the vessel.

Command and Control – The large OSVs in many cases have state of the art communication and electronic systems, as well as the accommodations to support the function of directing all skimming operations offshore and reporting back to the command post.

Possible Task Force Configuration (Multiple Koseq VOOs can be deployed in a task force)

1 – $\geq$ 200' Offshore Supply Vessels (OSV) with set of Koseq Arms
2 to 4 portable storage tanks (500 bbl)
1 – Modular Crane Pedestal System set (MCPS) or 30 cherry picker (crane) for deployment
1 – Tank barge (offshore) for temporary storage
1 – Utility/Crewboat (supply)
1 – Designated spotter aircraft
4 – Personnel (4 T&T OSRO)



Scattered oil is "caught" by two VOO and collected at the apex of the towed sea boom. The oil moves thought a "gate" at that apex, forming a larger stream of oil which moves into the boom of the skimming vessel. Operations are paced at >1. A recovered oil barge stationed nearby to minimize time taken to offload recovered oil.

This is a depiction of the same operation as above but using KOSEQ Arms. In this configuration, the collecting boom speed dictates the operational pace at $\geq$ 1 knot to minimize entrainment of the oil.

Clean Gulf Associates (CGA) Procedure for Accessing Member-Contracted and other Vessels of Opportunity (VOOs) for Spill Response

- CGA has procedures in place for CGA member companies to acquire vessels of opportunity (VOOs) from an existing CGA member's contracted fleet or other sources for the deployment of CGA portable skimming equipment including Koseq Arms, Fast Response Units (FRUs) and any other portable skimming system(s) deemed appropriate for the response for a potential or actual oil spill, WCD oil spill or a Spill of National Significance (SONS).

- CGA uses Port Vision, a web-based vessel and terminal interface that empowers CGA to track vessels through Automatic Identification System (AIS) and terminal activities using a Geographic Information System (GIS). It provides live AIS/GIS views of waterways showing current vessel positions, terminals, created vessel fleets, and points-of-interest. Through this system, CGA has the ability to get instant snapshots of the location and status of all vessels contracted to CGA members, day or night, from any web-enabled PC.

Near Shore Response Actions

Timing

- Put near shore assets on standby and deployment in accordance with planning based on the actual situation, actual trajectories and oil budgets
- VOO identification and training in advance of spill nearing shoreline if possible
- Outfitting of VOOs for specific missions
- Deployment of assets based on actual movement of oil

Considerations

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

Surveillance

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

Dispersant Use

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

Dedicated Near Shore skimming systems

- FRVs
- Egmopol and Marco SWS
- Operate with aerial spotter directing systems to observed oil slicks

VOO

- Use LLOG Exploration Offshore, L.L.C.'s contracted resources as applicable
- Industry vessel are usually best for deployment of Vessel of Opportunity Skimming Systems (VOSS)
- Acquire additional resources as needed
- Consider use of local assets, i.e. fishing and pleasure craft
- Expect mission specific and safety training to be required
- Plan with the US Coast Guard for vessel inspections
- Operate with aerial spotter directing systems to oil patches

Shoreline Protection Operations

Response Planning Considerations

- Review appropriate Area Contingency Plan(s)
- Locate and review appropriate Geographic Response and Site Specific Plans
- Refer to appropriate Environmentally Sensitive Area Maps
- Capability for continual analysis of trajectories run periodically during the response
- Environmental risk assessments (ERA) to determine priorities for area protection
- Time to acquire personnel and equipment and their availability
- Refer to the State of Louisiana Initial Oil Spill Response Plan, Deep Water Horizon, dated 2 May 2010, as a secondary reference
- Aerial surveillance of oil movement
- Pre-impact beach cleaning and debris removal
- Shoreline Cleanup Assessment Team (SCAT) operations and reporting procedures
- Boom type, size and length requirements and availability
- Possibility of need for In-situ burning in near shore areas
- Current wildlife situation, especially status of migratory birds and endangered species in the area
- Check for Archeological sites and arrange assistance for the appropriate state agency when planning operations the may impact these areas

Placement of boom

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

Beach Preparation - Considerations and Actions

- Use of a 10 mile go/no go line to determine timing of beach cleaning
- SCAT reports and recommendations
- Determination of archeological sites and gaining authority to enter
- Monitoring of tide tables and weather to determine extent of high tides
- Pre cleaning of beaches by moving waste above high tide lines to minimize waste
- Determination of logistical requirements and arranging of waste removal and disposal

- Staging of equipment and housing of response personnel as close to the job site as possible to maximize on-site work time
- Boom tending, repair, replacement and security (use of local assets may be advantageous)
- Constant awareness of weather and oil movement for resource re-deployment as necessary
- Earthen berms and shoreline protection boom may be considered to protect sensitive inland areas
- Requisitioning of earth moving equipment
- Plan for efficient and safe use of personnel, ensuring:
    - A continual supply of the proper Personal Protective Equipment
    - Heating or cooling areas when needed
    - Medical coverage
    - Command and control systems (i.e. communications)
    - Personnel accountability measures
- Remediation requirements, i.e., replacement of sands, rip rap, etc.
- Availability of surface washing agents and associated protocol requirements for their use (see National Contingency Plan Product Schedule for list of possible agents)
- Discussions with all stakeholders, i.e., land owners, refuge/park managers, and others as appropriate, covering the following:
    - Access to areas
    - Possible response measures and impact of property and ongoing operations
    - Determination of any specific safety concerns
    - Any special requirements or prohibitions
    - Area security requirements
    - Handling of waste
    - Remediation expectations
    - Vehicle traffic control
    - Domestic animal safety concerns
    - Wildlife or exotic game concerns/issues

Inland and Coastal Marsh Protection and Response Considerations and Actions

- All considered response methods will be weighed against the possible damage they may do to the marsh. Methods will be approved by the Unified Command only after discussions with local Stakeholder, as identified above.
    - In-situ burn may be considered when marshes have been impacted
- Passive clean up of marshes should considered and appropriate stocks of sorbent boom and/or sweep obtained.
- Response personnel must be briefed on methods to traverse the marsh, i.e.,
    - use of appropriate vessel
    - use of temporary walkways or road ways
- Discuss and gain approval prior cutting or moving vessels through vegetation
- Discuss use of vessels that may disturb wildlife, i.e, airboats
- Safe movement of vessels through narrow cuts and blind curves

- Consider the possibility that no response in a marsh may be best
- In the deployment of any response asset, actions will be taken to ensure the safest, most efficient operations possible. This includes, but is not limited to:
    - Placement of recovered oil or waste storage as near to vessels or beach cleanup crews as possible.
    - Planning for stockage of high use items for expeditious replacement
    - Housing of personnel as close to the work site as possible to minimize travel time
    - Use of shallow water craft
    - Use of communication systems appropriate ensure command and control of assets
    - Use of appropriate boom in areas that I can offer effective protection
    - Planning of waste collection and removal to maximize cleanup efficiency
- Consideration or on-site remediation of contaminated soils to minimize replacement operations and impact on the area

Decanting Strategy

Recovered oil and water mixtures will typically separate into distinct phases when left in a quiescent state. When separation occurs, the relatively clean water phase can be siphoned or decanted back to the recovery point with minimal, if any, impact. Decanting therefore increases the effective on-site oil storage capacity and equipment operating time. FOSC/SOSC approval will be requested prior to decanting operations. This practice is routinely used for oil spill recovery.

CGA Equipment Limitations

The capability for any spill response equipment, whether a dedicated or portable system, to operate in differing weather conditions will be directly in relation to the capabilities of the vessel the system in placed on. Most importantly, however, the decision to operate will be based on the judgment of the Unified Command and/or the Captain of the vessel, who will ultimately have the final say in terminating operations. Skimming equipment listed below may have operational limits which exceed those safety thresholds. As was seen in the Deepwater Horizon (DWH) oil spill response, vessel skimming operations ceased when seas reached 5-6 feet and vessels were often recalled to port when those conditions were exceeded. Systems below are some of the most up-to-date systems available and were employed during the DWH spill.

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

Environmental Conditions in the GOM

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

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

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

FIGURE 1
TRAJECTORY BY LAND SEGMENT

Trajectory of a spill and the probability of it impacting a land segment have been projected utilizing LLOG Exploration Offshore, L.L.C.'s WCD and information in the BOEM Oil Spill Risk Analysis Model (OSRAM) for the Central and Western Gulf of Mexico available on the BOEM website using 30 day impact. The results are tabulated below.

Area/Block	OCS-G	Launch Area	Land Segment and/or Resource	Conditional Probability (%)
MC 629, Well Location A *40 miles from shore*	G36134	C58	Galveston, TX Jefferson, TX Cameron, LA Vermilion, LA Iberia, LA Terrebonne, LA Lafourche, LA Jefferson, LA **Plaquemines, LA** St. Bernard, LA Okaloosa, FL	1 1 3 2 1 3 3 1 **8** 1 1

WCD Scenario– <u>BASED ON WELL BLOWOUT DURING DRILLING OPERATIONS</u> (40 miles from shore)
275,010 bbls of crude oil (Volume considering natural weathering)
API Gravity 28°

FIGURE 2 – Equipment Response Time to MC 629, Well Location A

Dispersants/Surveillance

Dispersant/Surveillance	Dispersant Capacity (gal)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to site	Total Hrs
ASI							
Basler 67T	2000	2	Houma	2	2	0.8	4.8
DC 3	1200	2	Houma	2	2	1.1	5.1
DC 3	1200	2	Houma	2	2	1.1	5.1
Aero Commander	NA	2	Houma	2	2	0.8	4.8
MSRC							
C-130 Spray AC	3,250	2	Kiln	3	0	0.5	3.5
King Air BE90 Spray AC	250	2	Kiln	3	0	0.7	3.7

Offshore Response

Offshore Equipment Pre-Determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
HOSS Barge	76285	4000	3 Tugs	12	Harvey	6	0	12	9	2	29
95' FRV	22885	249	NA	6	Leeville	2	0	2	6	1	11
95' FRV	22885	249	NA	6	Venice	2	0	3	3.5	1	9.5
95' FRV	22885	249	NA	6	Galveston	2	0	2	20	1	25
95' FRV	22885	249	NA	6	Vermilion	2	0	3	13	1	18
Boom Barge (CGA-300) 42" Auto Boom (25000')	NA	NA	1 Tug 50 Crew	4 (Barge) 2 (Per Crew)	Leeville	8	0	4	17	2	31

Offshore Equipment Pre-Determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
Kirby Offshore (available through contract with CGA)											
RO Barge	NA	80000+	1 Tug	6	Venice	46	0	4	9	1	60
RO Barge	NA	80000+	1 Tug	6	Venice	46	0	4	9	1	60
RO Barge	NA	80000+	1 Tug	6	Venice	46	0	4	9	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	46	0	4	9	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	46	0	4	9	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	46	0	4	9	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	46	0	4	9	1	60
RO Barge	NA	110000+	1 Tug	6	Venice	46	0	4	9	1	60
RO Barge	NA	130000+	1 Tug	6	Venice	46	0	4	9	1	60
RO Barge	NA	140000+	1 Tug	6	Venice	46	0	4	9	1	60
RO Barge	NA	150000+	1 Tug	6	Venice	46	0	4	9	1	60
RO Barge	NA	160000+	1 Tug	6	Venice	46	0	4	9	1	60

Offshore Equipment Pre-determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
MSRC											
Louisiana Responder 1 Transrec 350 1 Stress I *2,640' 67" Curtain Pressure Boom*	10567 15840	4000	NA	14	Fort Jackson, LA	2	0	4.5	6.5	1	14
MSRC 452 Offshore Barge 1 Crucial Disk 88/30 1 Desmi Ocean *2,640' 67" Curtain Pressure Boom*	11122 3017	45000	3 Tugs	6	Fort Jackson, LA	2.5	0	6	11	1	20.5
Mississippi Responder 1 Transrec 350 1 Stress I *2,640' 67" Curtain Pressure Boom*	10567 15840	4000	NA	14	Pascagoula, MS	2	0	2	8.5	1	13.5
MSRC 402 Offshore Barge 2 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	22244	40300	3 Tugs	6	Pascagoula, MS	2.5	0	3	15	1	21.5
S.T. Benz Responder 1 LFF 100 Brush 1 Stress I *2,640' 67" Curtain Pressure Boom*	18086 15840	4000	NA	14	Grand Isle, LA	2	0	1	8.5	1	12.5
Gulf Coast Responder 1 Transrec 350 1 Stress I *2,640' 67" Curtain Pressure Boom*	10567 15840	4000	NA	14	Lake Charles, LA	2	0	4	23	1	30
Texas Responder 1 Transrec 350 1 Stress I *2,640' 67" Curtain Pressure Boom*	10567 15804	4000	NA	14	Galveston, TX	2	0	1	28.5	1	32.5
MSRC 570 Offshore Barge 2 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	22244	56900	3 Tugs	6	Galveston, TX	2.5	0	2	50	1	55.5
Southern Responder 1 Transrec 350 1 Stress I *2,640' 67" Curtain Pressure Boom*	10567 15840	4000	NA	14	Ingleside, TX	2	0	1	39	1	43
MSRC 403 Offshore Barge 1 Crucial Disk 88/30 1 Crucial Disk 56/30 *2,640' 67" Curtain Pressure Boom*	11122 5671	40300	3 Tugs	6	Ingleside, TX	2.5	0	2	69	1	74.5
Florida Responder 1 Transrec 350 1 Stress I *2,640' 67" Curtain Pressure Boom*	10567 15840	4000	NA	14	Miami, FL	2	0	2	43	1	48
MSRC 360 Offshore Barge 1 Crucial Disk 88/30 1 Crucial Disk 56/30 *1,320' 67" Curtain Pressure Boom*	11122 5671	36000	3 Tugs	6	Tampa, FL	2.5	0	2	44	1	49.5

Loadout/Staging Area: Venice

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
CGA											
Hydro-Fire Boom	NA	NA	8 Utility	40	Harvey	0	24	2	6	6	38
MSRC											
67" Curtain Pressure Boom (53570')	NA	NA	14*	7	Houston	1	2	12	12	1	28
1000' Fire Resistant Boom	NA	NA	3*	6	Galveston	1	4	13	12	6	36
16000' Fire Resistant Boom	NA	NA	3*	6	Houston	1	4	12	12	6	35
2000' Hydro Fire Boom	NA	NA	8*	8	Lake Charles	1	4	8	12	6	31

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

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
T&T Marine (available through direct contract with CGA)											
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Galveston	4	12	13	6	2	37
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Harvey	4	12	2	6	2	26
Koseq Skimming Arms (2) Lamor brush	45770	2000	1 OSV	6	Harvey	24	24	2	6	2	58
Koseq Skimming Arms (4) MariFlex 150 HF	72652	4000	2 OSV	12	Harvey	24	24	2	6	2	58
Koseq Skimming Arms (10) Lamor brush	228850	10000	5 OSV	30	Galveston	24	24	13	6	2	69
Koseq Skimming Arms (6) MariFlex 150 HF	108978	6000	3 OSV	18	Galveston	24	24	13	6	2	69
CGA											
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Morgan City	2	6	5	6	1	20
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Vermilion	2	6	6	6	1	21
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Galveston	2	6	13	6	1	28
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Aransas Pass	2	6	18	6	1	33
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Lake Charles	2	6	8	6	1	23
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Leeville	2	6	5	6	1	20
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Venice	2	6	2	6	1	17

Staging Area: Venice

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
MSRC											
GT-185 Skimmer w Adaptor (1)	1371	400	1 Utility	6	Ingleside	1	2	18	12	1	34
Foilex 250 Skimmer (1)	3977	400	1 Utility	6	Ingleside	1	2	18	12	1	34
Walosep 4 Skimmer (1)	3017	400	1 Utility	6	Ingleside	1	2	18	12	1	34
GT-185 Skimmer w Adaptor (2)	2742	400	2 Utility	12	Galveston	1	2	13	12	1	29
Walosep 4 Skimmer (1)	3017	400	1 Utility	6	Galveston	1	2	13	12	1	29
Foilex 250 Skimmer (1)	3977	400	1 Utility	6	Galveston	1	2	13	12	1	29
GT-185 Skimmer w Adaptor (1)	1371	400	1 Utility	6	Port Arthur	1	2	10	12	1	26
Desmi Skimmer (1)	3017	400	1 Utility	6	Lake Charles	1	2	8	12	1	24
Foilex 250 Skimmer (1)	3977	400	1 Utility	6	Lake Charles	1	2	8	12	1	24
GT-185 Skimmer w Adaptor (1)	1371	400	1 Utility	6	Lake Charles	1	2	8	12	1	24
Stress I Skimmer (1)	15840	400	1 Utility	6	Lake Charles	1	2	8	12	1	24
LFF 100 Brush Skimmer (1) *1,320' 67" Curtain Pressure Boom*	18086	400	1 PSV	14	Lake Charles	1	2	8	12	1	24
LFF 100 Brush Skimmer (1) *1,320' 67" Curtain Pressure Boom*	18086	400	1 PSV	14	Lake Charles	1	2	8	12	1	24
LFF 100 Brush Skimmer (1) *1,320' 67" Curtain Pressure Boom*	18086	400	1 PSV	14	Lake Charles	1	2	8	12	1	24
Transrec 350 Skimmer (1) *1,320' 67" Curtain Pressure Boom*	10567	400	1 PSV	14	Lake Charles	1	2	8	12	1	24
Transrec 350 Skimmer (1) *1,320' 67" Curtain Pressure Boom*	10567	400	1 PSV	14	Lake Charles	1	2	8	12	1	24

Staging Area: Venice

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
MSRC											
GT-185 Skimmer w Adaptor (1)	1371	400	1 Utility	6	Baton Rouge	1	2	4.5	12	1	21
LFF 100 Brush Skimmer (1) *1,320' 67" Curtain Pressure Boom*	10567	400	1 PSV	14	Houma	1	2	3.5	12	1	20
GT-185 Skimmer w Adaptor (1)	1371	400	1 Utility	6	Belle Chasse	1	2	2	12	1	18
Walosep W4 Skimmer (1)	3017	400	1 Utility	6	Belle Chasse	1	2	2	12	1	18
Foilex 250 Skimmer (1)	3977	400	1 Utility	6	Belle Chasse	1	2	2	12	1	18
Foilex 200 Skimmer (1)	1989	400	1 Utility	6	Belle Chasse	1	2	2	12	1	18
Crucial Disk 56/30 Skimmer (1)	5671	400	1 Utility	6	Belle Chasse	1	2	2	12	1	18
Crucial Disk 88/30 Skimmer (1) *1,320' 67" Curtain Pressure Boom*	11122	400	1 PSV	14	Fort Jackson	1	2	0.5	12	1	16.5
Crucial Disk 88/30 Skimmer (1) *1,320' 67" Curtain Pressure Boom*	11122	400	1 PSV	14	Fort Jackson	1	2	0.5	12	1	16.5
GT-185 Skimmer (1)	1371	400	1 Utility	6	Pascagoula	1	2	5.5	12	1	21
Stress II Skimmer (1)	3017	400	1 Utility	6	Pascagoula	1	2	5.5	12	1	21
Stress I Skimmer (1)	15840	400	1 Utility	6	Tampa	1	2	21	12	1	37
GT-185 Skimmer w Adaptor (1)	1371	400	1 Utility	6	Tampa	1	2	21	12	1	37
GT-185 Skimmer w Adaptor (1)	1371	400	1 Utility	6	Miami	1	2	27	12	1	43
Walosep W4 Skimmer (1)	3017	400	1 Utility	6	Miami	1	2	27	12	1	43
Desmi Skimmer (1)	3017	400	1 Utility	6	Miami	1	2	27	12	1	43

Nearshore Equipment	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Staging	Hrs to Deploy	Total Hrs
CGA											
Mid-Ship SWS	22885	249	NA	4	Leeville	2	0	N/A	48	1	51
Mid-Ship SWS	22885	249	NA	4	Venice	2	0	N/A	48	1	51
Mid-Ship SWS	22885	249	NA	4	Galveston	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Aransas Pass	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Morgan City	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Lake Charles	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Vermilion	2	0	N/A	48	1	51
46' FRV	15257	65	NA	4	Aransas Pass	2	0	2	26	1	31
46' FRV	15257	65	NA	4	Morgan City	2	0	2	7	1	12
46' FRV	15257	65	NA	4	Lake Charles	2	0	2	13	1	18
46' FRV	15257	65	NA	4	Venice	2	0	2	2.5	1	7.5
MSRC											
30 ft. Kvichak	3588	24	NA	2	Ingleside	1	1	2	24	0	28
30 ft. Kvichak	3588	24	NA	2	Galveston	1	1	2	17.5	0	21.5
MSRC Quick Strike	5000	50	NA	3	Lake Charles	1	1	2	10	0	14
30 ft. Kvichak	3588	24	NA	2	Belle Chasse	1	1	2	3	0	7
30 ft. Kvichak	3588	24	NA	2	Pascagoula	1	1	2	4	0	8
Enterprise Marine (available through contract with CGA)											
CTCo 2603	NA	25000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 2604	NA	20000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 2605	NA	20000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 2606	NA	20000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 2607	NA	23000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 2608	NA	23000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 2609	NA	23000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 5001	NA	47000	1 Tug	6	Amelia	26	0	6	15	1	48
Kirby Offshore (available through contract with CGA and MSRC)											
RO Barge	NA	80000+	1 Tug	6	Venice	48	0	4	7	1	60

Staging Area: Venice

Nearshore and Inland Skimmers With Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Load Out	Travel to Venice	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
SWS Egmopol	1810	100	NA	3	Galveston	2	2	12.7	2	1	19.7
SWS Egmopol	1810	100	NA	3	Morgan City	2	2	4.9	2	1	11.9
SWS Marco	3588	20	NA	3	Lake Charles	2	2	8	2	1	15
SWS Marco	3588	34	NA	3	Leeville	2	2	4.4	2	1	11.4
SWS Marco	3588	34	NA	3	Venice	2	2	2	2	1	9
Foilex Skim Package (TDS 150)	1131	50	NA	3	Lake Charles	4	12	8	2	2	28
Foilex Skim Package (TDS 150)	1131	50	NA	3	Galveston	4	12	12.7	2	2	32.7
Foilex Skim Package (TDS 150)	1131	50	NA	3	Harvey	4	12	2.1	2	2	22.1
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Lake Charles	2	2	8	2	1	15
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Harvey	2	2	2.1	2	1	9.1
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Lake Charles	2	2	8	2	1	15
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Harvey	2	2	2.1	2	1	9.1
MSRC											
WP 1 Skimmer (1)	3017	400	1 Utility	4	Ingleside	1	1	18	2	0	22
Queensboro Skimmer (1)	905	400	1 Utility	4	Galveston	1	1	13	2	0	17
Queensboro Skimmer (5)	4525	2000	5 Utility	20	Lake Charles	1	1	8	2	0	12
AardVac Skimmer (1)	3840	400	1 Utility	4	Lake Charles	1	1	8	2	0	12
Queensboro Skimmer (1)	905	400	1 Utility	4	Belle Chasse	1	1	2	2	0	6
AardVac Skimmer (1)	3840	400	1 Utility	4	Pascagoula	1	1	5.5	2	0	9.5
WP 1 Skimmer (1)	3017	400	1 Utility	4	Pascagoula	1	1	5.5	2	0	9.5
Queensboro Skimmer (1)	905	400	1 Utility	4	Pascagoula	1	1	5.5	2	0	9.5
WP 1 Skimmer (1)	3017	400	1 Utility	4	Tampa	1	1	21	2	0	25
AardVac Skimmer (2)	7680	800	2 Utility	8	Miami	1	1	27	2	0	31
WP 1 Skimmer (1)	3017	400	1 Utility	4	Miami	1	1	27	2	0	31

Staging Area: Venice

Shoreline Protection Boom	VOO	Persons Req.	Storage/Warehouse Location	Hrs to Procure	Hrs to Loadout	Travel to Venice	Travel to Deployment Site	Hrs to Deploy	Total Hrs
AMPOL (Available through MSA)									
34,050' 18" Boom	13 Crew	26	New Iberia, LA	2	2	6	2	12	24
12,850' 18" Boom	7 Crew	14	Chalmette, LA	2	2	2.5	2	6	14.5
900' 18" Boom	1 Crew	2	Morgan City, LA	2	2	4.5	2	2	12.5
30,000' 18" Boom	13 Crew	26	Harvey, LA	2	2	2	2	12	20
1,700' 18" Boom	2 Crew	4	Venice, LA	2	2	0	2	2	8
14,750' 18" Boom	7 Crew	14	Port Arthur, TX	2	2	10	2	6	22
OMI Environmental (Available through MSA)									
12,500' 18" Boom	6 Crew	12	New Iberia, LA	1	1	6	2	3	13
4,850' 18" Boom	2 Crew	4	Belle Chasse, LA	1	1	2	2	3	9
8,000' 18" Boom	3 Crew	6	Port Allen, LA	1	1	5	2	3	12
2,000' 18" Boom	1 Crew	2	Houma, LA	1	1	4	2	3	11
2,500' 18" Boom	1 Crew	2	Morgan City, LA	1	1	5	2	3	12
1,600' 18" Boom	1 Crew	2	Gonzalez, LA	1	1	4	2	3	11
5,800' 18" Boom	5 Crew	10	Venice, LA	1	1	0	2	3	7
13,300' 18" Boom	5 Crew	10	Harvey, LA	1	1	2	2	3	9

Wildlife Response	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
Wildlife Support Trailer	NA	NA	NA	2	Harvey	2	2	2.1	1	2	9.1
Bird Scare Guns (48)	NA	NA	NA	2	Harvey	2	2	2.1	1	2	9.1
Bird Scare Guns (12)	NA	NA	NA	2	Galveston	2	2	12.7	1	2	19.7
Bird Scare Guns (12)	NA	NA	NA	2	Aransas Pass	2	2	17.7	1	2	24.7
Bird Scare Guns (24)	NA	NA	NA	2	Lake Charles	2	2	8	1	2	15
Bird Scare Guns (24)	NA	NA	NA	2	Leeville	2	2	4.4	1	2	11.4

Response Asset	Total (bbls)
Offshore EDRC	1,189,805
Offshore Recovered Oil Storage	1,622,096+
Nearshore / Shallow Water EDRC	289,320
Nearshore / Shallow Water Recovered Oil Storage	290,387+

APPENDIX I
ENVIRONMENTAL MONITORING INFORMATION
(30 CFR PART 550.221 AND 550.252)

A. Monitoring Systems

LLOG subscribes to StormGeo Weather Service which provides access to real-time weather conditions, and provides periodic updates on impending inclement weather conditions such as tropical depressions, storms and/or hurricanes entering the Gulf of Mexico.

LLOG also relies on the National Weather Service to support the aforementioned subscribed service. During impending inclement weather conditions, LLOG closely coordinates the activity with our contractors and field personnel to ensure the safety of people for evacuation; measures to prepare the facility for evacuation to ensure protection of the environment and the facility/equipment.

Mississippi Canyon Block 629 is in water depths greater than 400 meters (1,312'); therefore LLOG will follow the guidelines of the applicable NTL 2018-G01 "Ocean Current Monitoring", by monitoring and gathering ocean current data using Acoustic Doppler Current Profile (ADCP) while the MODU is on location.

B. Incidental Takes

LLOG does not anticipate the incidental taking of any species as a result of the proposed activities based on the implementation of, and adherence to, the BSEE NTL No. 2012-G01 "Marine Trash and Debris Awareness Training and Elimination" and NTL No. 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting".

C. Flower Garden Banks National Marine Sanctuary

This section of the plan is not applicable to the proposed operations.

APPENDIX J
LEASE STIPULATIONS/SPECIAL CONDITIONS INFORMATION
(30 CFR PART 550.222 AND 550.253)

A. Lease Stipulations

Lease Stipulation No. 4 for Protected Species on Lease OCS-G 36134 Mississippi Canyon Block 629:

Lease Stipulation No. 4 references measures to minimize or avoid potential adverse impacts to protected species (sea turtles, marine mammals, gulf sturgeon, and other federally protected species). BOEM has issued Notice to Lessees Joint NTL No. 2016-G02 "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program", NTL No. 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting" and BSEE NTL No. 2015-G03 "Marine Trash and Debris Awareness and Elimination".

B. Special Conditions

- **Subsea Completions**

  LLOG may potentially complete the proposed wells as subsea completions. Therefore, LLOG will follow the regulations in Title 30 CFR Parts 550.296 through 550.299, which mandates the submittal and approval of separate regulatory filings entitled a "Conservation Information Document" and Title 30 CFR Parts 250.286 to Title 30 CFR Parts 250.295 entitled "Deepwater Operations Plan".

- **Ocean Current Monitoring**

  The proposed operations under this Plan are in water depths greater than 400 meters (1,312'); therefore, LLOG will follow the guidelines of the applicable NTL 2018-G01 "Ocean Current Monitoring", by continuously monitoring and gathering ocean current data using Acoustic Doppler Current Profile (ADCP) while the MODU is on location.

- **Breton Sound Area**

  Mississippi Canyon Block 629 is located within the 200 km zone of the Breton National Wildlife Refuge, and LLOG will consider the use of best available control technology as required if the projected air emissions are determined to significantly affect the air quality of an onshore area.

APPENDIX K
ENVIRONMENTAL MITIGATION MEASURES INFORMATION
(30 CFR Part 550.23 and 550.54)

A. Measures Taken to Avoid, Minimize, and Mitigate Impacts

This section does not apply to the operations as proposed herein.

B. Incidental Takes

LLOG does not anticipate the incidental taking of any species as a result of the proposed activities based on the implementation of, and adherence to, the Notice to Lessees NTL BOEM 2016-G02 "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program", NTL BOEM 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting" and BSEE NTL No. 2015-G03 "Marine Trash and Debris Awareness and Elimination".

APPENDIX L

RELATED FACILITIES AND OPERATIONS INFORMATION (30 CFR PART 550.256)

A. Produced Liquid Hydrocarbon Transportation Vessels

Not applicable to proposed operations.

APPENDIX M
SUPPORT VESSELS AND AIRCRAFT INFORMATION
(30 CFR PART 550.224 AND 550.257)

A. General

Personnel involved in the proposed operations will typically use their own vehicles as transportation to and from the selected onshore base; whereas the selected vendors will transport the equipment by a combination of trucks, boats and/or helicopters to the onshore base. The personnel and equipment will then be transported to the drilling rig via the transportation methods and frequencies shown, taking the most direct route feasible as mandated by weather and traffic conditions:

Drillship and DP Semisubmersible Rig:

Type	Maximum Fuel Tank Storage Capacity	Maximum No. in Area at Any Time	Trip Frequency or Duration
Supply Boats	500 bbls	1	Six times weekly
Crew Boats	500 bbls	1	Three times weekly
Aircraft	279 gallons	1	As Needed

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
180' OSV	1900 bbls	1/weekly	Fourchon, LA to Mississippi Canyon Block 629

C. Drilling Fluids Transportation

See Table 2 – Wastes you will Transport and/or Dispose of Onshore, located in Appendix F of this Plan.

D. Solid and Liquid Wastes Transportation

See Table 2 – Wastes you will Transport and/or Dispose of Onshore, located in Appendix F of this Plan.

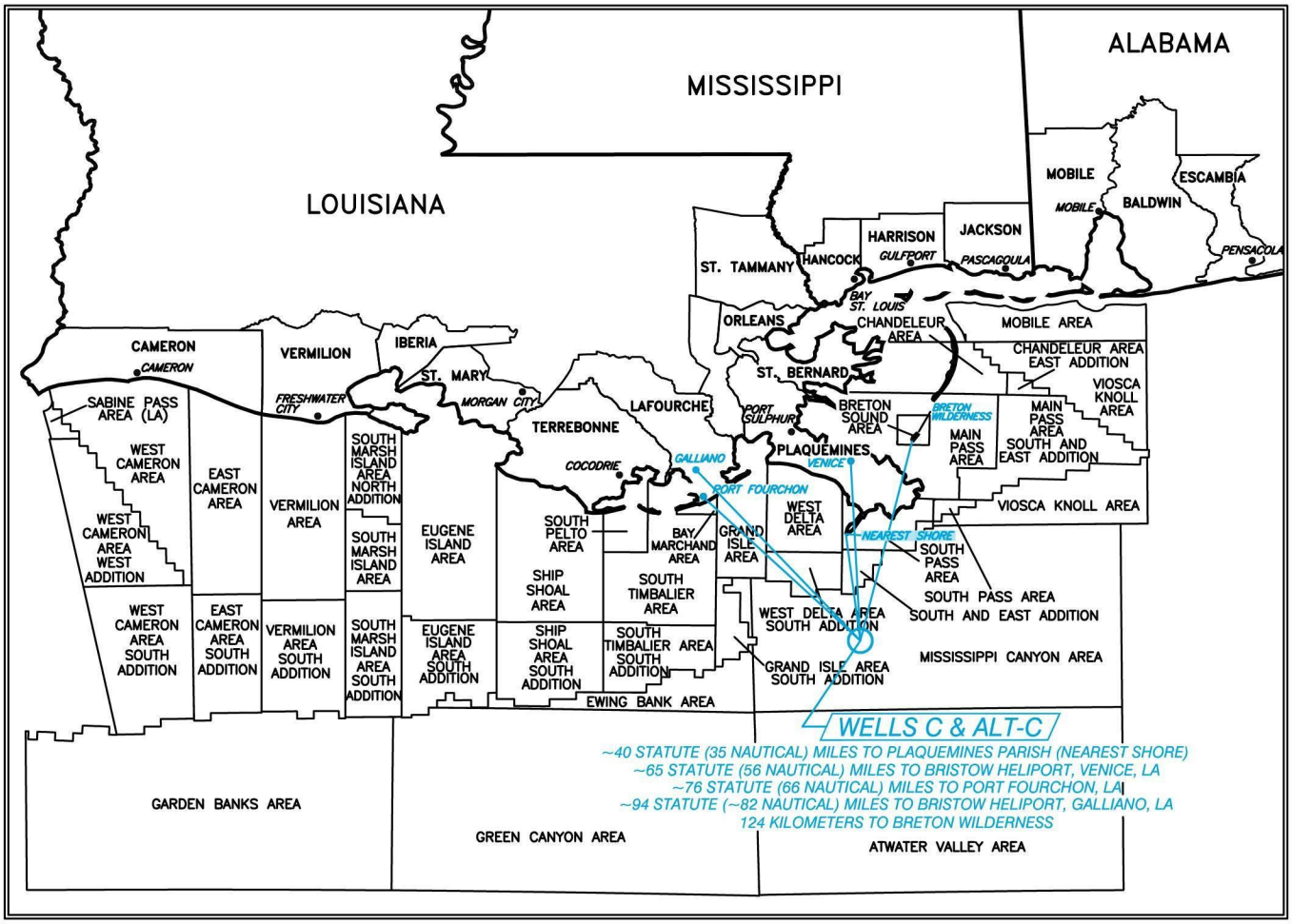
E. Vicinity Map

Vicinity Plat showing the location of Mississippi Canyon Block 629 relative to the nearest shoreline, Bristow Heliport and onshore base is included in ***Attachment M-1***.

Vicinity Map

Attachment M-1
(Public Information)

LOUISIANA GULF COAST INDEX
BOEM O.C.S. LEASING AREAS



VICINITY MAP

COORDINATE TO NEAREST POINT ON SHORELINE X = 868,252 Y = 10,502,516

THE DISTANCES SHOWN HEREON ARE FROM THE PROPOSED WELL TO THE NEAREST COASTLINE POINT AS OBTAINED FROM NOAA, ENTITLED NOAA MEDIUM RESOLUTION SHORELINE. <HTTP://SHORELINE.NOAA.GOV/DATA/DATASHEETS/MEDRES.HTML>.

SHEET 1 OF 1

DATUM: NAD 27	
SPHEROID: CLARKE 1866	
PROJECTION: U.T.M.	
ZONE: 16	

Echo OFFSHORE LLC
36499 Perkins Road
Prairieville, Louisiana 70769
Tel: 225-673-2163

LLOG EXPLORATION OFFSHORE, L.L.C.

LLOG exploration

EXPLORATION PLAT

PROPOSED WELLS C & ALT-C
OCS-G 36134 BLOCK 629
MISSISSIPPI CANYON AREA

GULF OF MEXICO

DRAWN BY:	DATE:	CHECKED BY:	DRAWING No.:
MEK	6/26/2019	RJN	19-038-EXP_REV2
REV. DATE:	REV. No.:	SCALE:	JOB No.:
7/2/2019	2	N.T.S.	19-038-031

APPENDIX N
ONSHORE SUPPORT FACILITIES INFORMATION
(30 CFR PART 550.225 AND 550.258)

A. General

The proposed surface disturbances in Mississippi Canyon Block 629 will be located approximately 40 statute miles from the nearest Louisiana shoreline, Plaquemines Parish, approximately 76 statute miles from the following onshore support base and 65 statute miles from Bristow-Venice Heliport:

Name	Location	Existing/New/Modified
LLOG c/o GIS Yard	Fourchon, LA	Existing
Bristow-Venice Heliport	Venice, LA	Existing

LLOG will use an existing onshore base to accomplish the following routine operations:

- Loading/Offloading point for equipment supporting the offshore operations.
- Dispatching personnel and equipment, and does not anticipate the need for any expansion of the selected facilities as a result of the activities proposed in this Initial Plan.
- Temporary storage for materials and equipment.
- 24 Hour Dispatcher

B. Support Base Construction or Expansion

The proposed operations are temporary in nature and do not require any immediate action to acquire additional land or expand existing base facilities.

C. Support Base Construction or Expansion Timetable

This section of the plan is not applicable to the proposed operations.

D. Waste Disposal

See Table 2 – Wastes you will Transport and/or Dispose of Onshore, located in Appendix F of this Plan.

APPENDIX O

COASTAL ZONE MANAGEMENT ACT (CZMA) INFORMATION (30 CFR PART 550.226 AND 550.260)

A. Consistency Certification

Certificate of Coastal Zone Management Consistency for the State of Louisiana is enclosed as ***Attachment O-1.***

B. Other Information

Not required for this plan.

Coastal Zone Management Consistency Statement for the State of Louisiana

Attachment O-1
(Public Information)

COASTAL ZONE MANAGEMENT CONSISTENCY CERTIFICATION

SUPPLEMENTAL EXPLORATION PLAN

OCS-G-36134 Lease
MISSISSIPPI CANYON BLOCK 629

The proposed activities described in detail in the enclosed Joint Initial Exploration Plan comply with Louisiana's approved Coastal Zone Management Program and will be conducted in a manner consistent with such Program.

By: **LLOG Exploration Offshore, L.L.C., Operator**

Signed by: Carol Eaton

Carol Eaton, Certifying Official

Date: **July 10, 2019**

APPENDIX P
ENVIRONMENTAL IMPACT ANALYSIS
(30 CFR PART 550.227 AND 550.261)

A. Impact Producing Factors (IPF's) From Proposed Activities

The following matrix is utilized to identify the affected environments that could be impacted by these IPF's. An "x" has been marked for each IPF category that LLOG has determined may impact a particular environment as a result of the proposed activities. For those cells which are footnoted, a statement is provided as to the applicability of the proposed activities, and where there may be an effect, an analysis of the effect is provided.

Environmental Resources	Impact Producing Factors (IPF's)					
	Emissions (air, noise, light, etc)	Effluents (muds, cuttings, other discharges to the water column or seafloor)	Physical disturbances to the seafloor (rig, anchor, structure emplacement, etc.)	Wastes sent to shore for treatment or disposal	Accidents (e.g., oil spills, chemical spills, H2S releases)	Other IPF's you Identify
Site Specific at Offshore Location						
Designated topographic features		(1)	(1)		(1)	
Pinnacle Trend area live bottoms		(2)	(2)		(2)	
Eastern Gulf live bottoms		(3)	(3)		(3)	
Chemosynthetic communities			(4)			
Water quality		X			X	
Fisheries	X	X			X	
Marine mammals	X (8)	X			X (8)	
Sea turtles	X (8)	X			X (8)	
Air quality	(9)					
Shipwreck sites (known or potential)			(7)			
Prehistoric archaeological sites			(7)			
Vicinity of Offshore Location						
Essential fish habitat					X (6)	
Marine and pelagic birds					X	
Public health and safety					(5)	
Coastal and Onshore						
Beaches					(6)	
Wetlands					(6)	
Shorebirds and coastal nesting birds					(6)	
Coastal wildlife refuge						
Wilderness areas						

Footnotes for Environmental Impact Analysis Matrix:

1. Activities that may affect a marine sanctuary or topographic feature. Specifically, if the well or platform site or any anchors will be on the seafloor within the:
    (a) 4-mile zone of the Flower Gardens Banks, or the 3-mile zone of Stetson Bank;
    (b) 1000-m, 1-mile or 3-mile zone of any topographic feature (submarine bank) protected by the Topographic Features Stipulation attached to an OCS lease;
    (c) Essential Fish Habitat (EFH) criteria of 500 feet from any no-activity zone; or
    (d) Proximity of any submarine bank (500 ft buffer zone) with relief greater than 2 meters that is not protected by the Topographic Stipulation attached to an OCS lease.
2. Activities with any bottom disturbance within an OCS lease block protected through the Live Bottom (Pinnacle Trend) Stipulation attached to an OCS lease.
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.
4. Activities on blocks designated by the BOEM as being in water depths 300 meters or greater.
5. Exploration or production activities where H2S concentrations greater than 500 ppm might be encountered.
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.
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.
8. All activities that you determine might have an adverse effect on endangered or threatened marine mammals or sea turtles or their critical habitats.
9. Production activities that involve transportation of produced fluids to shore using shuttle tankers or barges.

B. Impact Analysis

LLOG does not anticipate any unforeseen incidents from the proposed activities which could significantly impact the associated environment. LLOG activities associated with this Exploration Plan (Plan) will be performed with prudent and industry accepted standards, and in compliance with the federal agency regulations and oversight.

The "Oil Spills Information" Section of this Plan details the potential worse case discharge volume which has been calculated based on the new Bureau of Ocean Energy Management (BOEM) Notice to Lessees (NTL 2015-N01). Response details associated with an unanticipated spill from this site are detailed in our Regional Oil Spill Response Plan (OSRP) which outlines the potential spill scenario, spill volumes, anticipated trajectory of the spill, response equipment available, and actions to be taken to respond to the potential spill incident. Additional measures implemented by LLOG is trajectory analyses to be obtained prior to and during the proposed activities, contractual arrangements with well control specialists and preliminary reviews of potential well intervention scenarios, and to supplement existing contracted response/clean-up equipment with equipment offered by Helix which specializes in subsea deepwater well intervention, containment and processing.

Site Specific at Offshore Location

- **Designated Topographic Features**

  There are no anticipated emissions, effluents, physical disturbances to the seafloor, wastes transported to shore, and/or accidents from the proposed activities that could cause impacts to topographic features.

  The proposed surface disturbances within Mississippi Canyon Block 629 are located a significant distance from the closest designated topographic feature (Sackett Bank).

  The crests of these designated topographic features in the northern Gulf are typically found below 10 m; therefore, concentrated oil from a surface spill is not likely to reach sessile biota. Subsurface spills could cause adverse impacts to a designated topographic feature; however, due to the offset distance this should not have an impact.

  In the event of an unanticipated spill, LLOG would immediately implement its Regional Oil Spill Response Plan and active source control and countermeasures to minimize these potential impacts.

- **Pinnacle Trend Area Live Bottoms**

  There are no anticipated emissions, effluents, physical disturbances to the seafloor, wastes sent to shore and/or accidents from the proposed activities that could cause impacts to a pinnacle trend area.

  The proposed surface disturbances within Mississippi Canyon Block 629 are located a significant distance from the closest pinnacle trend live bottom stipulated block. The crests of these pinnacle trend areas are much deeper than 20 m.

  During the surface location disturbance review, LLOG reviews potential surface impacts, and would be able to identify any pinnacles within the vicinity and would avoid placement of any surface disturbances such as a drilling rig and associated anchors. These surface location disturbance areas would be avoided and/or mitigated during the review and approval process by the BOEM.

  In the event of an unanticipated spill, LLOG would immediately implement its Regional Oil Spill Response Plan and activate source control and countermeasures to minimize these potential impacts.

- **Eastern Gulf Live Bottoms**

  There are no anticipated emissions, effluents, emissions physical disturbances to the seafloor, wastes sent to shore, and/or accidents from the proposed activities that could cause impacts to Eastern Gulf live bottoms.

  The proposed surface disturbance within Mississippi Canyon Block 629 is located a significant distance from the closest Eastern Gulf live bottoms stipulated block. During the surface location disturbance review, LLOG previews potential surface impacts, and would be able to identify any live bottom areas within the vicinity and would avoid placement of any surface disturbances such as a drilling rig and associated anchors.

  In the event of an unanticipated spill, LLOG would immediately implement its Regional Oil Spill Response Plan and activate source control and countermeasures to minimize these potential impacts.

- **Chemosynthetic Communities**

  Water depths at the surface location in Mississippi Canyon Block 629 range from 2,300' to 2,660'. As noted in the shallow hazards assessment (Attachment I) benthic communities have not been reported in the seafloor assessment area.

- **Water Quality**

  Bottom disturbances which may result based on placement of drilling rigs during an exploratory phase could increase water column turbidity and redistribution of any accumulated pollutants in the water column; which could cause temporary impacts on water quality conditions in the immediate vicinity.

  Associated overboard effluents are regulated by the EPA Region VI NPDES General Permit GMG290000 which mandates volume discharge rate limitations, certain testing requirements for toxicity and oil and grease limitations. As such, it is not anticipated these discharges authorized under the approved EPA NPDES permit will cause significant adverse impacts to water quality.

  Certain wastes generated from the proposed activities will be manifested and sent to shore for treatment and/or disposal at approved facilities. Other waste which may be considered hazardous will be collected and transported in sealed containers and transported to approve disposal sites in accordance with the RCRA regulations and guidelines.

  An accidental oil spill release from the proposed activities, and cumulative similar discharge activity within the vicinity could potentially cause temporary impacts to water quality. In the event of such a release, the water quality would be temporarily affected by the dissolved components and small droplets. Currents and microbial degradation would remove the oil from the water column or dilute the constituents to background levels.

  In the event of an unanticipated blowout, LLOG will implement industry wide standards for using proven equipment and technology for such responses. LLOG would immediately implement its Regional Oil Spill Response Plan and activate source control and countermeasures to minimize these potential impacts.

- **Fisheries**

  Accidental oil spill releases from the proposed activities, and cumulative similar discharge activity within the vicinity may potentially cause some detrimental effects on fisheries. It is unlikely a spill would occur; however, such a release in open waters closed to mobile adult finfish or shellfish would likely be sub-lethal and the extent of damage would be reduced to the capability of adult fish and shellfish to avoid a spill, to metabolize hydrocarbons, and to excrete both metabolites and parent compounds.

In the event of an unanticipated blowout, LLOG will implement industry wide standards for using proven equipment and technology for such responses. LLOG would immediately implement its Regional Oil Spill Response Plan and activate source control and countermeasures to minimize these potential impacts.

- **Marine Mammals**

GulfCet II studies reveal that cetaceans of the continental shelf and shelf edge are comprised of bottlenose dolphin and Atlantic spotted dolphin. Squid eaters, including dwarf and pygmy killer whale, Risso's dolphin and Cuvier's beaked whale occur most frequently along the upper slope in areas outside of anticyclones.

As a result of the proposed activities, marine mammals may be adversely impacted by emissions, effluents, waste sent to shore and/or accidents.

Chronic and sporadic sub-lethal effects would occur that may stress and/or weaken individuals of a local group or population and make them more susceptible to infection from natural or anthropogenic sources. Few lethal effects are expected from an accidental oil spill, chance collisions with service vessels and ingestion of plastic material.

The net results of any disturbance would depend on the size and percentage of the population affected, ecological importance of the disturbed area, environmental and biological parameters that influence an animal's sensitivity to disturbance and stress, and the accommodation time in response to prolonged disturbance (Geraci and St. Aubin, 1980). Collisions between cetaceans and ship could cause serious injury or death (Laist et al., 2001).

Sperm whales are one of 11 whale species that are hit commonly by ships (Laist et al., 2001). Collisions between OCS vessels and cetaceans within the project area are expected to be unusual events.

LLOG does not anticipate the incidental taking of any marine mammals as the result of the proposed activities. The proposed activities will be conducted by our company and its contractors under the additional criteria addressed in BSEE NTL No. 2015-G03 "Marine Trash and Debris Awareness Training and Elimination" and NTL No. 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting". The proposed operations will be conducted in accordance with the regulations via manifesting waste sent to shore and ensuring such wastes are contained to prevent loss. Informational placards will be maintained on the facility, and LLOG and the associated contractors obtain training on at least an annual basis to ensure personnel are aware of the reporting and operational requirements.

LLOG will conduct the proposed activities under EPA's Region VI NPDES General Permit GMG290000 which authorizes the discharge of certain effluents, subject to certain limitations, prohibitions and recordkeeping requirements. As such, it is not anticipated these discharges authorized under the approved EPA NPDES permit will not cause significant adverse impacts to water quality.

In the event of an unanticipated blowout, LLOG will implement industry wide standards for using proven equipment and technology for such responses. LLOG would immediately implement its Regional Oil Spill Response Plan and activate source control and countermeasures to minimize these potential impacts.

- **Sea Turtles**

Small numbers of turtles could be killed or injured by chance collision with service vessels or by eating indigestible trash, particularly plastic items accidentally lost from drilling rigs, production facilities and service vessels. Drilling rigs and project vessels produce noise that could disrupt normal behavior patterns and create some stress to sea turtles, making them more susceptible to disease. Accidental oil spill releases are potential threats which could have lethal effects on turtles. Contact and/or consumption of this released material could seriously affect individual sea turtles. Most OCS related impacts on sea turtles are expected to be sub-lethal. Chronic and/or avoidance of affected areas could cause declines in survival or productivity, resulting in gradual population declines.

LLOG will conduct the proposed activities under EPA's Region VI NPDES General Permit GMG290000 which authorizes the discharge of certain effluents, subject to certain limitations, prohibitions and recordkeeping requirements. As such, it is not anticipated these discharges authorized under the approved EPA NPDES permit will not cause significant adverse impacts to water quality.

Additionally, LLOG and its contractors will conduct the proposed activities under the additional criteria addressed by BSEE NTL No. 2015-G03 "Marine Trash and Debris Awareness Training and Elimination" and Joint NTL No. 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting". The proposed operations will be conducted in accordance with the regulations via manifesting waste sent to shore and ensuring such wastes are contained to prevent loss. Informational placards will be maintained on the facility, and LLOG and the associated contractors obtain training on at least an annual basis to ensure personnel are aware of the reporting and operational requirements.

In the event of an unanticipated blowout, LLOG will implement industry wide standards for using proven equipment and technology for such responses. LLOG would immediately implement its Regional Oil Spill Response Plan and activate source control and countermeasures to minimize these potential impacts.

- **Air Quality**

  The proposed activities are located approximately 40 miles to the nearest shoreline. LLOG has addressed the air quality issues associated with the proposed activities in the "Air Emissions Information" section of this Plan as a result of the proposed activities.

- **Ship Wreck Sites (Known or Potential)**

  There are no physical disturbances to the seafloor which could impact known or potential shipwreck sites, as the review of high resolution shallow hazards data indicate there are no known or potential shipwreck sites located within the survey area. As such, LLOG does not anticipate any IPF's as a result of the proposed activities.

- **Prehistoric Archaeological Sites**

  There are no physical disturbances to the seafloor which could cause impacts to prehistoric archaeological sites, as the review of high resolution shallow hazards data and supporting studies did not reflect the occurrence of prehistoric archaeological sites. As such LLOG does not anticipate any IPF's as a result of the proposed activities.

Vicinity of Offshore Location

- **Essential Fish Habitat**

  As a result of the proposed activities, essential fish habitat may be adversely impacted by effluents and/or accidents.

  An Accidental oil spill that may occur as a result of the proposed activities has potential to cause some detrimental effects on essential fish habitat. It is unlikely that an accidental oil spill release would occur; however, if a spill were to occur in close proximity to finfish or shellfish, the effects would likely be sub-lethal and the extent of damage would be reduced to the capability of adult fish and shellfish to avoid a spill, to metabolize hydrocarbons and to excrete both metabolites and parent compounds.

  In the event of an unanticipated blowout, LLOG will implement industry wide standards for using proven equipment and technology for such responses. LLOG would immediately implement its Regional Oil Spill Response Plan and activate source control and countermeasures to minimize these potential impacts.

- **Marine and Pelagic Birds**

  As a result of the proposed activities, marine and pelagic birds may be adversely impacted by an accidental oil spill, by the birds coming into contact with the released oil.

  In the event of an unanticipated blowout resulting in an oil spill, it is likely to have an impact based on the industry wide standards for using proven equipment and technology for such responses. In that event, LLOG will implement the Regional Oil Spill Response Plan and activate source control and countermeasures to minimize these potential impacts.

- **Public Health and Safety**

  There are no anticipated emissions, effluents, wastes sent to shore, and/or accidents from the proposed activities that could cause impacts to the public health safety. LLOG has requested BOEM approval to classify the proposed objective area as absent of hydrogen sulfide.

Coastal and Onshore

- **Beaches**

  As a result of the proposed activities, beaches may be adversely impacted by an accidental oil spill. However, due to the distance from shore (approximately 40 miles, and the response capabilities that would be implemented, no significant adverse impacts are expected. Both historical spill data and the combined trajectory/risk calculations referenced in the publication of OCS EIS/EA BOEM 2016-016 indicate there is little risk of contact or impact to the coastline and associated environmental resources.

  In the event of an unanticipated blowout, LLOG will implement industry wide standards for using proven equipment and technology for such responses. LLOG would immediately implement its Regional Oil Spill Response Plan and activate source control and countermeasures to minimize these potential impacts.

- **Wetlands**

  As a result of the proposed activities, wetlands may be adversely impacted by an accidental oil spill. However, due to the distance from shore (approximately 40 miles), and the response capabilities that would be implemented, no significant adverse impacts are expected. Both historical spill data and the combined trajectory/risk calculations referenced in the publication of OCS EIA/EA BOEM 2016-016 indicate there is little risk of contact or impact to the coastline and associated environmental resources.

In the event of an unanticipated blowout, LLOG will implement industry wide standards for using proven equipment and technology for such responses. LLOG would immediately implement its Regional Oil Spill Response Plan and activate source control and countermeasures to minimize these potential impacts.

- **Shore Birds and Coastal Nesting Birds**

  As a result of the proposed activities, shore birds and coastal nesting birds may be adversely impacted by an accidental oil spill. However, due to the distance from shore (approximately 40 miles) and the response capabilities that would be implemented, no significant adverse impacts are expected. Both historical spill data and the combined trajectory/risk calculations referenced in the publication of OCS EIA/EA BOEM 2016-016 indicate there is little risk of contact or impact to the coastline and associated environmental resources.

  In the event of an unanticipated blowout, LLOG will implement industry wide standards for using proven equipment and technology for such responses. LLOG would immediately implement its Regional Oil Spill Response Plan and activate source control and countermeasures to minimize these potential impacts.

- **Coastal Wildlife Refuges**

  As a result of the proposed activities, coastal wildlife refuges may be adversely impacted by an accidental oil spill. However, due to the distance from shore (approximately 40 miles) and the response capabilities that would be implemented, no significant adverse impacts are expected. Both historical spill data and the combined trajectory/risk calculations referenced in the publication of OCS EIA/EA BOEM 2016-016 indicate there is little risk of contact or impact to the coastline and associated environmental resources.

  In the event of an unanticipated blowout, LLOG will implement industry wide standards for using proven equipment and technology for such responses. LLOG would immediately implement its Regional Oil Spill Response Plan and activate source control and countermeasures to minimize these potential impacts.

- **Wilderness Area**

  As a result of the proposed activities, wilderness areas may be adversely impacted by an accidental oil spill. However, due to the distance from shore (approximately 40 miles) and the response capabilities that would be implemented, no significant adverse impacts are expected. Both historical spill data and the combined trajectory/risk calculations referenced in the publication of

OCS EIA/EA BOEM 2016-016 indicate there is little risk of contact or impact to the coastline and associated environmental resources.

In the event of an unanticipated blowout, LLOG will implement industry wide standards for using proven equipment and technology for such responses. LLOG would immediately implement its Regional Oil Spill Response Plan and activate source control and countermeasures to minimize these potential impacts.

Other Resources Identified

LLOG has not identified any other environmental resources other than those addressed above.

C. Impacts of Proposed Activities

LLOG does not anticipate any impacts on the offshore site specific locations, offshore vicinity, and/or coastal and onshore environmental conditions based on the potential impacts identified in the EIA worksheets and historical operations in the exploration of this reservoir.

D. Environmental Hazards

The Gulf of Mexico may experience several hurricanes throughout the season which typically runs from June through November. A severe hurricane may impact the activities covered in this Plan. Such impacts may be damage to the drilling rig, the unanticipated release of hydrocarbons depending upon the current status of the well. Additionally, the surfaces located in Mississippi Canyon Block 629 has the potential to be affected by the "Loop Current" which is a warm ocean current in the Gulf of Mexico that flows northward between Cuba and the Yucatan Peninsula, moves northward into the Gulf of Mexico, then loops east and south before exiting to the east through the Florida Straits. While the loop current is present approximately 95% of the time, it is most active in the summer and fall seasons.

To mitigate potential impacts to the well during impending hurricanes or loop currents, LLOG will take precautionary measures by securing the well, rig and evacuation of personnel; and will comply with the requirements of NTL's 2008-G09 and 2009-G10.

E. Alternatives

LLOG did not consider any alternatives to reduce environmental impacts as a result of the proposed activities.

F. Mitigation Measures

LLOG will not implement any mitigation measures to avoid, diminish or eliminate potential environmental resources, other than those required by regulation and policy.

G. Consultation

LLOG has not contacted any agencies or persons for consultation regarding potential impacts associated with the proposed activities. Therefore, a list of such entities is not being provided.

H. Preparer

Questions or requests for additional information should be made to LLOG's authorized representative of this Plan:

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Covington, Louisiana 70433
Sue.Sachitana@llog.com
985-801-4300 (Phone)

I. References

The following documents were utilized in preparing the Environmental Impact Assessment:

Document	Author	Dated
AUV Archaeological Investigation, Block MC 629 Shallow Hazards Assessment, Benthic Communities Evaluation, and Archaeological Resource Survey	Echo Offshore LLC Berger Geosciences, LLC	2018 2018
BOEM Environmental Impact Statement Report No. OCS EIS/EA BOEM 2016-016	Bureau of Ocean Energy Management	2017
Title 30 CFR Part 250 Subpart B (250.216 / 250.221 / 250.223 / 250.227	Bureau of Ocean Energy Management	2006
NTL 2015-N04 "General Finance Assurance"	Bureau of Ocean Energy Management	2015
NTL 2005-G07 "Archaeological Resource Surveys and Reports"	Bureau of Ocean Energy Management	2005
NTL 2012-N04 "Flaring and Venting Regulations"	Bureau of Ocean Energy Management	2012
NTL 2006-G07 "Revisions to the List of OCS Lease Blocks Requiring Archaeological Surveys and Reports:"	Bureau of Ocean Energy Management	2006
BOEM NTL 2016-G02 "Implementation of seismic Survey Mitigation Measures and Protected Species Observer Program"	Bureau of Safety and Environmental Enforcement and Bureau of Ocean Energy Management	2016
BSEE NTL 2015-G03 "Marine Trash & Debris Awareness & Elimination"	Bureau of Safety and Environmental Enforcement	2015
BOEM NTL 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protective Species"	Bureau of Ocean Energy Management	2016
NTL 2008-G04 "Information Requirements for Exploration Plans and Development Operations Coordination Documents"	Bureau of Ocean Energy Management	2008
NTL 2008-N05 "Guidelines for Oil Spill Financial Responsibility for Covered Offshore Facilities"	Bureau of Ocean Energy Management	2008
NTL 2016-N01 "Requiring Additional Security"	Bureau of Ocean Energy Management	2016
Joint NTL 2011-G01 "Revisions to the List of OCS Lease Blocks Requiring Archaeological Resource Surveys and Reports"	Bureau of Ocean Energy Management	2011
NTL 2018-G01 "Ocean Current Monitoring"	Bureau of Ocean Energy Management	2018
NTL 2009-G27 "Submitting Exploration Plans and Development Operations Coordination Documents"	Bureau of Ocean Energy Management	2009
NTL 2009-G29 "Implementation Plan for Transition from North American Datum 27 to North American Datum 83"	Bureau of Ocean Energy Management	2009
NTL 2009-G34 "Ancillary Activities"	Bureau of Ocean Energy Management	2009
Joint NTL 2014-G01 "Drilling Windows, Eastern Gulf of Mexico"	Bureau of Safety and Environmental Enforcement and Bureau of Ocean Energy Management	2014
NTL 2009-G39 "Biologically-Sensitive Underwater Features and Areas"	Bureau of Ocean Energy Management	2009
NTL 2009-G40 "Deepwater Benthic Communities"	Bureau of Ocean Energy Management	2009
NTL 2009-N11 "Air Quality Jurisdiction on the OCS"	Bureau of Ocean Energy Management	2009
NTL 2015-N01 "Information Requirements for EP's, DOCD's, DPP on the OCS"	Bureau of Ocean Energy Management	2015
NPDES General Permit GMG290000	EPA – Region VI	2017
Regional Oil Spill Response Plan	LLOG Exploration Offshore, L.L.C.	2017/2018

APPENDIX Q
ADMINISTRATIVE INFORMATION
(30 CFR Part 550.228 and 550.262)

A. Exempted Information Description (Public Information Copies only)

Excluded from the Public Information copies are the following:

- Proposed bottom hole location information
- Proposed total well depths (measured and true vertical depth)
- Production Rates and Life of Reserves
- New and Unusual Technologies
- Geological and Geophysical Attachments

B. Bibliography

The following documents were utilized in preparing this Plan:

Document	Author	Dated
AUV Archaeological Investigation, Block MC 629 Shallow Hazards Assessment, Benthic Communities Evaluation, and Archaeological Resource Survey	Echo Offshore LLC Berger Geosciences, LLC	2018 2018
BOEM Environmental Impact Statement Report No. OCS EIS/EA BOEM 2016-016	Bureau of Ocean Energy Management	2017
Regional Oil Spill Response Plan	LLOG Exploration Offshore, L.L.C.	2017/2018