UNITED STATES GOVERNMENT September 17, 2020
MEMORANDUM

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

Subject: Public Information copy of plan

Control #	-	Control N-10174
Type	-	Initial Exploration Plan
Lease(s)	-	OCS-G 36250 Block - 509 Mississippi Island Area
Operator	-	LLOG Exploration Offshore LLC
Description	-	Subsea Wells A, Alt A, B, Alt B, C, Alt C, D, Alt D, E and Alt E
Rig Type	-	Not Found

Attached is a copy of the subject plan.

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

Nicole Martinez
Plan Coordinator

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

INITIAL EXPLORATION PLAN

OCS-G-36250 LEASE

MISSISSIPPI CANYON BLOCK 509

PUBLIC INFORMATION

Prepared By:

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Date: August, 2021

LLOG EXPLORATION OFFSHORE, L.L.C.
INITIAL EXPLORATION PLAN
OCS-G 36250 LEASE
MISSISSIPPI CANYON 509

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), NTL No. 2008-G04 and NTL 2015-N01, LLOG Exploration Offshore, LLC (LLOG) proposes the drilling, completion, testing and installation of subsea wellhead and/or manifold for five (5) proposed surface locations A, B, C, D & E on Lease OCS-G-36250, Mississippi Canyon Block 509 and proposes five mirrored wells (Alt A, Alt B, Alt C, Alt D & Alt E) to be drilled only in the event of a failure. The operations proposed will not utilize pile-driving, nor is LLOG proposing any new pipelines expected to make landfall.

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 Drillship or a DP semi-submersible drilling rig for the proposed operations. A description of the drilling units 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 table details 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)

Initial Exploration Plan
OCS-G-36250 Lease
Mississippi Canyon Block 509

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

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

OCS PLAN INFORMATION FORM

General Information

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

Company Name: LLOG EXPLORATION OFFSHORE, LLC	BOEM Operator Number: 02058
Address:	Contact Person: SUE SACHITANA
1001 OCHNER BOULEVARD, SUITE 100	Phone Number: 985-801-4300
COVINGTON, LA 70433	E-Mail Address: SUE.SACHITANA@LLOG.COM

If a service fee is required under 30 CFR 550.125(a), provide the	Amount paid	$18,365.00	Receipt No.	26T4KP31

Project and Worst Case Discharge (WCD) Information

Lease(s): G36250	Area: MC 509	Block(s):	Project Name (If Applicable): Hawks Shallow

Objective(s)	X	Oil		Gas		Sulphur		Salt	Onshore Support Base(s): FOURCHON

Platform/Well Name: Loc A	Total Volume of WCD: ~1.65 MMBO	API Gravity: 36°
Distance to Closest Land (Miles): 43	Volume from uncontrolled blowout: 336,100 BOPD	

Have you previously provided information to verify the calculations and assumptions for your WCD?		Yes	X	No
If so, provide the Control Number of the EP or DOCD with which this information was provided				
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		Caisson		Tension leg platform
	Gorilla Jackup		Platform rig		Fixed platform		Compliant tower
	Semisubmersible		Submersible		Spar		Guyed tower
X	DP Semisubmersible		Other (Attach Description)		Floating production system		Other (Attach Description)

Drilling Rig Name (If Known):

Description of Lease Term Pipelines

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

Schedule of Activities

WELL / EVENT	SPUD	TD	COMPL START	COMPL FINISH	Number of Days	DESCRIPTION
MC 509 A	1-Jun-22	12-Sep-22			103	Drill
MC 509 A			1-Jun-23	12-Sep-23	103	Complete
MC 509 B	1-Jun-24	12-Sep-24			103	Drill
MC 509 B			1-Jun-25	12-Sep-25	103	Complete
MC 509 C	1-Jun-26	12-Sep-26			103	Drill
MC 509 C			1-Jun-27	12-Sep-27	103	Complete
MC 509 D	1-Jun-28	12-Sep-28			103	Drill
MC 509 D			1-Jun-29	12-Sep-29	103	Complete
MC 509 E	1-Jun-30	12-Sep-30			103	Drill
MC 509 E			1-Jun-31	12-Sep-31	103	Complete

Days in 2022	103
Days in 2023	103
Days in 2024	103
Days in 2025	103
Days in 2026	103
Days in 2027	103
Days in 2028	103
Days in 2029	103
Days in 2030	103
Days in 2031	103

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): Loc. A				Previously reviewed under an approved EP or DOCD?		Yes	X	No
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): 336,100 BOPD	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	36°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 36250	OCS	OCS OCS
Area Name	Mississippi Canyon		
Block No.	509		
Blockline Departures (in feet)	N/S Departure: F N 2,830' L E/W Departure: F W 4,555' L	N/S Departure: F____ L E/W Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,081,675.00 Y: 10,340,690.00	X: Y:	X: X: X: Y: Y: Y:
Latitude/ Longitude	Latitude 28° 29' 01.413" N Longitude 88° 44' 23.117" W	Latitude Longitude	Latitude Latitude Latitude Longitude Longitude Longitude
Water Depth (Feet): 4,244'	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):
Anchor Radius (if applicable) in feet: N/A			TVD (Feet): TVD (Feet): TVD (Feet):

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): Loc. Alt A					Previously reviewed under an approved EP or DOCD?		Yes	X	No
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): 336,100 BOPD	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	36°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 36250	OCS	OCS OCS
Area Name	Mississippi Canyon		
Block No.	509		
Blockline Departures (in feet)	N/S Departure: F N ___ L 2,780'	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F W ___ L 4,555'	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: 1,081,675.00	X:	X: X: X:
	Y: 10,340,740.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28° 29' 01.908" N	Latitude	Latitude Latitude Latitude
	Longitude 88° 44' 23.125" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 4,244'		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): Loc. B				Previously reviewed under an approved EP or DOCD?		Yes	X	No
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): 336,100 BOPD	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	36°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 36250	OCS	OCS OCS
Area Name	Mississippi Canyon		
Block No.	509		
Blockline Departures (in feet)	N/S Departure: F N ___ L 980'	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F W ___ L 2,650'	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: 1,079,770.00	X:	X: X: X:
	Y: 10,342,540.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28° 29' 19.445" N	Latitude	Latitude Latitude Latitude
	Longitude 88° 44' 44.764" W	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 4,198	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 =	

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): Loc. Alt B					Previously reviewed under an approved EP or DOCD?		Yes	X	No
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): 336,100 BOPD	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	36°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 36250	OCS	OCS OCS
Area Name	Mississippi Canyon		
Block No.	509		
Blockline Departures (in feet)	N/S Departure: F N 980' L	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F W 2,700' L	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: 1,079,820.00	X:	X: X: X:
	Y: 10,342,540.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28° 29' 19.462" N	Latitude	Latitude Latitude Latitude
	Longitude 88° 44' 44.204" W	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 4,198	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 =	

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): Loc. C				Previously reviewed under an approved EP or DOCD?		Yes	X	No
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): 336,100 BOPD	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	36°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 36250	OCS	OCS OCS
Area Name	Mississippi Canyon		
Block No.	509		
Blockline Departures (in feet)	N/S Departure: F N 6,639' L E/W Departure: F W 3,049' L	N/S Departure: F____ L E/W Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,080,169.00 Y: 10,336,881.00	X: Y:	X: X: X: Y: Y: Y:
Latitude/ Longitude	Latitude 28° 28' 23.485" N Longitude 88° 44' 39.372" W	Latitude Longitude	Latitude Latitude Latitude Longitude Longitude Longitude

Water Depth (Feet): 4,271	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 =	

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): Loc. Alt C					Previously reviewed under an approved EP or DOCD?		Yes	X	No
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): 336,100 BOPD	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	36°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 36250	OCS	OCS OCS
Area Name	Mississippi Canyon		
Block No.	509		
Blockline Departures (in feet)	N/S Departure: F N ___ L 6,589'	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F W ___ L 3,049'	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: 1,080,169.00	X:	X: X: X:
	Y: 10,336,931.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28° 28' 23.980" N	Latitude	Latitude Latitude Latitude
	Longitude 88° 44' 39.381" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 4,271		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): Loc. D					Previously reviewed under an approved EP or DOCD?		Yes	X	No
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): 336,100 BOPD				For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid		36°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 36250	OCS	OCS OCS
Area Name	Mississippi Canyon		
Block No.	509		
Blockline Departures (in feet)	N/S Departure: F N ___ L 6,371'	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 5,496'	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: 1,087,464.00	X:	X: X: X:
	Y: 10,337,149.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28° 28' 27.180" N	Latitude	Latitude Latitude Latitude
	Longitude 88° 43' 17.682" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 4,340		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): Loc. Alt D					Previously reviewed under an approved EP or DOCD?		Yes	X	No
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): 336,100 BOPD	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	36°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 36250	OCS	OCS OCS
Area Name	Mississippi Canyon		
Block No.	509		
Blockline Departures (in feet)	N/S Departure: F N L 6,321'	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 5,496'	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: 1,087,464.00	X:	X: X: X:
	Y: 10,337,199.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28° 28' 27.675" N	Latitude	Latitude Latitude Latitude
	Longitude 88° 43' 17.690" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 4,340		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): Loc. E				Previously reviewed under an approved EP or DOCD?		Yes	X	No
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): 336,100 BOPD	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	36°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 36250	OCS	OCS OCS
Area Name	Mississippi Canyon		
Block No.	509		
Blockline Departures (in feet)	N/S Departure: F N ___ L 5,174'	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F W ___ L 6,759'	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: 1,083,879.00	X:	X: X: X:
	Y: 10,338,346.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28° 28' 38.521" N	Latitude	Latitude Latitude Latitude
	Longitude 88° 43' 58.042" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 4,306		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): Loc. Alt E					Previously reviewed under an approved EP or DOCD?		Yes	X	No
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): 336,100 BOPD	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	36°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 36250	OCS	OCS OCS
Area Name	Mississippi Canyon		
Block No.	509		
Blockline Departures (in feet)	N/S Departure: F N ___ L 5,124'	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F W ___ L 6,759'	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: 1,083,879.00	X:	X: X: X:
	Y: 10,338,396.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28° 28' 38.016" N	Latitude	Latitude Latitude Latitude
	Longitude 88° 43' 58.050" W	Longitude	Longitude Longitude Longitude

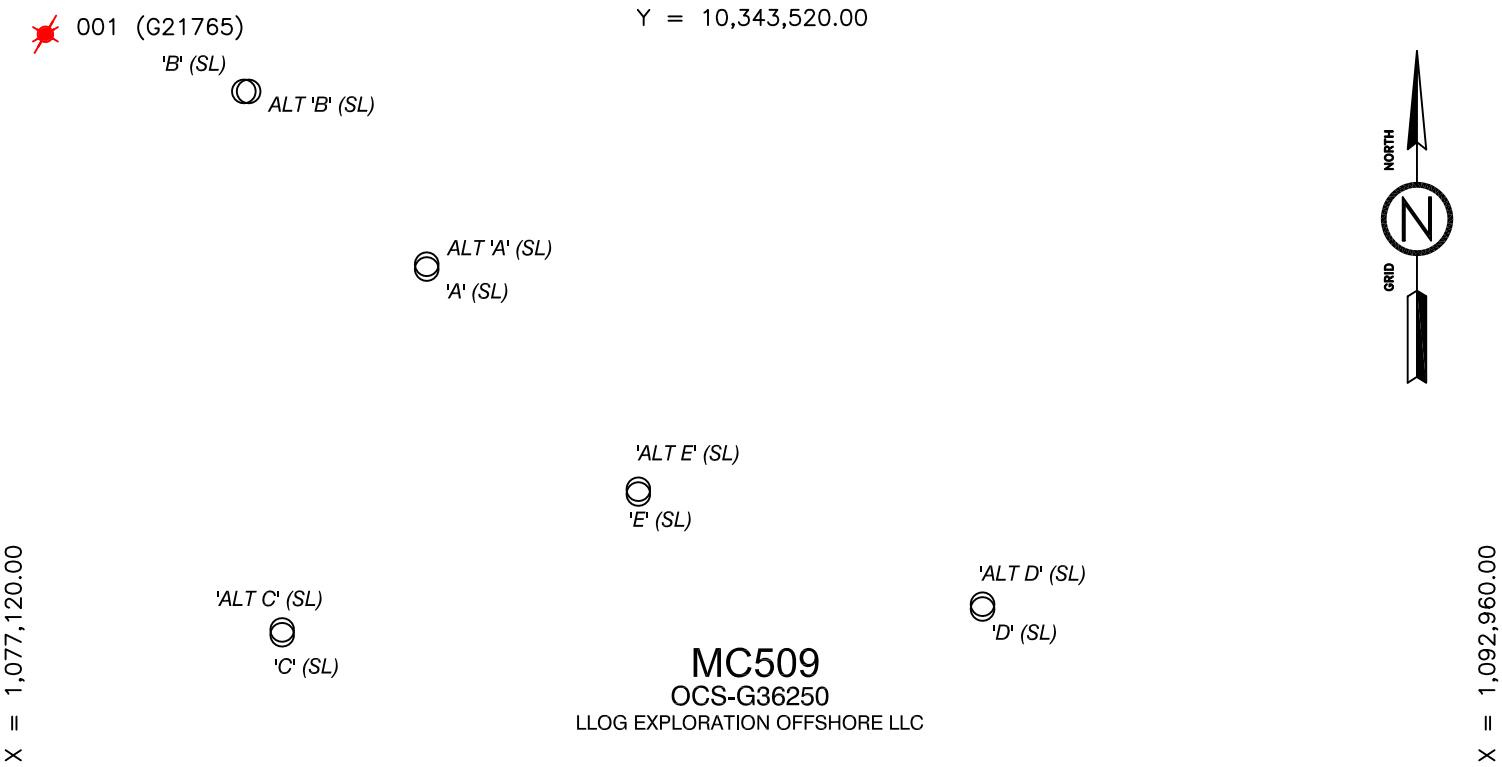
Water Depth (Feet): 4,306	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A			

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 Location Plats

Attachment A-2
(Public Information)



PROPOSED WELL LOCATIONS

LOCATION	BLOCK	CALLS		COORDINATES		LATITUDE	LONGITUDE	WD		
'A' (SL)	MC/509	4,555.00' FWL	2,830.00' FNL	X = 1,081,675.00	Y = 10,340,690.00	28° 29' 01.413"N	88° 44' 23.117"W	4,244'		
ALT 'A' (SL)	MC/509	4,555.00' FWL	2,780.00' FNL	X = 1,081,675.00	Y = 10,340,740.00	28° 29' 01.908"N	88° 44' 23.125"W	4,244'		
'B' (SL)	MC/509	2,650.00' FWL	980.00' FNL	X = 1,079,770.00	Y = 10,342,540.00	28° 29' 19.455"N	88° 44' 44.764"W	4,198'		
ALT 'B' (SL)	MC/509	2,700.00' FWL	980.00' FNL	X = 1,079,820.00	Y = 10,342,540.00	28° 29' 19.462"N	88° 44' 44.204"W	4,198'		
'C' (SL)	MC/509	3,049.00' FWL	6,639.00' FNL	X = 1,080,169.00	Y = 10,336,881.00	28° 28' 23.485"N	88° 44' 39.372"W	4,271'		
'ALT C' (SL)	MC/509	3,049.00' FWL	6,589.00' FNL	X = 1,080,169.00	Y = 10,336,931.00	28° 28' 23.980"N	88° 44' 39.381"W	4,271'		
'D' (SL)	MC/509	5,496.00' FEL	6,371.00' FNL	X = 1,087,464.00	Y = 10,337,149.00	28° 28' 27.180"N	88° 43' 17.682"W	4,340'		
'ALT D' (SL)	MC/509	5,496.00' FEL	6,321.00' FNL	X = 1,087,464.00	Y = 10,337,199.00	28° 28' 27.675"N	88° 43' 17.690"W	4,340'		
'E' (SL)	MC/509	6,759.00' FWL	5,174.00' FNL	X = 1,083,879.00	Y = 10,338,346.00	28° 28' 38.521"N	88° 43' 58.042"W	4,306'		
'ALT E' (SL)	MC/509	6,759.00' FWL	5,124.00' FNL	X = 1,083,879.00	Y = 10,338,396.00	28° 28' 39.016"N	88° 43' 58.050"W	4,306'		

Y = 10,327,680.00

PUBLIC INFORMATION

LLOG EXPLORATION OFFSHORE, L.L.C.

LLOG exploration

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

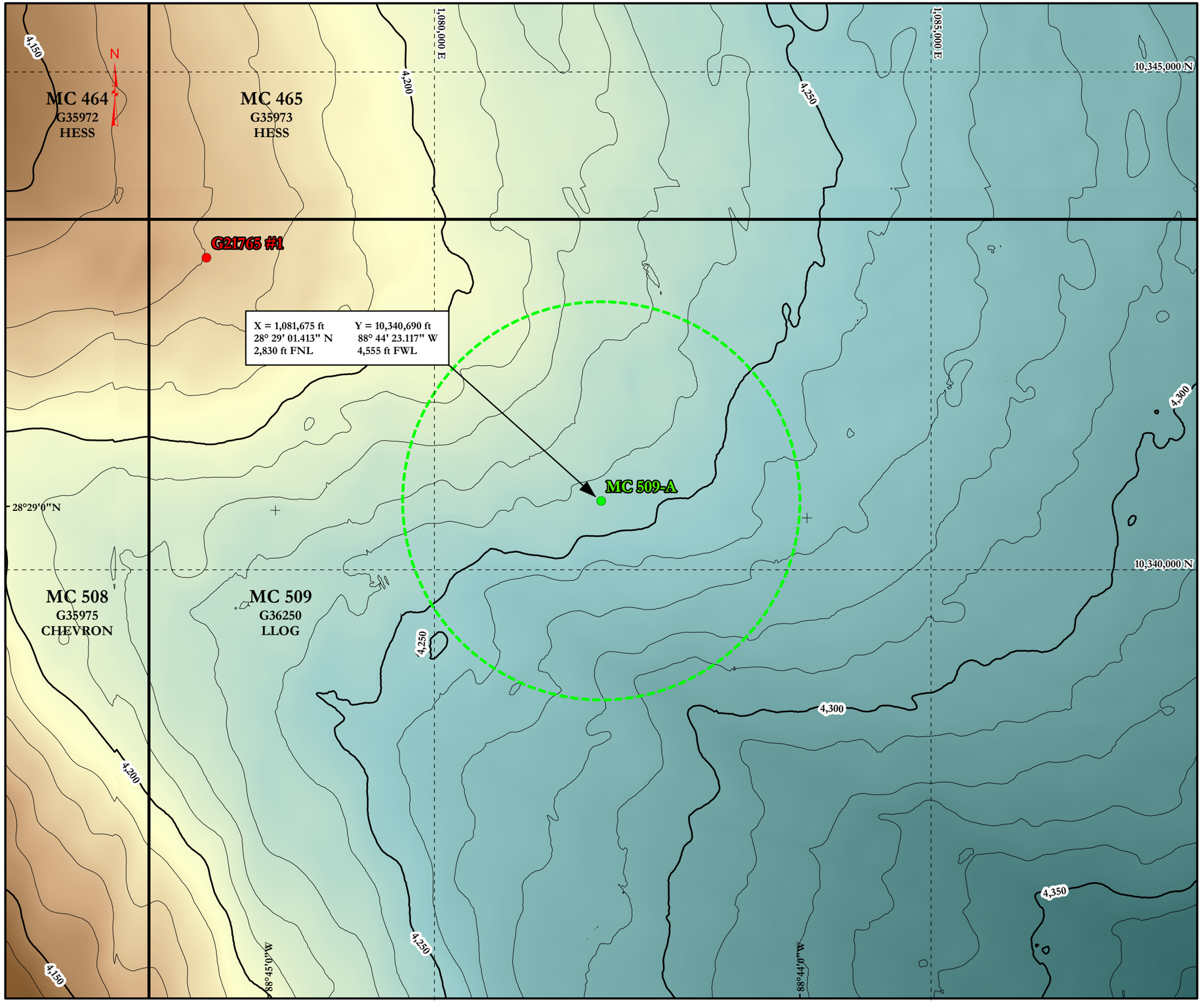
1,000 0 1,000 2,000
SCALE IN FEET

EXPLORATION PLAT
PROPOSED WELLS 'A', ALT 'A', 'B', ALT 'B', 'C', ALT 'C', 'D', ALT 'D', 'E' & ALT 'E'
OCS-G 36250 BLOCK 509
MISSISSIPPI CANYON AREA
GULF OF MEXICO

DRAWN BY: RJN	CHK. BY.: MEK	REV. No.:	JOB No.: 21-029	DWG No.: 21-029-EXP
DATUM: NAD 27	SPHEROID: CLARKE 1866	PROJECTION: U.T.M.	ZONE: 16	DATE: 8/11/2021	REV. DATE:	SCALE: 1"=2,000'	SHEET 1 OF 1

Bathymetry Map

Attachment A-3
(Public Information)



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Existing Well
- Proposed Well
- 2,000-ft Radius Circle
- 10-ft Contours
- 50-ft Contours

Depths
(Below Sea Level)
4,134 ft
4,373 ft

Grid Information:
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 (April 2019).

Geodetic Datum: NAD27
Projection: UTM
Zone: 16N
Grid Units: Feet

Interpretation By: T. Nguyen
Cartography: T. Nguyen
Project No.: 19-01-30
Date: May 2019

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

Scale =1:12,000

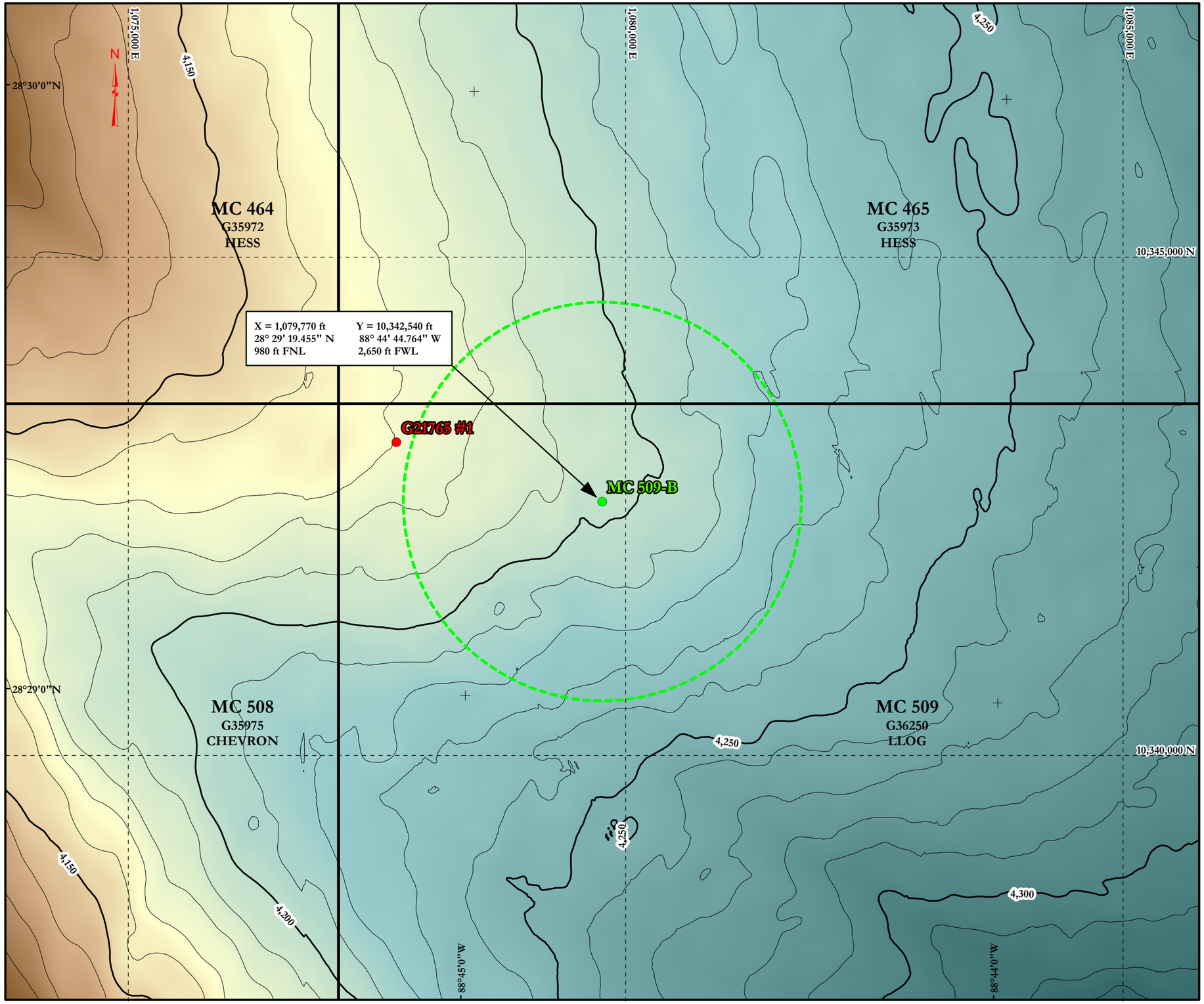
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-1
Bathymetry
Proposed Well MC 509-A
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Existing Well
- Proposed Well
- 2,000-ft Radius Circle
- 10-ft Contours
- 50-ft Contours

Depths
(Below Sea Level)

4,111 ft

4,332 ft

Grid Information:
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 (April 2019).

Geodetic Datum: NAD27 Projection: UTM Zone: 16N Grid Units: Feet	Interpretation By: T. Nguyen Cartography: T. Nguyen Project No.: 19-01-30 Date: May 2019

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

Scale =1:12,000

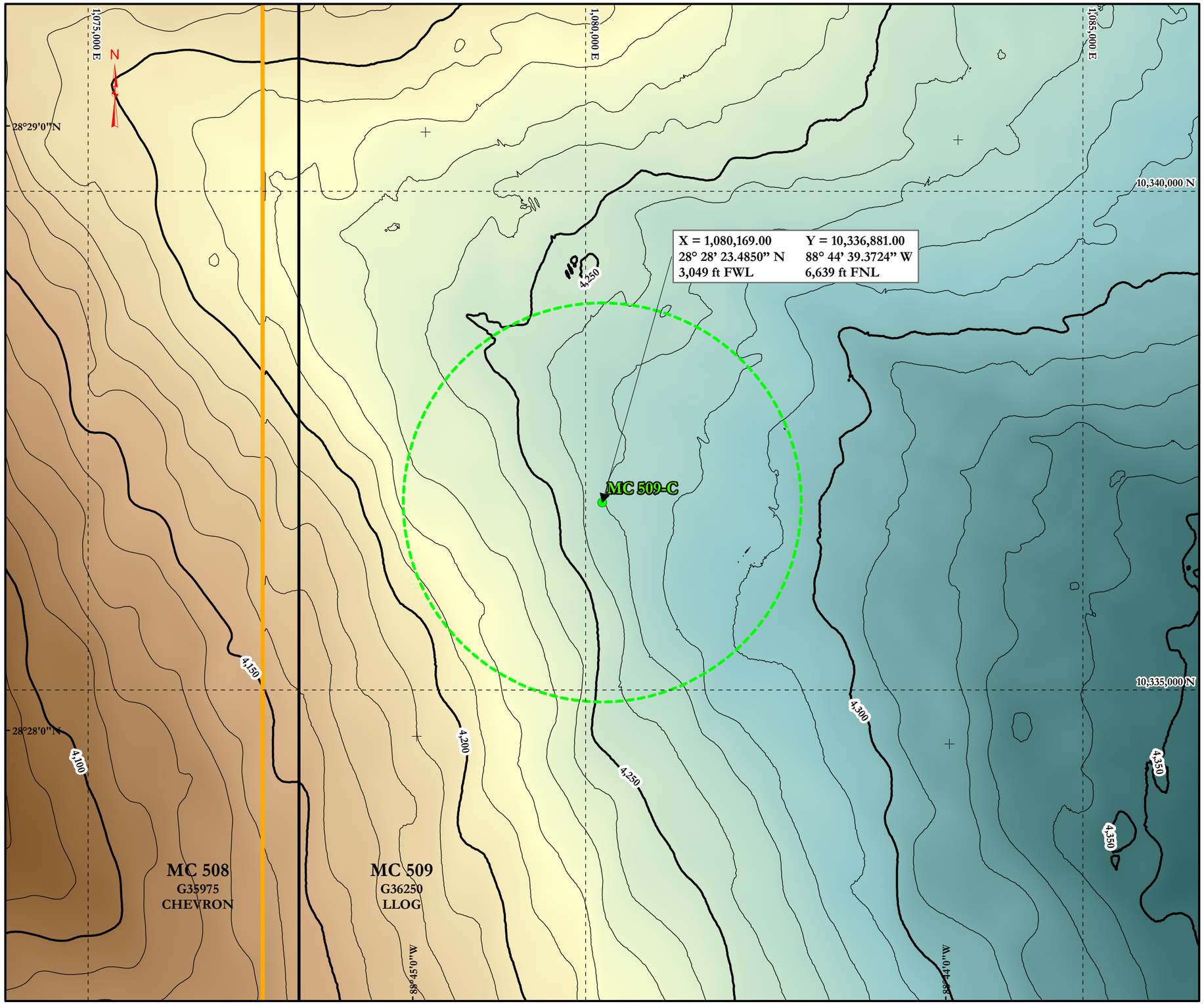
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-2
Bathymetry
Proposed Well MC 509-B
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- AUV Survey Area
- Proposed Well
- 2,000-ft Radius Circle
- 10-ft Contours
- 50-ft Contours

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

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

Rendering Illumination:
Azimuth: 300°
Elevation : 45°
Vertical Exaggeration: 5X

Depths
(Below Sea Level)

4,079 ft

4,357 ft

IMPORTANT NOTICE
This map is not intended for navigation purposes.
Public information obtained from BOEM database (August 2021).

Geodetic Datum: NAD27
Projection: UTM
Zone: 16N
Grid Units: Feet

Interpretation By: S. Ul-Hadi
Cartography: T. Nguyen
Project No.: 21-04-26
Date: August 2021

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

Scale =1:12,000

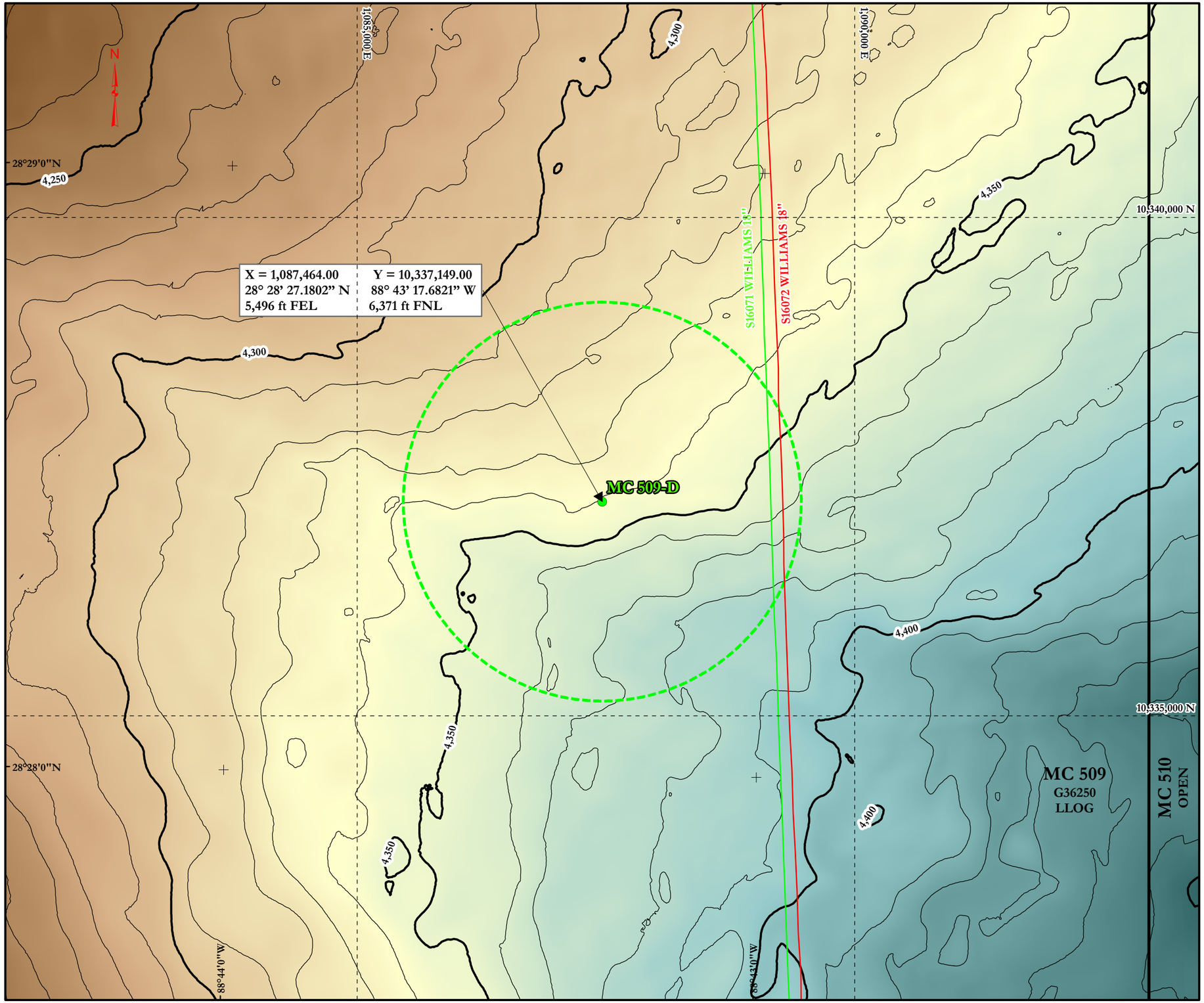
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-1
Bathymetry
Proposed Well MC 509-C
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Oil Pipeline, Active
- Gas Pipeline, Active
- Proposed Well
- 2,000-ft Radius Circle
- 10-ft Contours
- 50-ft Contours

Depths
(Below Sea Level)

4,227 ft

4,452 ft

Grid Information:
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 (August 2021).

Geodetic Datum: NAD27 Projection: UTM Zone: 16N Grid Units: Feet	Interpretation By: S. Ul-Hadi Cartography: T. Nguyen Project No.: 21-04-26 Date: August 2021

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

Scale =1:12,000

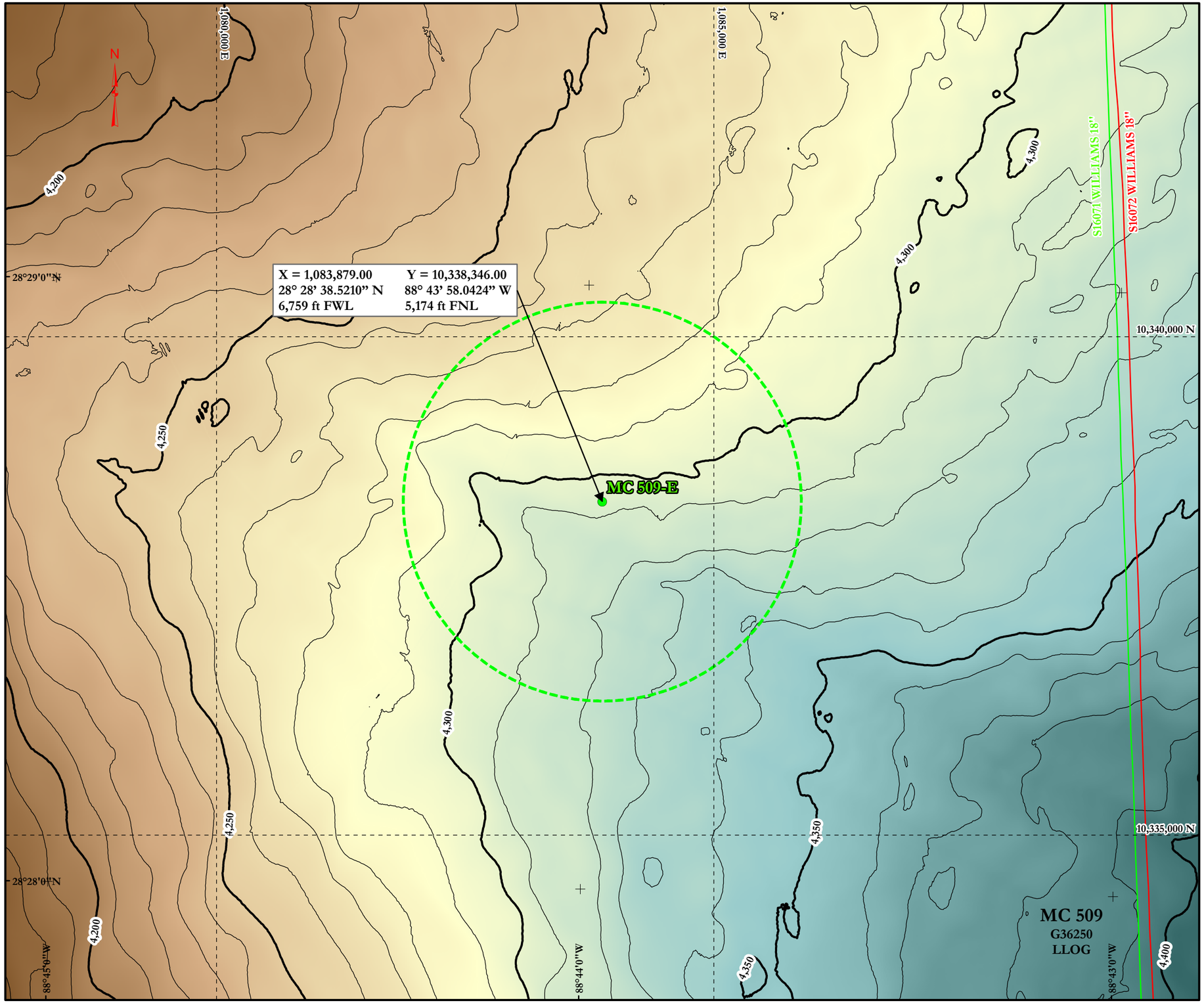
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-5
Bathymetry
Proposed Well MC 509-D
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Oil Pipeline, Active
- Gas Pipeline, Active
- Proposed Well
- 2,000-ft Radius Circle
- 10-ft Contours
- 50-ft Contours

Depths
(Below Sea Level)

4,167 ft

4,407 ft

Grid Information:
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 (August 2021).

Geodetic Datum: NAD27
Projection: UTM
Zone: 16N
Grid Units: Feet

Interpretation By: S. Ul-Hadi
Cartography: T. Nguyen
Project No.: 21-04-26
Date: August 2021

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

Scale =1:12,000

LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-9
Bathymetry
Proposed Well MC 509-E
Lease No. G36250

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
LA Consistency	LA Coastal Zone Management	To be filed
MS Consistency	MS Coastal Zone Management	To be filed
APD	BSEE	To be filed

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 256; subpart I; NTL No. 2000-G16, "Guidelines for General Lease Surety Bonds," and additional security under 30 CFR 256.53(d) and NTL No. 2003-N06 "Supplemental Bond Procedures."

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 (WCD) Calculations for the proposed well is included as part of this plan – Attachment B-1. The Blowout Scenario, including Site Specific Proposed Relief Well and Intervention Planning and Relief Well Response Time Estimate (Public Information) - Attachment B-2.

NTL 2015-N01 Data

Worst Case Discharge Calculations
Attachment B-1

(Proprietary Information)

Initial Exploration Plan
OCS-G-36250 Lease
Mississippi Canyon Block 509

NTL 2015-N01 Data

Blowout Scenario

Attachment B-2
(Public Information)

Initial Exploration Plan
OCS-G-36250 Lease
Mississippi Canyon Block 509

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	**INITIAL EP**
Type of Activity	Drilling / Completion
Facility Location (area / block)	**MC 509** (surface location)
Facility Designation	MODU
Distance to Nearest Shoreline (statute miles)	**~43**
Uncontrolled Blowout (Volume per day – Drilling Ops)	**336,100 bbls** (max estimated)
Type of Fluid	Crude Oil

C) Total volume and maximum duration of the potential blowout

Duration of Flow (days)	**106** days total **(see Relief Well Response Estimate below)**
Total Volume of Spill (bbls)	**35.6 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 functions 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 will have one deepwater MODU under contract **(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 Q5000 (DP Semi)
Relief Well Drilling Rigs	• Seadrill West Neptune (DP Drillship) • Transocean Deepwater Asgard (DP Drillship) • Pacific Sharav (DP Drillship) • Valaris Rowan Relentless (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 drilling 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 well would be drilled from an appropriately cleared-of-hazards surface location.

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	10
RELIEF WELL(S) OPERATIONS • continue intervention and containment measures • continue spill control measures • drill relief well (s)	81
PERFORM HYDRAULIC KILL OPERATIONS / SECURE BLOWNOUT WELL • continue intervention and containment measures • continue spill control measures • perform hydraulic kill operations, monitor well, secure well	10
ESTIMATED TOTAL DAYS OF UNCONTROLLED FLOW	**106**
SECURE RELIELF WELL(S) / PERFORM P&A / TA OPERATIONS / DEMOBE	30
TOTAL DAYS	**136**

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

A Shallow Hazards Assessment and Benthic Communities Evaluation for Block 509, Mississippi Canyon Area was prepared by Berger Geosciences dated May 2019 which was submitted to BOEM by letter dated May 7, 2019. An AUV Archaeological Investigation was prepared by Oceaneering dated February, 2019 for OCS-G-36250 Lease, Block 509, Mississippi Canyon Area. This report was filed with BOEM by letter dated March 7, 2019.

F. Shallow Hazards Assessment

Utilizing the 3D deep seismic exploration data a shallow hazards analysis was prepared 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 did not run 3-D seismic for this prospect.

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)

Initial Exploration Plan
OCS-G-36250 Lease
Mississippi Canyon Block 509

Wellsite Discussion

Mississippi Canyon Area
Block 509
Gulf of Mexico

Table of Contents: Wellsite Discussion Page

List of Tables

List of Figures

List of Maps

Shallow Hazards Assessment for the Proposed Wells

This section contains an assessment of the shallow hazards and a tophole prognosis for two proposed exploration wells located within MC 509.

The seafloor benthic communities assessment considers surface conditions within the muds and cuttings discharge radius of 2,000-ft from the proposed well locations. The archaeologic assessment considers surface conditions within 1,000-ft of the proposed well locations. The wellsite assessment considers the conditions within a 500-ft radius from the proposed well locations from the seafloor to 7,000 ft below the mudline (BML; ~2.20 s BML).

Maximum Anchor Radius Criteria

LLOG anticipates using a dynamically positioned mobile offshore drilling unit (MODU) in the Seafloor Assessment area; therefore, no specific anchor pattern has been analyzed.

Tophole Prognosis Criteria

The following sections specify the criteria used to develop the tophole prognosis for the proposed wells. The assessment is based on the evaluation of high-resolution geophysical data, 3-D seismic data, and comparison to regional stratigraphic units as available. The tophole assessment is restricted to the specific proposed well locations.

Gas Hydrates. The base of the gas hydrate stability zone (BGHSZ) is calculated based on Maekawa et al. (1995). The potential for solid gas hydrates was evaluated for the proposed wells. The criteria include:

- Is water depth conducive for gas hydrate formation?
- What is the depth to the BGHSZ at the proposed well?
- Is a 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 wells. The criteria used to evaluate the proposed wells include:

- Does an anomalous amplitude event exist in proximity to 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 wells. 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, or 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 509-A

The following is a discussion of Proposed Well 509-A along with a twinned location Proposed Well MC 509-Alt-A. The surface location for MC 509-A is in the northwestern portion of MC 509.

The water depth at Proposed Well MC 509-A is 4,244 ft BSL (Map W-1). The proposed well is within a relatively smooth seafloor that slopes to the southeast at about 0.4°. The proposed location provided by LLOG is as follows:

Table W-1. Location, block calls, and seismic lines for Proposed Well MC 509-A

NAD27 UTM Zone 16 North, US Survey ft		Geographic Coordinates	
X	**Y**	**Latitude**	**Longitude**
1,081,675.00	10,340,690.00	28° 29' 01.413" N	88° 44' 23.117" W
Block Calls		**3-D Seismic Line Reference**	
		Line	**Trace**
4,555’ FWL	2,830’ FNL	14997	14670

Twinned Location.

Proposed Well MC 509-Alt-A is located 50 ft north of Proposed Well MC 509-A with the same well path, and is intended to be used as an alternate drilling location. Seafloor and subsurface conditions at the twinned well 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 Twinned Well MC 509-Alt-A

NAD27 UTM Zone 16 North, US Survey ft		Geographic Coordinates	
X	**Y**	**Latitude**	**Longitude**
1,081,675.00	10,340,740.00	28° 29' 01.906" N	88° 44' 23.125" W
		Block Calls	
		4,555’ FWL	2,780’ FNL

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 509-A, the power spectrum was extracted from a subset that ranges from Inline 14897 to 15097 and Crossline 14570 to 14770, and is limited to the upper two seconds below the seafloor. The frequency content within the upper two seconds below the seafloor is of sufficient quality for shallow hazards analysis.

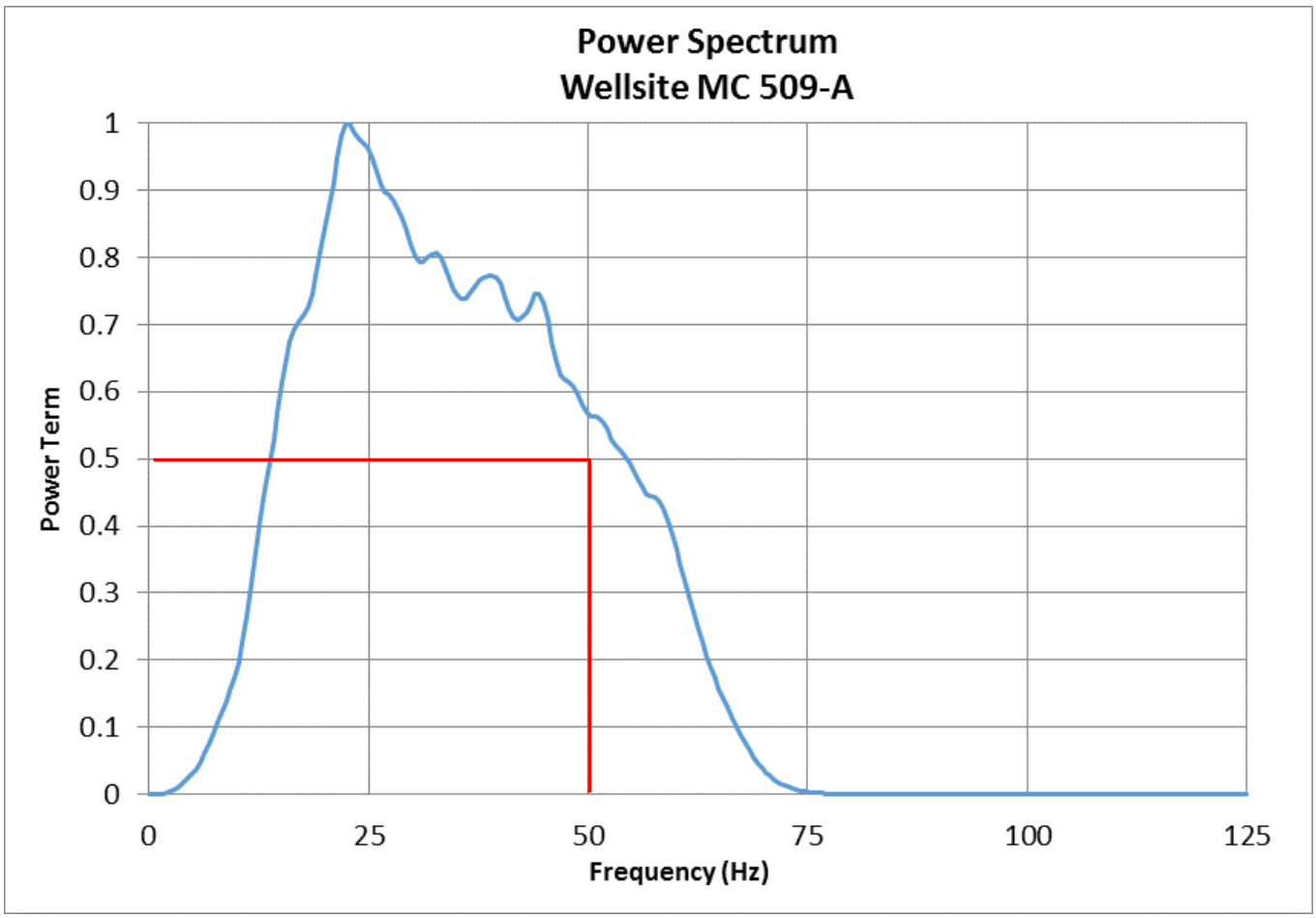


Figure W-1. Power spectrum at Proposed Well MC 509-A

Seafloor Conditions

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

Seafloor Morphology. Proposed Well MC 509-A is located in the northwestern portion of MC 509. Water depth near the proposed well ranges from 4,134 ft to 4,373 ft BSL (Map W-1). The seafloor at the proposed well location is hummocky, no seafloor faults or other seafloor features are identified within 2,000 ft of the proposed well location (Map W-1).

There are no seafloor faults within 2,000 ft of the proposed well location.

Benthic Communities Assessment. There is no evidence of fluid migration to the seafloor within 2,000 ft of Proposed Well MC 509-A. There are no seafloor amplitude anomalies or signs of gas migration within 2,000 ft of the proposed well (Map 5). There are no BSRs or other seismic indicators of gas hydrates within 2,000 ft of the proposed well.

Features or areas that could support high-density chemosynthetic or other benthic communities are not anticipated within 2,000 ft of Proposed Well MC 509-A.

Infrastructure. There is one existing well within the Seafloor Assessment area located approximately 4,700 ft northwest of the proposed well (Map W-1)

No infrastructure is within 2,000 ft of the proposed well location.

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 509. Pursuant to the public information in the NOAA Automated Wreck and Obstruction Information System and Navigational Charts (NOAA, 2016); no shipwrecks are reported within MC 509. The required archaeological survey and report was completed by Oceaneering and was submitted to LLOG under separate cover. For avoidances and sonar contacts please refer to the Oceaneering report.

For details about sonar contacts and avoidances within the Seafloor Assessment area please refer to the Oceaneering report (2019).

Stratigraphy and Tophole Prognosis

The *wellsite assessment* covers the subsurface conditions within a 500-ft radius from the proposed well path from the seafloor to the investigation limit of 7,000 ft BML. Seven 3-D seismic marker horizons (Horizons 10, 20, 30, 40, 50, 60, and 70) were interpreted at Proposed Well MC 509-A (Figure W-3). A generalized description of the stratigraphic sequences can be found in Section 1.4 of this report. The following is an assessment of the conditions that will be encountered at or near the borehole.

Faults. The wellbore at the Proposed Well MC 509-A will not penetrate any apparent seafloor faults (Map W-1). A vertical wellbore at Proposed Well MC 509-A will penetrate a buried fault at 6,169 ft BML (10,413 ft BSL), Figure W-3.

A vertical wellbore will intersect a buried fault at 6,169 ft BML (10,413 ft BSL).

Seafloor to the SBP Penetration Limit. Horizon 10 is the first stratigraphic marker horizon traced on the 3-D seismic data; however, the SBP data provided more detailed information about the sediments within this surficial sequence.

The sequence between the seafloor and the SBP penetration limit is interpreted to comprise approximately 13 ft of clay drape overlying stratified clays and silts to the subbottom profiler penetration limit (Figure W-2). The SBP penetration limit occurs at approximately 110 ft BML.

Seafloor to Horizon 10. On the 3-D seismic data, the sequence between the seafloor and Horizon 10 consists of low-amplitude, parallel and continuous reflections overlying low- to moderate-amplitude, semi-parallel and continuous reflections. These reflections are interpreted to represent fine-grained hemipelagic clay drape and stratified turbidites consisting of silts and clays overlying a basal silt and clay mass transport deposits (Figure W-3). Horizon 10 is expected to be encountered at 319 ft BML (Map 6 and Figure W-3).

There are no amplitude anomalies within 500 ft of the proposed wellbore within this sequence (Map 5).

This sequence is assessed as having a ***low*** potential for gas hydrates (Figure W-3). There is a ***negligible*** potential for shallow gas and a ***negligible*** potential for SWF within this sequence (Figure W-3).

Horizon 10 to Horizon 20. The Horizon 10 to Horizon 20 sequence consists of low amplitude, chaotic reflections interpreted to represent silt and sand dominated mass transport deposits (Figure W-3). The sequence may become sand rich at the base. Horizon 20 is mapped at 439 ft BML and marks the base of this sequence.

There are no amplitude anomalies within 500 ft of the proposed wellbore within this sequence (Map 5).

There is a ***low*** potential for gas hydrates within this sequence (Figure W-3). There is a ***negligible*** potential for shallow gas and a ***negligible*** potential for SWF within this sequence.

Horizon 20 to Horizon 30. The sequence between Horizon 20 and Horizon 30 contains three units. The upper unit is 137 ft thick at the proposed well location and consists of silt and clay turbidite deposits (Figure W-3). The middle unit is 243 ft thick at the proposed well location and consists of silt and clay-dominated mass transport deposits (Figure W-3). The lower unit is 419 ft thick at the proposed well location and consists of silt and sand-dominated slump and landslides that may correlate to the regional SWF Blue Unit (Figure W-3). Horizon 30 is expected to be encountered at 1,238 ft BML (Figure W-3).

There are no amplitude anomalies within 500 ft of the proposed wellbore within this sequence (Map 5).

There is a ***low*** potential for gas hydrates within this sequence. There is a ***negligible*** potential for shallow gas within this sequence. There is a ***low*** potential for and SWF from Horizon 20 (439 ft BML) to the

second interface at 819 ft BML, and a ***moderate*** potential for SWF from the second interface at 819 ft BML to Horizon 30 (1,238 ft BML; Figure W-3).

Horizon 30 to Horizon 40. The sequence between Horizon 30 and Horizon 40 contains two units. The upper unit is 501 ft thick at the proposed well location and consists of clay-dominated mass transport deposits (Figure W-3). The lower unit is 329 ft thick at the proposed well location and consists of silt and sand-dominated mass transport deposits that may correlate to the regional SWF Green Unit (Figure W-3). The two unit are separated by an interface at 1,739 ft BML and Horizon 40 is expected to be encountered at 2,068 ft BML (Figure W-3).

The base of the gas hydrate stability zone (BGHSZ) at this water depth is estimated to be within the upper unit of this sequence at 1,451 ft BML based on Maekawa et al. (1995).

There is one amplitude anomaly within 500 ft of the proposed wellbore within this sequence (Map 5). The anomaly is located 430 ft northeast of the proposed location and should not impact drilling operations at this location.

There is a ***low*** potential for gas hydrates from Horizon 30 (1,238 ft BML) to the BGHSZ at 1,451 ft BML and a ***negligible*** potential for gas hydrates from the BGHSZ at 1,451 ft BML to Horizon 40 at 2,068 ft BML (Figure W-3). There is a ***negligible*** potential for shallow gas from Horizon 30 to the interface at 1,739 ft BML and a ***low*** potential for shallow gas from the interface to Horizon 40. There is a ***negligible*** potential for SWF from Horizon 30 to the interface at 1,739 ft BML and a ***moderate*** potential for SWF from the interface to Horizon 40 (Figure W-3).

Horizon 40 to Horizon 50. The Horizon 40 to Horizon 50 sequence consists of low- to moderate-amplitude, chaotic reflections interpreted to represent silt dominated mass transport deposits overlying semi-continuous reflections interpreted as stratified silt and sand turbidites (Figure W-3). The sequence may correlate to the regional SWF Green Unit, Horizon 50 is mapped at 2,550 ft BML and marks the base of this sequence.

There are no amplitude anomalies within 500 ft of the proposed wellbore within this unit (Map 5).

There is a ***negligible*** potential for gas hydrates within this sequence (Figure W-3). There is a ***low*** potential for shallow gas and a ***moderate*** potential for SWF within this sequence.

Horizon 50 to Horizon 60. The Horizon 50 to Horizon 60 sequence consists of low- to moderate-amplitude, chaotic reflections interpreted to represent silt and clay mass transport deposits with possible thin sand (Figure W-3). Horizon 60 is mapped at 3,011 ft BML and marks the base of this sequence.

There are two amplitude anomalies within 500 ft of the proposed wellbore within this sequence (Map 5). The nearest is located 190 ft southeast and the furthest is 260 ft west of the proposed wellbore. These anomalies are isolated and should not impact drilling operations at this location.

There is a ***negligible*** potential for gas hydrates within this sequence (Figure W-3). There is a ***low*** potential for shallow gas and a ***low*** potential for SWF within this sequence.

Horizon 60 to Horizon 70. The Horizon 60 to Horizon 70 sequence consists of low- to moderate-amplitude, chaotic reflections interpreted to represent clay and silt mass transport deposits with possible thin sand intervals (Figure W-3). Horizon 70 is mapped at 4,492 ft BML and marks the base of this sequence.

There is one amplitude anomaly within 500 ft of the proposed wellbore within this sequence (Map 5). The isolated anomaly is located 330 ft southwest of the proposed location and should not impact drilling operations at this location.

There is a ***negligible*** potential for gas hydrates within this sequence (Figure W-3). There is a ***low*** potential for shallow gas and a ***low*** potential for SWF within this sequence.

Horizon 70 to Limit of Investigation. The Horizon 70 to Limit of Investigation (7,000 ft BML) sequence consists of low- to moderate-amplitude, chaotic reflections interpreted to represent clay and silt dominated turbidites (Figure W-3). The proposed wellbore will intersect a buried fault within this sequence at 6,169 ft BML.

There is one amplitude anomaly within 500 ft of the proposed wellbore within this sequence (Map 5). The isolated anomaly is located 430 ft southwest of the proposed location and should not impact drilling operations at this location.

There is a ***negligible*** potential for gas hydrates within this sequence (Figure W-3). There is a ***low*** potential for shallow gas and a ***low*** potential for SWF within this sequence.

Proposed Well MC 509-B

The following is a discussion of Proposed Well 509-B along with a twinned location Proposed Well MC 509-Alt-B. The surface location for MC 509-B is in the northwestern portion of MC 509.

The water depth at Proposed Well MC 509-B is 4,198 ft BSL (Map W-2). The proposed well is within a relatively smooth seafloor that slopes to the southeast at about 0.7°. The proposed location provided by LLOG is as follows:

Table W-3. Location, block calls, and seismic lines for Proposed Well MC 509-B

NAD27 UTM Zone 16 North, US Survey ft		Geographic Coordinates	
X	**Y**	**Latitude**	**Longitude**
1,079,770.00	10,342,540.00	28° 29' 19.455" N	88° 44' 44.764" W
Block Calls		**3-D Seismic Line Reference**	
		Line	**Trace**
2,650’ FWL	980’ FNL	14996	14735

Twinned Location.

Proposed Well MC 509-Alt-B is located 50 ft east of Proposed Well MC 509-B with the same well path, and is intended to be used as an alternate drilling location. Seafloor and subsurface conditions at the twinned well are approximately equivalent and no separate illustrations of the subsurface conditions were prepared. The proposed alternate drilling location is as follows:

Table W-4. Location and block calls for Proposed Twinned Well MC 509-Alt-B

NAD27 UTM Zone 16 North, US Survey ft		Geographic Coordinates	
X	**Y**	**Latitude**	**Longitude**
1,079,820.00	10,342,540.00	28° 29' 19.462" N	88° 44' 44.204" W
		Block Calls	
		2,700’ FWL	980’ FNL

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 509-B, the power spectrum was extracted from a subset that ranges from Inline 14896 to 15096 and Crossline 14635 to 14835, and is limited to the upper two seconds below the seafloor. The frequency content within the upper two seconds below the seafloor is of sufficient quality for shallow hazards analysis.

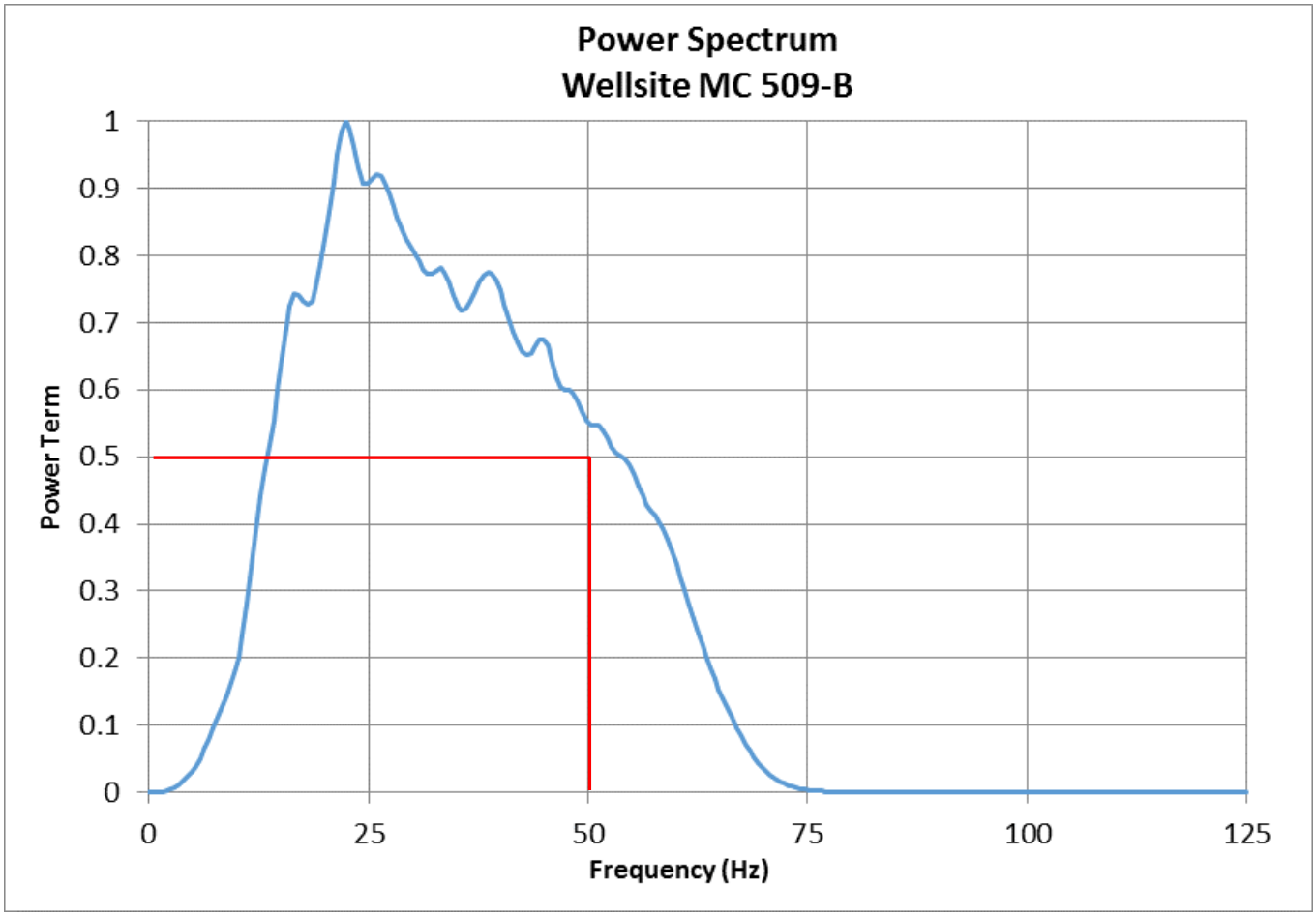


Figure W-4. Power spectrum at Proposed Well MC 509-B

Seafloor Conditions

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

Seafloor Morphology. Proposed Well MC 509-B is located in the northwestern portion of MC 509. Water depth near the proposed well ranges from 4,111 ft to 4,332 ft BSL (Map W-2). The seafloor at the proposed well location is hummocky, no seafloor faults or other seafloor features are identified within 2,000 ft of the proposed well location (Map W-2).

There are no seafloor faults within 2,000 ft of the proposed well location.

Benthic Communities Assessment. There is no evidence of fluid migration to the seafloor within 2,000 ft of Proposed Well MC 509-B. There are no seafloor amplitude anomalies or signs of gas migration within 2,000 ft of the proposed well (Map 5). There are no BSRs or other seismic indicators of gas hydrates within 2,000 ft of the proposed well.

Features or areas that could support high-density chemosynthetic or other benthic communities are not anticipated within 2,000 ft of Proposed Well MC 509-B.

Infrastructure. There is one e well within the Seafloor Assessment area located approximately 2,160 ft northwest of the proposed well (Map W-2)

No infrastructure is within 2,000 ft of the proposed well location.

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 509. Pursuant to the public information in the NOAA Automated Wreck and Obstruction Information System and Navigational Charts (NOAA, 2016); no shipwrecks are reported within MC 509. The required archaeological survey and report was completed by Oceaneering and was submitted to LLOG under separate cover. For avoidances and sonar contacts please refer to the Oceaneering report.

For details about sonar contacts and avoidances within the Seafloor Assessment area please refer to the Oceaneering report (2019).

Stratigraphy and Tophole Prognosis

The *wellsite assessment* covers the subsurface conditions within a 500-ft radius from the proposed well path from the seafloor to the investigation limit of 7,000 ft BML. Seven 3-D seismic marker horizons (Horizons 10, 20, 30, 40, 50, 60, and 70) were interpreted at Proposed Well MC 509-B (Figure W-6). A generalized description of the stratigraphic sequences can be found in Section 1.4 of this report. The following is an assessment of the conditions that will be encountered at or near the borehole.

Faults. The wellbore at the Proposed Well MC 509-B will not penetrate any apparent seafloor faults (Map W-2). A vertical wellbore at Proposed Well MC 509-B will intersect two buried faults at 4,913 ft and 6,144 ft BML (9,111 ft and 10,342 ft BSL), Figure W-6.

A vertical wellbore will intersect two buried faults at 4,913 ft and 6,144 ft BML (9,111 ft and 10,342 ft BSL)

Seafloor to the SBP Penetration Limit. Horizon 10 is the first stratigraphic marker horizon traced on the 3-D seismic data; however, the SBP data provided more detailed information about the sediments within this surficial sequence.

The sequence between the seafloor and the SBP penetration limit is interpreted to comprise approximately 15 ft of clay drape overlying stratified clays and silts to the subbottom profiler penetration limit (Figure W-5). The SBP penetration limit occurs at approximately 110 ft BML.

Seafloor to Horizon 10. On the 3-D seismic data, the sequence between the seafloor and Horizon 10 consists of low-amplitude, parallel and continuous reflections overlying low- to moderate-amplitude, semi-parallel and continuous reflections. These reflections are interpreted to represent fine-grained hemipelagic clay drape and stratified turbidites consisting of silts and clays overlying a basal silt and clay mass transport deposits (Figure W-6). Horizon 10 is expected to be encountered at 322 ft BML (Map 6 and Figure W-6).

There are no amplitude anomalies within 500 ft of the proposed wellbore within this sequence (Map 5).

This sequence is assessed as having a ***low*** potential for gas hydrates (Figure W-6). There is a ***negligible*** potential for shallow gas and a ***negligible*** potential for SWF within this sequence (Figure W-6).

Horizon 10 to Horizon 20. The Horizon 10 to Horizon 20 unit consist of low amplitude, chaotic reflections interpreted to represent fine-grained mass transport deposits (Figure W-6). The sequence may become sand rich at the base. Horizon 20 is mapped at 465 ft BML and marks the base of this sequence.

There are no amplitude anomalies within 500 ft of the proposed wellbore within this unit (Map 5).

There is a ***low*** potential for gas hydrates within this sequence (Figure W-6). There is a ***negligible*** potential for shallow gas and a ***negligible*** potential for SWF within this sequence.

Horizon 20 to Horizon 30. The sequence between Horizon 20 and Horizon 30 contains three units. The upper unit is 165 ft thick at the proposed well location consisting of silt and clay turbidite deposits (Figure W-6). The middle unit is 233 ft thick at the proposed well location and consists of silt and clay-dominated mass transport deposits (Figure W-6). The lower unit is 415 ft thick at the proposed well location and consists of silt and sand-dominated slump and landslides that may correlate to the regional SWF Blue Unit (Figure W-6). Horizon 30 is expected to be encountered at 1,278 ft BML (Figure W-6).

There are no amplitude anomalies within 500 ft of the proposed wellbore within this sequence (Map 5).

There is a ***low*** potential for gas hydrates within this sequence. There is a ***negligible*** potential for shallow gas within this sequence. There is a ***low*** potential for SWF from Horizon 20 (465 ft BML) to the second interface at 863 ft BML, and a ***moderate*** potential for SWF from the second interface at 863 ft BML to Horizon 30 (1,278 ft BML; Figure W-6).

Horizon 30 to Horizon 40. The sequence between Horizon 30 and Horizon 40 contains two units. The upper unit is 625 ft thick at the proposed well location and consists of clay-dominated mass transport deposits (Figure W-6). The lower unit is 150 ft thick at the proposed well location and consists of silt and sand-dominated mass transport deposits that may correlate to the regional SWF Green Unit (Figure W-6). The two units are separated by an interface at 1,903 ft BML and Horizon 40 is expected to be encountered at 2,053 ft BML (Figure W-6).

The base of the gas hydrate stability zone (BGHSZ) at this water depth is estimated to be within the upper unit of this sequence at 1,439 ft BML based on Maekawa et al. (1995).

There is one amplitude anomaly within 500 ft of the proposed wellbore within this unit (Map 5). The anomaly is located 460 ft south-southeast of the proposed location on Horizon 40 and should not impact drilling operations at this location.

There is a ***low*** potential for gas hydrates from Horizon 30 (1,278 ft BML) to the BGHSZ at 1,439 ft BML and a ***negligible*** potential for gas hydrates from the BGHSZ at 1,439 ft BML to Horizon 40 at 2,053 ft BML (Figure W-6). There is a ***negligible*** potential for shallow gas from Horizon 30 to the interface at 1,903 ft BML and a ***low*** potential for shallow gas from the interface to Horizon 40. There is a ***negligible*** potential for SWF from Horizon 30 to the interface and a ***moderate*** potential for SWF from the interface to Horizon 40 (Figure W-6).

Horizon 40 to Horizon 50. The Horizon 40 to Horizon 50 sequence consists of low- to moderate-amplitude, chaotic reflections interpreted to represent silt dominated mass transport deposits overlying sand and silt turbidites (Figure W-6). The sequence may correlate to the regional SWF Green Unit and Horizon 50 is mapped at 2,522 ft BML, marks the base of this sequence.

There are no amplitude anomalies within 500 ft of the proposed wellbore within this unit (Map 5).

There is a ***negligible*** potential for gas hydrates within this sequence (Figure W-6). There is a ***low*** potential for shallow gas and a ***moderate*** potential for SWF within this sequence.

Horizon 50 to Horizon 60. The Horizon 50 to Horizon 60 sequence consists of low- to moderate-amplitude, chaotic reflections interpreted to represent silt and clay mass transport deposits (Figure W-6). Horizon 60 is mapped at 3,107 ft BML and marks the base of this sequence.

There is one amplitude anomaly within 500 ft of the proposed wellbore within this sequence (Map 5). The anomaly is located 400 ft north-northwest of the proposed location and should not impact drilling operations at this location.

There is a ***negligible*** potential for gas hydrate within this sequence (Figure W-6). There is a ***low*** potential for shallow gas and a ***low*** potential for SWF within this sequence.

Horizon 60 to Horizon 70. The Horizon 60 to Horizon 70 sequence consists of low- to moderate-amplitude, chaotic reflections interpreted to represent clay and silt mass transport deposits with possible thins silt and sand intervals (Figure W-6). Horizon 70 is mapped at 4,577 ft BML and marks the base of this sequence.

There is one amplitude anomaly within 500 ft of the proposed wellbore within this sequence (Map 5). The isolated anomaly is located 203 ft south of the proposed location and should not impact drilling operations at this location.

There is a ***negligible*** potential for gas hydrates within this sequence (Figure W-6). There is a ***low*** potential for shallow gas and a ***low*** potential for SWF within this sequence.

Horizon 70 to Limit of Investigation. The Horizon 70 to Limit of Investigation (7,000 ft BML) sequence consists of low- to moderate-amplitude, chaotic reflections interpreted to represent clay - and silt- dominated turbidites (Figure W-6). The proposed wellbore will intersects two buried faults within this sequence at 4,913 ft and 6,144 ft BML.

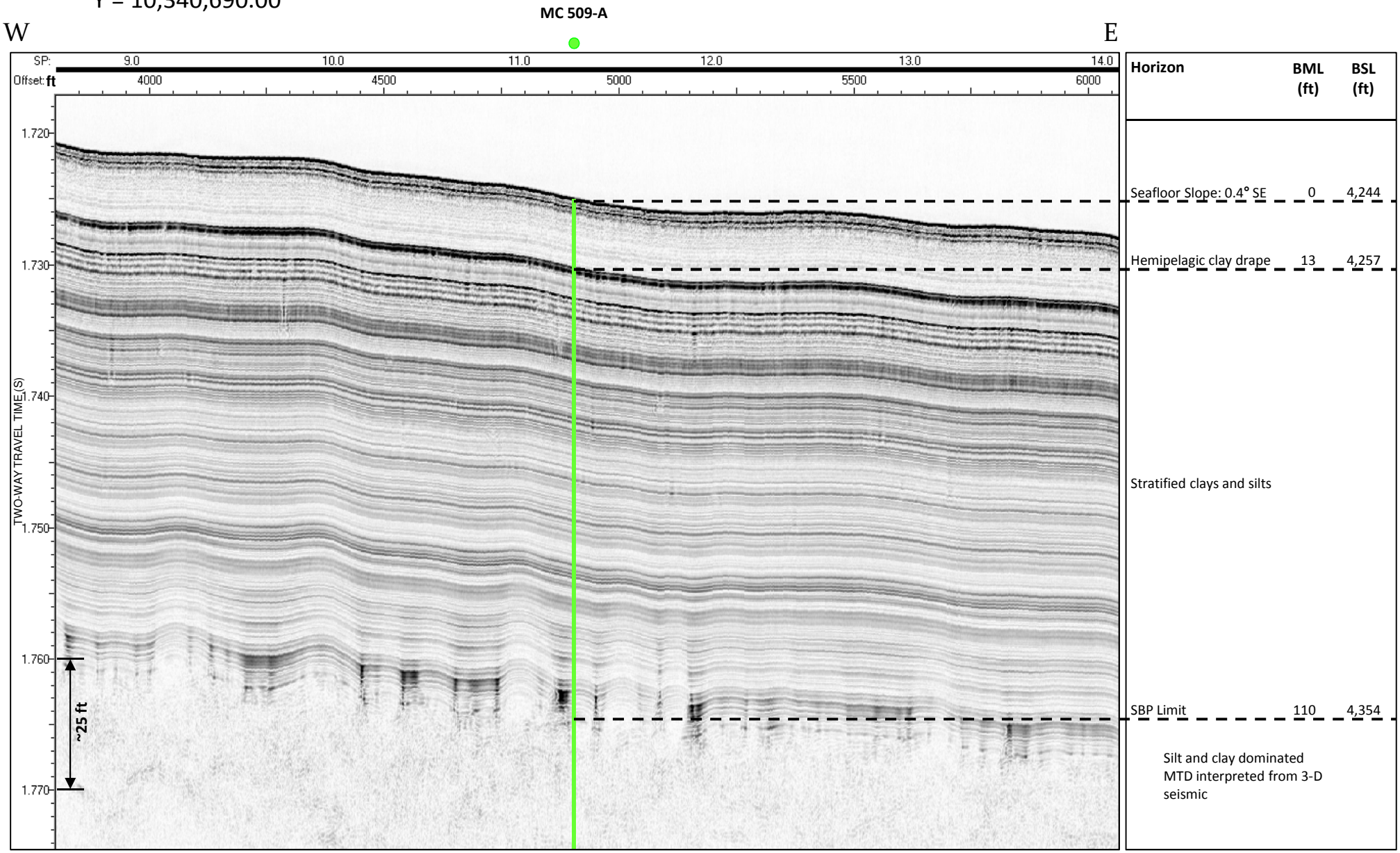
There are no amplitude anomalies within 500 ft of the proposed wellbore within this sequence (Map 5).

There is a ***negligible*** potential for gas hydrates within this sequence (Figure W-6). There is a ***low*** potential for shallow gas and a ***low*** potential for SWF within this sequence.

(+) Envelope (0)

X = 1,081,675.00’
Y = 10,340,690.00’

*Note: The subbottom profiler Line 105 is ~162 ft north of MC 509-A



Subbottom profiler line 105 near Proposed Well MC 509-A

Figure W-2

B-geO

X = 1,081,675’
Y = 10,340,690’

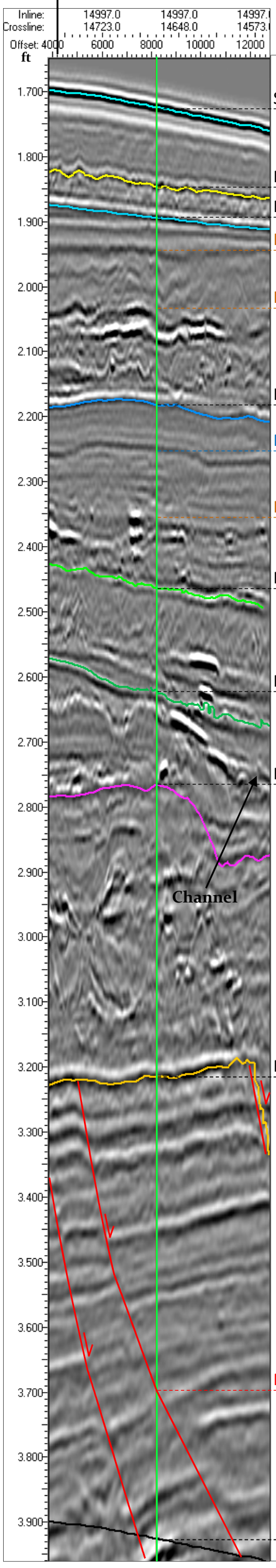
Legend
Mass Transport Deposit – MTD
Base of Gas Hydrate Stability Zone – BGHSZ

Lithology
Clay | Silt & Sand
Clay & Silt | Sand

Potential Ranking
High | Low
Moderate | Negligible

NW — **MC 509-A** — SE

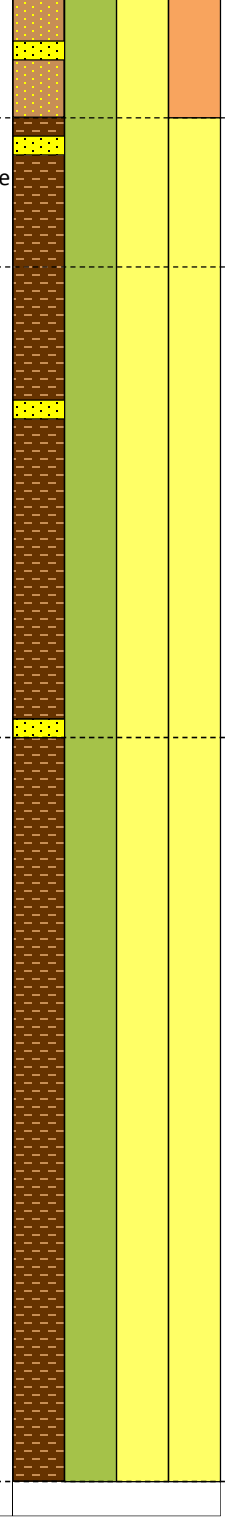
MC 465 ← → MC 509



Two-Way Travel Time (sec)

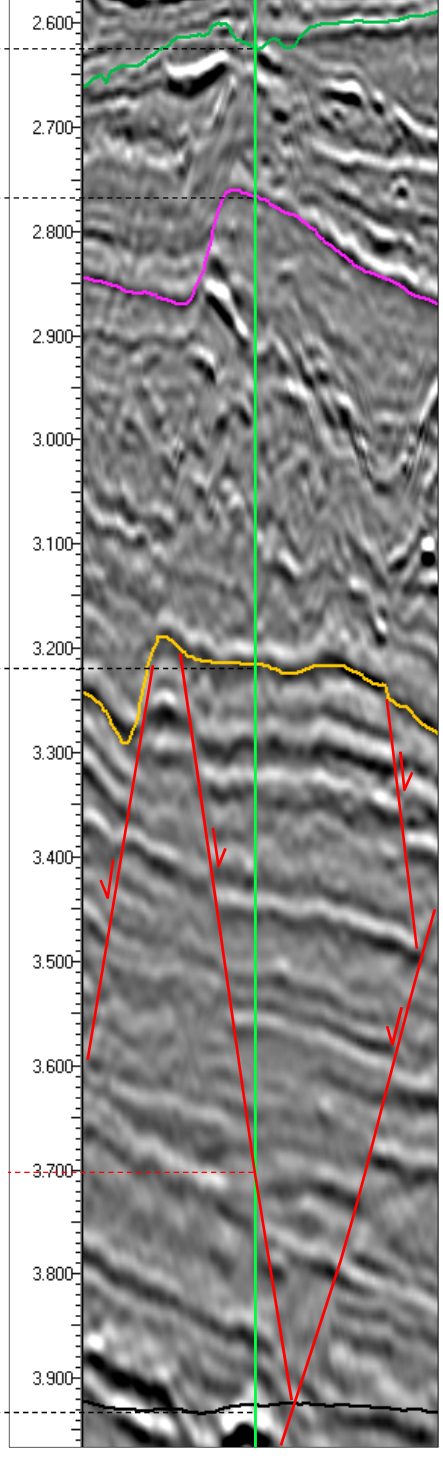
Horizon	Time (s)	BML (ft)	BSL (ft)	Predicted Lithology
Seafloor	1.725	0	4,244	Seafloor slope is 0.4° to the southeast
Horizon 10	1.848	319	4,563	Hemipelagic clay drape overlying stratified silt and clay turbidites and a basal silt and clay MTD’s
Horizon 20	1.893	439	4,683	Silt- and sand- dominated MTDs with potential sand at base
Interface	1.944	576	4,820	Silt- and clay-dominated turbidite deposits
Interface	2.033	819	5,063	Silt- and clay-dominated MTDs
Horizon 30	2.182	1,238	5,482	BLUE UNIT - Silt- and sand-dominated slump and land slides with potential sands/ silt
BGHSZ	2.256	1,451	5,695	Clay-dominated slump and MTD deposits
Interface	2.354	1,739	5,983	
Horizon 40	2.464	2,068	6,312	GREEN UNIT Silt-and sand- dominated MTDs
Horizon 50	2.621	2,550	6,794	Silt-dominated MTD’s overlying sand and silt turbidites
Horizon 60	2.767	3,011	7,255	Silt and clay MTD’s. Thin sand intervals are possible
Horizon 70	3.216	4,492	8,736	Clay-and silt-dominated mass transport deposits. Thin silt and sand intervals are possible
Fault	3.696	6,169	10,413	Alternating intervals of silt- and clay-dominated turbidite deposits
Limit of Investigation	3.926	7,000	11,244	

Prognosis



SW — **MC 509-A** — NE

MC 509



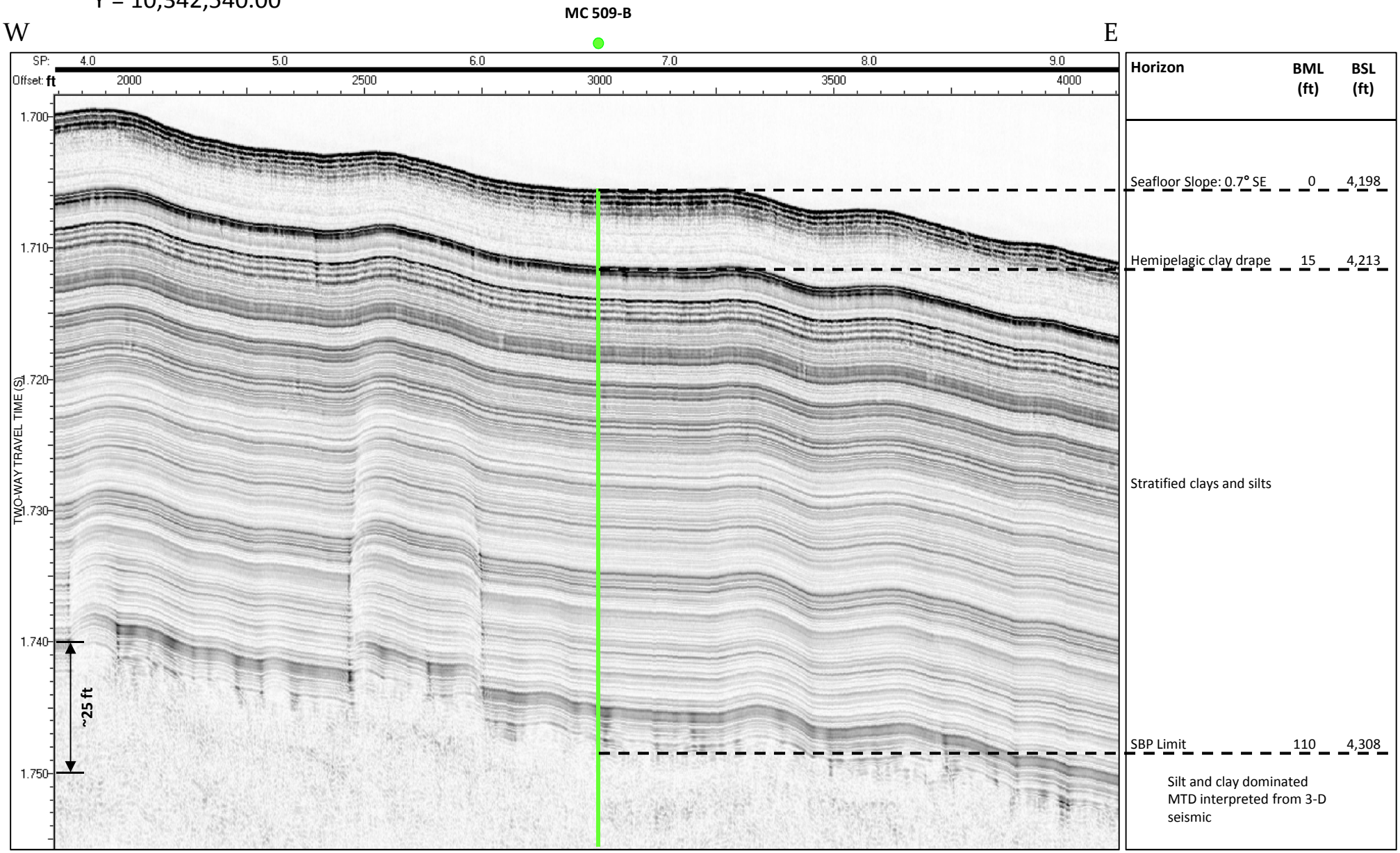
Seismic sections with tophole prognosis for Proposed Well MC 509-A

Figure W-3

(+) Envelope (0)

X = 1,079,770.00’
Y = 10,342,540.00’

*Note: The subbottom profiler Line 102 is ~275 ft north of MC 509-B



Subbottom profiler line 102 near Proposed Well MC 509-B

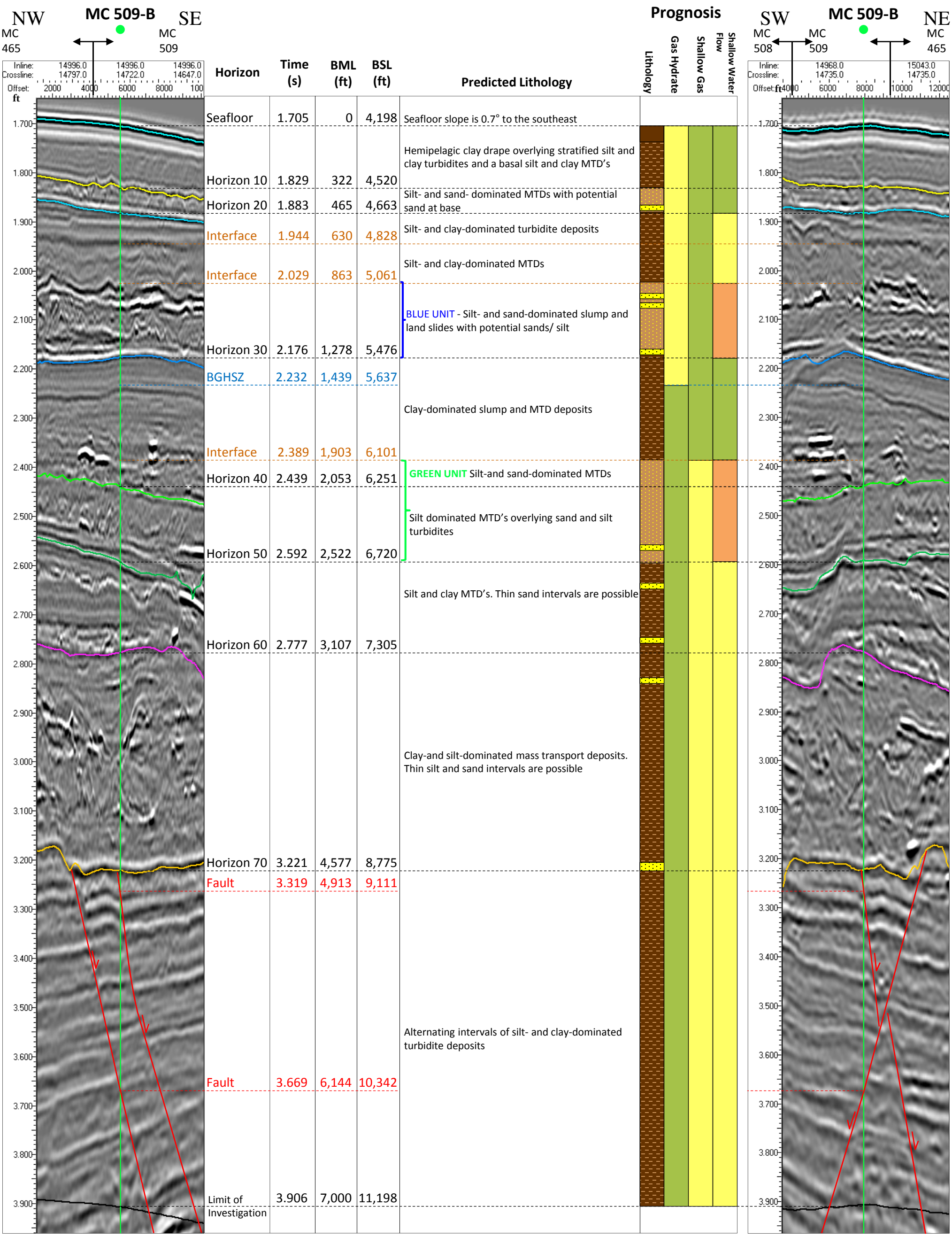
Figure W-5

X = 1,079,770’
Y = 10,342,540’

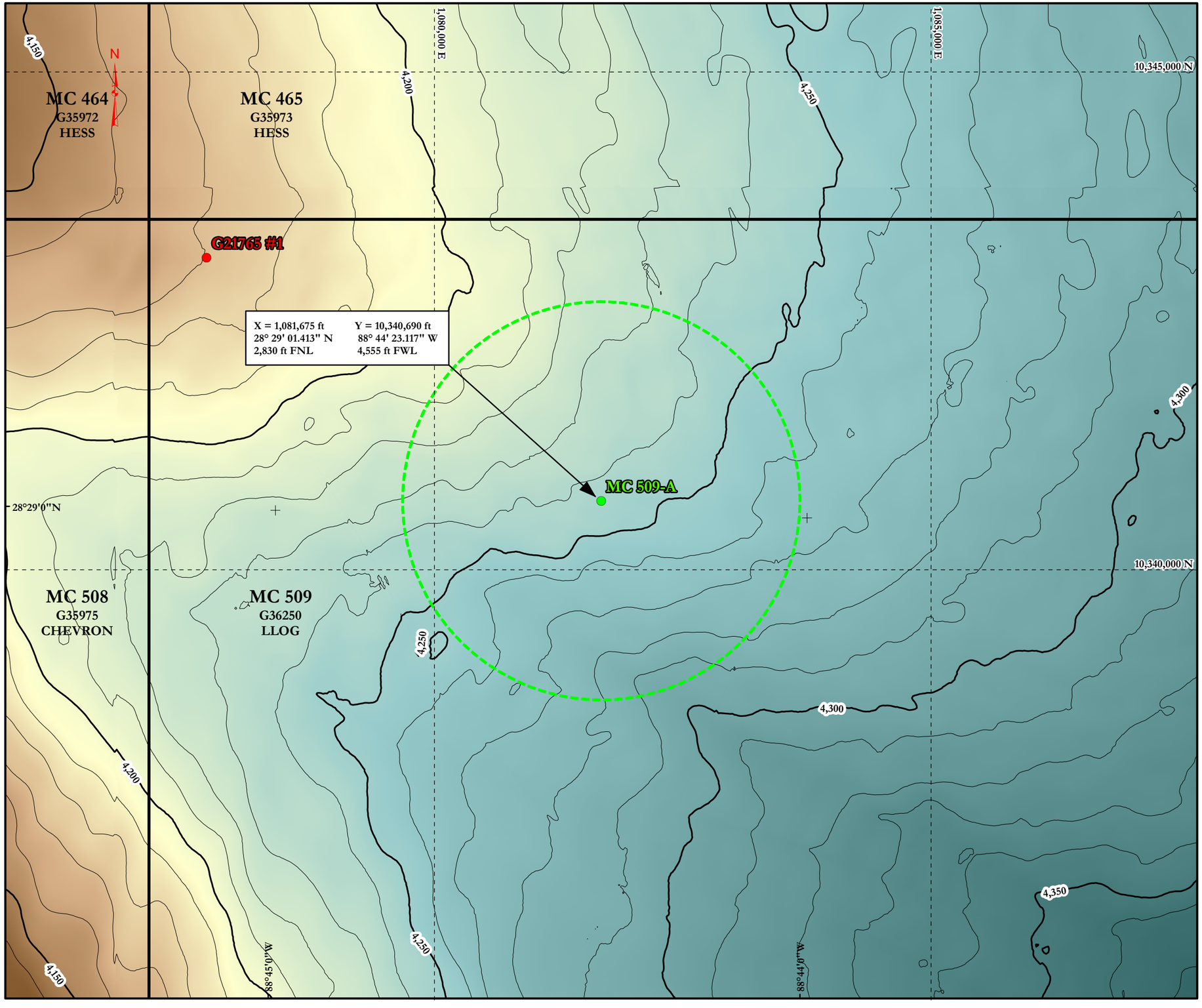
Legend
Mass Transport Deposit – MTD
Base of Gas Hydrate Stability Zone – BGHSZ

Lithology
Clay
Clay & Silt
Silt & Sand
Sand

Potential Ranking
High
Moderate
Low
Negligible



Seismic sections with tophole prognosis for Proposed Well MC 509-B



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Existing Well
- Proposed Well
- 2,000-ft Radius Circle
- 10-ft Contours
- 50-ft Contours

Depths
(Below Sea Level)
4,134 ft
4,373 ft

Grid Information:
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 (April 2019).

Geodetic Datum: NAD27
Projection: UTM
Zone: 16N
Grid Units: Feet

Interpretation By: T. Nguyen
Cartography: T. Nguyen
Project No.: 19-01-30
Date: May 2019

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

Scale =1:12,000

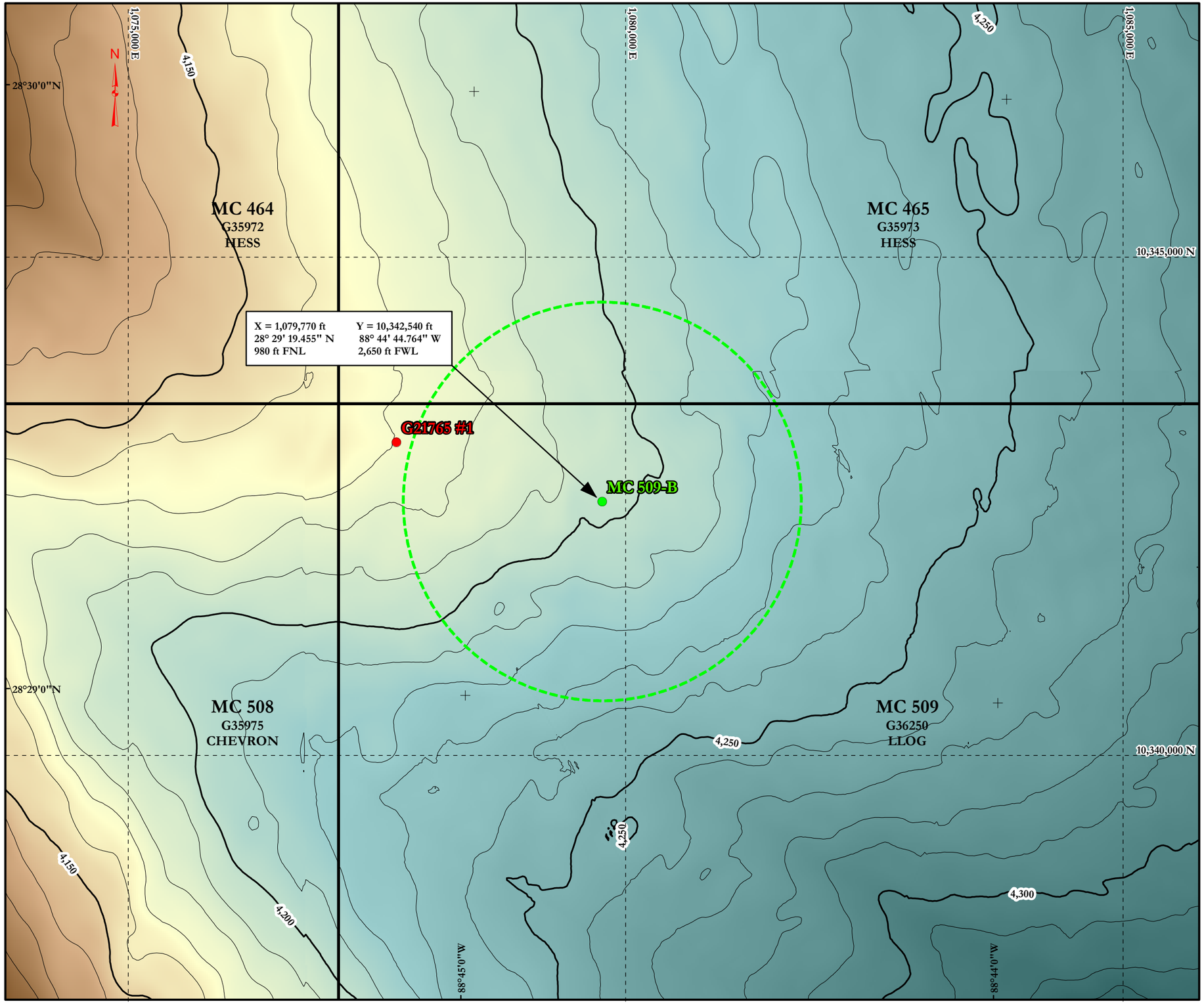
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-1
Bathymetry
Proposed Well MC 509-A
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Existing Well
- Proposed Well
- 2,000-ft Radius Circle
- 10-ft Contours
- 50-ft Contours

Depths
(Below Sea Level)

4,111 ft

4,332 ft

Grid Information:
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 (April 2019).

Geodetic Datum: NAD27 Projection: UTM Zone: 16N Grid Units: Feet	Interpretation By: T. Nguyen Cartography: T. Nguyen Project No.: 19-01-30 Date: May 2019

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

Scale =1:12,000

LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-2
Bathymetry
Proposed Well MC 509-B
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO

BERGER GEOSCIENCES, LLC.
13100 NORTHWEST FWY, STE 600
HOUSTON, TEXAS 77040
PHONE: 713-341-0397
FAX: 713-341-0398

Wellsite Clearance Letters

Proposed Well MC 509-C, Proposed Well MC 509-D, and Proposed Well MC 509-E

Mississippi Canyon Area
Block 509 (Lease No. G36250)
Gulf of Mexico

Berger Geosciences Project No. 21-04-26

Prepared for:

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

August 2021

Table of Contents

List of Figures

List of Maps (1:12,000)

List of Tables

List of Appendix Maps (1:24,000)

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 Wells MC 509-C, D, and E with surface locations in the northwest of Mississippi Canyon (MC) Area, Block 509 (Lease No. G36250). All geologic interpretations presented in this report are based on the shallow hazards assessment entitled:

- *Shallow Hazards Assessment and Benthic Communities Evaluation, Block 509, Mississippi Canyon Area (Lease No. G36250), Gulf of Mexico* prepared by Berger (2019).

The shallow hazard assessment was prepared for LLOG and submitted to the Bureau of Ocean Energy Management (BOEM) under a different cover (Berger, 2019).

This letter is intended to update the previous shallow hazards report (Berger, 2019) 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, 2015a) eliminates the expiration of MMS NTLs 2008-G04 and 2008-G05. Mississippi Canyon Block 505 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 Oceaneering International, Inc. (Oceaneering) Archaeological Assessment (Oceaneering, 2019).

Twelve maps and twelve figures were generated for the proposed wellsites. The maps show the bathymetry (Maps W-1, W-5, and W-9) near the proposed well locations. Figures W-1, W-5, and W-9 show the wellsite locations. Figures W-2, W-6, and W-10 displays the power spectrum at the proposed wellsite locations. Figures W-3, W-7, and W-11 show subbottom profiler lines near proposed wellsites. Figures W-4, W-8, and W-12 are tophole prognosis for the wellsites. All the maps and figures provided are intended to be reviewed in conjunction with the Shallow Hazards Assessment and Benthic Communities Evaluation (Berger, 2019) report.

Wellsite Discussion

This section contains an assessment of the shallow hazards and tophole prognosis for Proposed Wells MC 509-C, MC 509-D, and MC 509-E located within Mississippi Canyon Area, Block 509.

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 assessments for the proposed locations considers the subsurface conditions within a 500-ft radius of a presumed vertical wellbore from the seafloor to 2.20 seconds two-way travel time below the mudline (BML, approximately 7,000 ft BML). For avoidances and sonar contacts, please refer to the Oceaneering Archaeological Assessment (Oceaneering, 2019).

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. Each 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 wells. 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 wells. 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 wells. 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 509-C

The water depth at Proposed Well MC 509-C is 4,269 ft below sea level (BSL; Map W-1). The proposed well is within an area of relatively smooth seafloor that slopes to the southeast at 1.9°. The proposed location provided by LLOG is as follows:

Table W-1. Location, block calls, and seismic lines for Proposed Well MC 509-C

NAD27 UTM Zone 16 North, US Survey ft		Geographic Coordinates	
X	Y	Longitude	Latitude
1,080,169	10,336,881	88° 44’ 39.3724” W	28° 28’ 23.4850” N
Block Calls		3-D Seismic Line Reference	
		Line	Trace
3,049’ FWL	6,639’ FNL	14940	14630

Twinned Location

Proposed Well MC 509-Alt-C is 50 ft north from the Proposed MC 509-C location, and conditions are approximately equivalent, 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 509-Alt-C

NAD27 UTM Zone 16 North, US Survey ft		Geographic Coordinates	
X	Y	Longitude	Latitude
1,080,169	10,336,931	88° 44' 39.3805" W	28° 28' 23.9800" N
Block Calls			
3,049’ FWL	6,589’ FNL		

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 509-C, the power spectrum was extracted from a subset that ranges from Inline 14840 to 15040 and Crossline 14730 to 14530 and is limited to the upper two seconds below the seafloor. The frequency content within the upper one second below the seafloor is of sufficient quality for shallow hazards analysis.

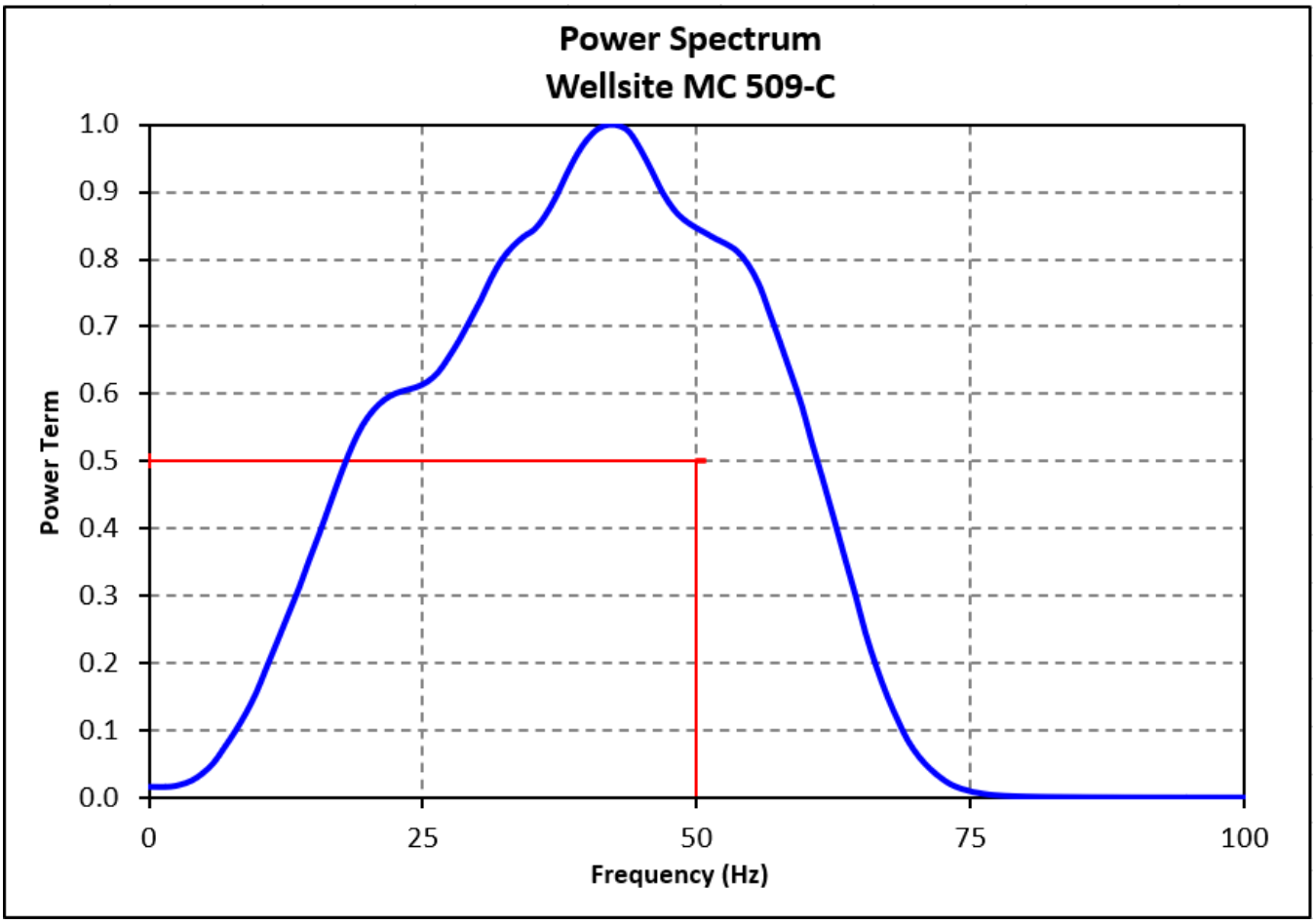


Figure W-2. Power spectrum at Proposed Well MC 509-C

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 509-C is located in the west-central portion of MC 509 (Figure W-1). Water depths near the proposed well range from 4,079 ft to 4,357 ft BSL (Map W-1). The seafloor near the proposed well is hummocky and gently dipping to the east. No seafloor faults or other seafloor features are within the 2,000-ft muds and cuttings radius for the proposed wellsite (Map W-1 and Map W-2).

There are no obvious seafloor faults within 2,000 ft of Proposed Well MC 509-C.

Benthic Communities Assessment. There are no water bottom anomalies identified by the BOEM (2018b) 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 509-C.

Infrastructure. There is one existing well, G21765#1, within the seafloor assessment area located approximately 1.3 miles northwest of the proposed well location (Figure W-1). An oil pipeline and a gas pipeline trend from north to south across the eastern portion of MC 509 about 1.7 miles east of the proposed well location.

No infrastructure is within 2,000 ft of Proposed Well MC 509-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 509. Pursuant to the public information in the NOAA Automated Wreck and Obstruction Information System and Navigational Charts (NOAA, 2020); there are no reported shipwrecks within the seafloor assessment area. The required archaeological survey and report was completed by Oceaneering and was submitted under a separate cover (Oceaneering, 2019). There are no archaeologically significant contacts identified within 2,000 of Proposed Well MC 509-C. For avoidances and sonar contacts please refer to the Oceaneering Archaeological Assessment.

No archaeologically significant contacts identified within 2,000 of Proposed Well MC 509-C. For details about sonar contacts and avoidances please refer to the Oceaneering Archaeological Assessment (2019).

Wellsite Assessment

The wellsite assessment covers the subsurface conditions within a 500-ft radius of the proposed wellpath from the seafloor to the investigation limit of 7,000 ft BML.

Stratigraphy and Tophole Prognosis. Seven 3-D seismic marker horizons (Horizons 10, 20, 30, 40, 50, 60, and 70) were interpreted at the Proposed Well MC 509-C (Figure W-4). A generalized description of the stratigraphic sequences can be found in Section 1.4 of the previous Berger (2019) Shallow Hazards Assessment. The following is an assessment of the conditions that will be encountered at or near the borehole.

Seafloor to the SBP Penetration Limit. Horizon 10 is the first stratigraphic marker horizon traced on the 3-D seismic data; however, the SBP data provided more detailed information about the sediments within this surficial sequence.

The sequence between the seafloor and the SBP penetration limit is interpreted to comprise approximately 17 ft of clay drape overlying 226 ft of stratified clays and silts to the limit of SBP penetration at approximately 243 ft BML (Figure W-3).

Seafloor to Horizon 10. The seismic data between the seafloor and Horizon 10 consists of low-amplitude, parallel and continuous reflections overlying low- to moderate-amplitude, semi-parallel and continuous reflections. These reflectors are interpreted to represent a fine-grained hemipelagic clay drape overlying stratified silt and clay turbidites (Figure W-4). Horizon 10 is expected to be encountered at 238 ft BML (Figure W-4).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-4).

There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas, and a ***negligible*** potential for SWF within this sequence.

Horizon 10 to Horizon 20. The sequence between Horizon 10 and Horizon 20 consists of low-amplitude, chaotic reflections interpreted to represent silt and sand dominated mass transport deposits becoming, more sand-prone near the base (Figure W-4). Horizon 20 is expected to be encountered at 364 ft BML (Figure W-4).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-4).

There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas, and a ***negligible*** potential for SWF within this sequence

Horizon 20 to Horizon 30. The sequence between Horizon 20 and Horizon 30 consists of three units. The upper unit, between 364 ft and 527 ft BML, contains low-amplitude, semi-continuous reflectors interpreted to represent silt-and clay-dominated turbidite deposits (Figure W-4). The middle unit, between 527 ft and 852 ft BML, contains low-amplitude, chaotic, and discontinuous reflectors interpreted to represent silt- and clay-dominated mass transport deposits. The lower unit, between 852 ft and 1,327 ft BML, contains low- to moderate-amplitude, chaotic, and discontinuous reflectors interpreted to represent silt-and sand-dominated slump and landslide deposits with isolated sands. The lower unit is interpreted to correlate to the regional SWF Blue Unit. Horizon 30 is estimated to be encountered at 1,327 ft BML (Figure W-4).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-4).

There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas and SWF within the upper unit. There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas, and a ***low***

potential for SWF within the middle unit. There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas, and a ***moderate*** potential for SWF within the lower unit.

Horizon 30 to Horizon 40. The sequence between Horizon 30 and Horizon 40 consists of two units. The upper unit, between 1,327 ft and 1,527 ft BML, contains low-amplitude, semi-continuous reflectors interpreted to represent clay-dominated slump and mass transport deposits (Figure W-4). The lower unit, between 1,527 ft and 2,229 ft BML, contains low- to moderate-amplitude, chaotic, and discontinuous reflectors interpreted to represent silt-and sand-dominated mass transport and channel deposits with isolated sands. The lower unit is interpreted to correlate to the upper portion of the regional SWF Green Unit.

The base of the gas hydrate stability zone (BGHSZ) at this water depth is estimated to be 1,455 ft BML based on Maekawa et al. (1995).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-4).

The upper unit, between 1,327 ft and the BGHSZ (1,455 ft BML), is assessed as having a ***low*** for potential gas hydrates to and a ***negligible*** potential for gas hydrates from the BGHSZ (1,455 ft BML) to 1,527 ft BML, a ***negligible*** for potential for shallow gas, and a ***negligible*** potential for SWF (Figure W-4).

The lower unit, between 1,527 ft and 2,229 ft BML, is assessed as having a ***negligible*** for potential gas hydrates, a ***negligible*** for potential for shallow gas, and a ***negligible*** potential for SWF (Figure W-4).

Horizon 40 to Horizon 50. The sequence between Horizon 40 and Horizon 50 consists of low- to moderate-amplitude, chaotic reflections interpreted to represent fine-grained mass transport deposits overlying low-amplitude, semi-continuous reflections interpreted to represent sand- and silt-rich turbidite deposits (Figure W-4). The sequence is interpreted as the lower part of the Regional SWF Green Unit. Horizon 50 is expected to be encountered at 2,600 ft BML (Figure W-4).

There are two amplitude anomalies within this interval located 395 ft north and 430 ft south of the proposed location (Map W-4). Both anomalies are associated with a high-amplitude reflector which is eroded at the proposed well location. There is no connectivity between these anomalies and the proposed wellbore.

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

Horizon 50 to Horizon 60. The sequence between Horizon 50 and Horizon 60 consists of low-amplitude, chaotic to semi-continuous reflections interpreted to represent fine-grained mass transport and turbidite deposits with thin sand intervals possible (Figure W-4). Horizon 60 is estimated to be encountered at 3,255 ft BML (Figure W-4).

There is one amplitude anomaly within this interval located 185 ft northeast of the proposed location (Map W-4). The anomaly is associated with an erosion surface and is considered to represent lithologic variation.

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

Horizon 60 to Horizon 70. The sequence between Horizon 60 and Horizon 70 consists of low-amplitude, chaotic reflections interpreted to represent fine-grained mass transport deposits with sand intervals possible (Figure W-4). Horizon 70 is interpreted at 4,591 ft BML.

There is one amplitude anomaly within this interval located 170 ft northeast of the proposed location (Map W-4). The anomaly is small and isolated and not considered to have connectivity with the proposed wellbore.

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

Horizon 70 to the Limit of Investigation. The interval below Horizon 70 to the limit of investigation (7,000 ft BML) contains low- to moderate-amplitude, semi-parallel reflectors interpreted to represent clay- and silt-dominated turbidites (Figure W-4). A fault will be penetrated within this interval at 5,752 ft BML. The fault is a buried fault and is not considered to be active.

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-4).

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

Faults. The proposed vertical wellbore will intersect one buried fault at 5,752 ft BML (Figure W-4).

Proposed Well MC 509-D

The water depth at Proposed Well MC 509-D is 4,341 ft below sea level (BSL; Map W-5). The proposed well is within an area of relatively smooth seafloor that slopes to the southeast at 1.1°. The proposed location provided by LLOG is as follows:

Table W-3. Location, block calls, and seismic lines for Proposed Well MC 509-D

NAD27 UTM Zone 16 North, US Survey ft		Geographic Coordinates	
X	**Y**	**Longitude**	**Latitude**
1,087,464	10,337,149	88° 43’ 17.6821” W	28° 28’ 27.1802” N
Block Calls		**3-D Seismic Line Reference**	
		Line	**Trace**
5,496’ FEL	6,371’ FNL	15021	14509

Twinned Location

Proposed Well MC 509-Alt-D is 50 ft north from the Proposed Well MC 509-D, and conditions are approximately equivalent, no separate illustrations of the subsurface conditions were prepared. The proposed alternate drilling location is as follows:

Table W-4. Location and block calls for Proposed Well MC 509-Alt-D

NAD27 UTM Zone 16 North, US Survey ft		Geographic Coordinates	
X	**Y**	**Longitude**	**Latitude**
1,087,464	10,337,199	88° 43' 17.6901" W	28° 28' 27.6752" N
Block Calls			
5,496’ FEL	6,321’ FNL		

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 509-D, the power spectrum was extracted from a subset that ranges from Inline 14921 to 15121 and Crossline 14409 to 14609 and is limited to the upper two seconds below the seafloor. The frequency content within the upper one second below the seafloor is of sufficient quality for shallow hazards analysis.

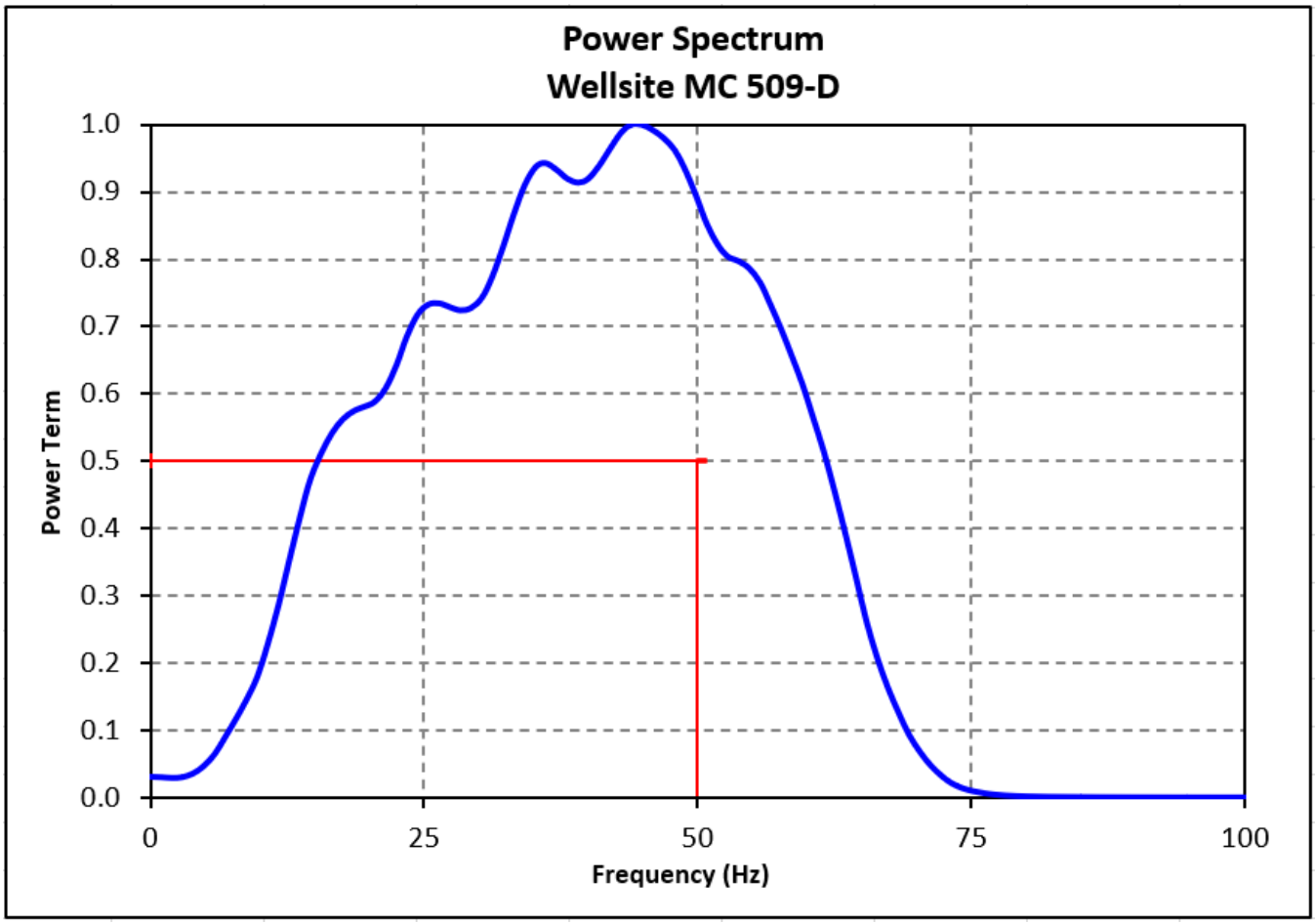


Figure W-6. Power spectrum at Proposed Well MC 509-D

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 509-D is located in the east-central portion of MC 509 (Figure W-5). Water depths near the proposed well range from 4,227 ft to 4,452 ft BSL (Map W-5). The seafloor near the proposed well is hummocky and gently dipping to the southeast. No seafloor faults or other seafloor features are within the 2,000-ft muds and cuttings radius for the proposed wellsite (Map W-5 and Map W-6).

There are no obvious seafloor faults within 2,000 ft of Proposed Well MC 509-D.

Benthic Communities Assessment. There are no water bottom anomalies identified by the BOEM (2018b) 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-7). 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 509-D.

Infrastructure. There is one existing well, G21765#1, within the seafloor assessment area located approximately 2.2 miles northwest of the proposed well location (Figure W-5). An oil pipeline and a gas pipeline trend from north to south across the eastern portion of MC 509 about 1,685 ft and 1,835 ft east of the proposed well location, respectively (Map W-1, Map W-2, and MapW-3; Figure W-5).

An oil pipeline is located 1,685 ft east and a gas pipeline is located 1,835 ft east of Proposed Well MC 509-D

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 509. Pursuant to the public information in the NOAA Automated Wreck and Obstruction Information System and Navigational Charts (NOAA, 2020); there are no reported shipwrecks within the seafloor assessment area. The required archaeological survey and report was completed by Oceaneering and was submitted under a separate cover (Oceaneering, 2019). There are no archaeologically significant contacts identified within 2,000 of Proposed Well MC 509-D. For avoidances and sonar contacts please refer to the Oceaneering Archaeological Assessment.

No archaeologically significant contacts identified within 2,000 of Proposed Well MC 509-D. For details about sonar contacts and avoidances please refer to the Oceaneering Archaeological Assessment (2019).

Wellsite Assessment

The wellsite assessment covers the subsurface conditions within a 500-ft radius of the proposed wellpath from the seafloor to the investigation limit of 7,000 ft BML.

Stratigraphy and Tophole Prognosis. Seven 3-D seismic marker horizons (Horizons 10, 20, 30, 40, 50, 60, and 70) were interpreted at the Proposed Well MC 509-D (Figure W-6). A generalized description of the stratigraphic sequences can be found in Section 1.4 of the previous Berger (2019) Shallow Hazards Assessment. The following is an assessment of the conditions that will be encountered at or near the borehole.

Seafloor to the SBP Penetration Limit. Horizon 10 is the first stratigraphic marker horizon traced on the 3-D seismic data; however, the SBP data provided more detailed information about the sediments within this surficial sequence.

The sequence between the seafloor and the SBP penetration limit is interpreted to comprise approximately 13 ft of clay drape overlying 82 ft of stratified clays and silts to 95 ft BML (Figure W-7). A 31 ft thick clay- and silt-rich mass transport deposit exists between 95 ft and 126 ft BML. One hundred and seventeen feet of stratified clays and silts are interpreted from 126 ft BML to the limit of SBP penetration at approximately 243 ft BML.

Seafloor to Horizon 10. The seismic data between the seafloor and Horizon 10 consists of low-amplitude, parallel and continuous reflections overlying low- to moderate-amplitude, semi-parallel and continuous reflections. These reflectors are interpreted to represent a fine-grained hemipelagic clay drape overlying stratified silt and clay turbidites (Figure W-8). Horizon 10 is expected to be encountered at 295 ft BML (Figure W-8).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-8).

There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas, and a ***negligible*** potential for SWF within this sequence.

Horizon 10 to Horizon 20. The sequence between Horizon 10 and Horizon 20 consists of low-amplitude, chaotic reflections interpreted to represent silt and sand dominated mass transport deposits becoming, more sand-prone near the base (Figure W-8). Horizon 20 is expected to be encountered at 423 ft BML (Figure W-8).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-8).

There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas, and a ***negligible*** potential for SWF within this sequence

Horizon 20 to Horizon 30. The sequence between Horizon 20 and Horizon 30 consists of three units. The upper unit, between 423 ft and 530 ft BML, contains low-amplitude, semi-continuous reflectors interpreted to represent silt-and clay-dominated turbidite deposits (Figure W-8). The middle unit, between 530 ft and 808 ft BML, contains low-amplitude, chaotic, and discontinuous reflectors interpreted to represent silt- and clay-dominated mass transport deposits. The lower unit, between 808 ft and 1,223 ft BML, contains low- to moderate-amplitude, chaotic, and discontinuous reflectors interpreted to represent silt-and sand-dominated slump and landslide deposits with isolated sands. The lower unit is interpreted to correlate to the regional SWF Blue Unit. Horizon 30 is estimated to be encountered at 1,223 ft BML (Figure W-8).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-8).

There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas and SWF within the upper unit. There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas, and a ***low*** potential for SWF within the middle unit. There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas, and a ***moderate*** potential for SWF within the lower unit.

Horizon 30 to Horizon 40. The sequence between Horizon 30 and Horizon 40 consists of two units. The upper unit, between 1,223 ft and 1,736 ft BML, contains low-amplitude, semi-continuous reflectors interpreted to represent clay-dominated slump and mass transport deposits (Figure W-8). The lower unit, between 1,736 ft and 2,029 ft BML, contains low- to moderate-amplitude, chaotic, and discontinuous reflectors interpreted to represent silt-and sand-dominated mass transport and channel deposits with isolated sands. The lower unit is interpreted to correlate to the upper portion of the regional SWF Green Unit.

The base of the gas hydrate stability zone (BGHSZ) at this water depth is estimated to be 1,470 ft BML based on Maekawa et al. (1995).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-8).

The upper unit, between 1,223 ft and the BGHSZ (1,470 ft BML), is assessed as having a ***low*** for potential gas hydrates to and a ***negligible*** potential for gas hydrates from the BGHSZ (1,470 ft BML) to 1,736 ft BML, a ***negligible*** for potential for shallow gas, and a ***negligible*** potential for SWF (Figure W-8).

The lower unit, between 1,736 ft and 2,029 ft BML, is assessed as having a ***negligible*** for potential gas hydrates, a ***negligible*** for potential for shallow gas, and a ***negligible*** potential for SWF (Figure W-8).

Horizon 40 to Horizon 50. The sequence between Horizon 40 and Horizon 50 consists of low- to moderate-amplitude, chaotic reflections interpreted to represent fine-grained mass transport deposits overlying low-amplitude, semi-continuous reflections interpreted to represent sand- and silt-rich turbidite deposits (Figure W-8). The sequence is interpreted as the lower part of the Regional SWF Green Unit. Horizon 50 is expected to be encountered at 2,647 ft BML (Figure W-8).

There are two amplitude anomalies within this interval located 385 ft south and 490 ft east of the proposed location (Map W-8). The anomaly to the south occurs along Horizon 40 and may represent lithologic variation. There does not appear to be connectivity between this anomaly and the proposed wellbore. Both anomalies are associated with a high-amplitude reflector which is eroded at the proposed well location. There is no connectivity between these anomalies and the proposed wellbore. The anomaly to the east is associated with an erosion surface and is considered to represent lithologic variation.

There is a ***negligible*** potential for gas hydrates, a ***low*** potential for shallow gas, and a ***moderate*** potential for SWF within this sequence (Figure W-8).

Horizon 50 to Horizon 60. The sequence between Horizon 50 and Horizon 60 consists of low-amplitude, chaotic to semi-continuous reflections interpreted to represent fine-grained mass transport and turbidite deposits with thin sand intervals possible (Figure W-8). Horizon 60 is estimated to be encountered at 3,336 ft BML (Figure W-8).

There are two amplitude anomalies within this interval located 430 ft northwest and 440 ft southeast of the proposed location (Map W-8). These anomalies are small and isolated and have no connectivity with the proposed wellbore.

There is a ***negligible*** potential for gas hydrates, a ***low*** potential for shallow gas, and a ***low*** potential for SWF within this sequence (Figure W-8).

Horizon 60 to Horizon 70. The sequence between Horizon 60 and Horizon 70 consists of low-amplitude, chaotic reflections interpreted to represent fine-grained mass transport deposits with sand intervals possible (Figure W-8). Horizon 70 is interpreted at 4,673 ft BML.

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-8).

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

Horizon 70 to the Limit of Investigation. The interval below Horizon 70 to the limit of investigation (7,000 ft BML) contains low- to moderate-amplitude, semi-parallel reflectors interpreted to represent clay- and silt-dominated turbidites (Figure W-8). A fault will be penetrated within this interval at the depth of Horizon 70, 4,673 ft BML. The fault is a buried fault and is not considered to be active.

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-8).

There is a ***negligible*** potential for gas hydrates, a ***low*** potential for shallow gas, and a ***low*** potential for SWF within this interval (Figure W-8).

Faults. The proposed vertical wellbore will intersect one buried fault at 4,673 ft BML (Figure W-8).

Proposed Well MC 509-E

The water depth at Proposed Well MC 509-E is 4,307 ft below sea level (BSL; Map W-9). The proposed well is within an area of relatively smooth seafloor that slopes to the southeast at 1.7°. The proposed location provided by LLOG is as follows:

Table W-5. Location, block calls, and seismic lines for Proposed Well MC 509-E

NAD27 UTM Zone 16 North, US Survey ft		Geographic Coordinates	
X	**Y**	**Longitude**	**Latitude**
1,083,879	10,338,346	88° 43’ 58.0424” W	28° 28’ 38.5210” N
Block Calls		**3-D Seismic Line Reference**	
		Line	**Trace**
6,759’ FWL	5,174’ FNL	14995	14591

Twinned Location

Proposed Well MC 509-Alt-E is 50 ft north from the Proposed Well MC 509-E, and conditions are approximately equivalent, no separate illustrations of the subsurface conditions were prepared. The proposed alternate drilling location is as follows:

Table W-6. Location and block calls for Proposed Well MC 509-Alt-E

NAD27 UTM Zone 16 North, US Survey ft		Geographic Coordinates	
X	**Y**	**Longitude**	**Latitude**
1,083,879	10,338,396	88° 43' 58.0504" W	28° 28' 39.0160" N
Block Calls			
6,759’ FWL	5,124’ FNL		

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 509-E, the power spectrum was extracted from a subset that ranges from Inline 14395 to 14595 and Crossline 14491 to 14691 and is limited to the upper two seconds below the seafloor. The frequency content within the upper one second below the seafloor is of sufficient quality for shallow hazards analysis.

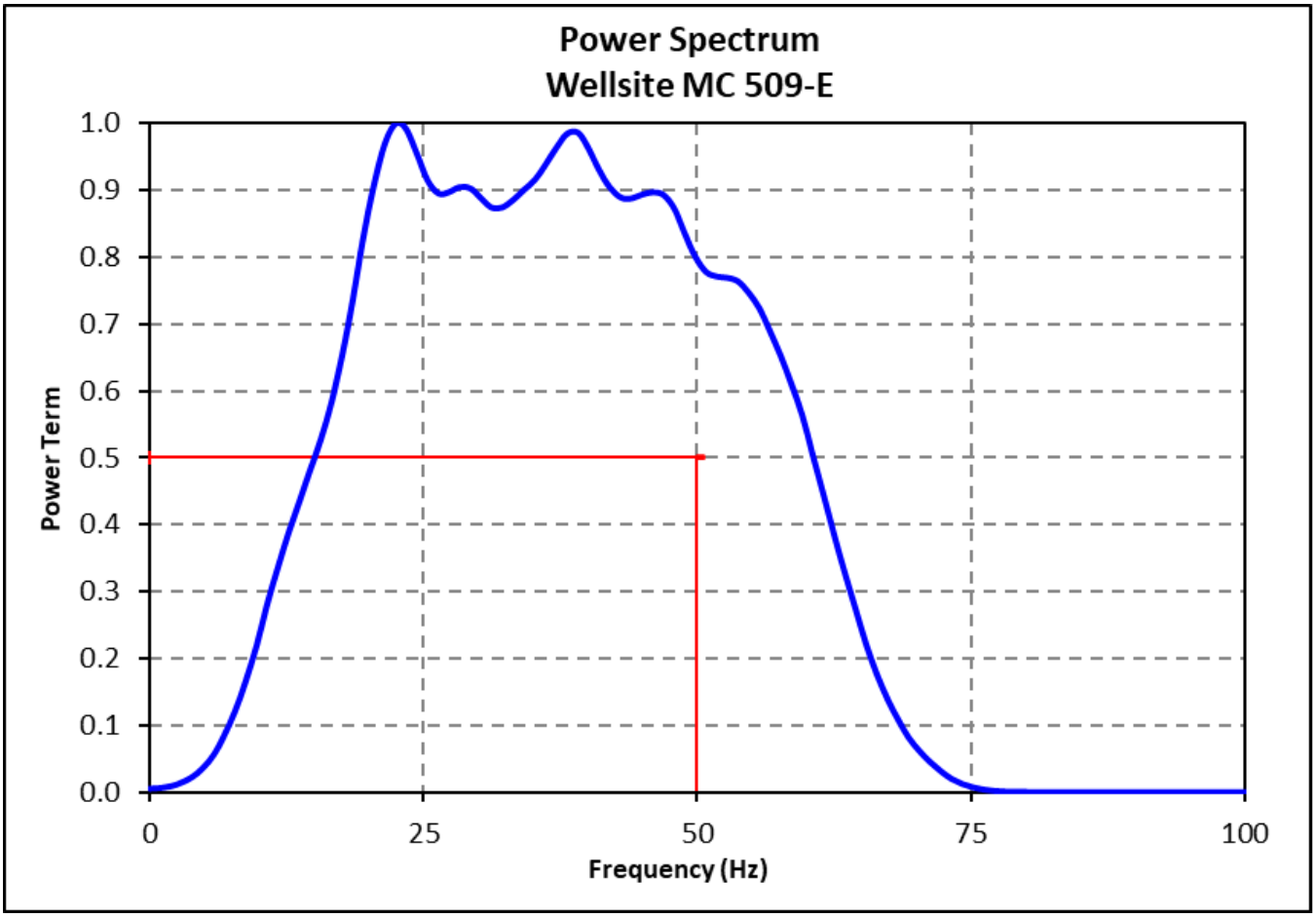


Figure W-10. Power spectrum at Proposed Well MC 509-E

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 509-E is located in the north-central portion of MC 509 (Figure W-9). Water depths near the proposed well range from 4,167 ft to 4,407 ft BSL (Map W-9). The seafloor near the proposed well is hummocky and gently dipping to the south-southeast. No seafloor faults or other seafloor features are within the 2,000-ft muds and cuttings radius for the proposed wellsite (Map W-9).

There are no obvious seafloor faults within 2,000 ft of Proposed Well MC 509-E.

Benthic Communities Assessment. There are no water bottom anomalies identified by the BOEM (2018b) 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-9 and Map W-10). 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 509-E.

Infrastructure. There is one existing well, G21765#1, within the seafloor assessment area located approximately 1.5 miles northwest of the proposed well location (Figure W-9). An oil pipeline and a gas pipeline trend from north to south across the eastern portion of MC 509 about 1 mile east of the proposed well location.

No infrastructure is within 2,000 ft of Proposed Well MC 509-E.

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 509. Pursuant to the public information in the NOAA Automated Wreck and Obstruction Information System and Navigational Charts (NOAA, 2020); there are no reported shipwrecks within the seafloor assessment area. The required archaeological survey and report was completed by Oceaneering and was submitted under a separate cover (Oceaneering, 2019). There are no archaeologically significant contacts identified within 2,000 of Proposed Well MC 509-E. For avoidances and sonar contacts please refer to the Oceaneering Archaeological Assessment.

No archaeologically significant contacts identified within 2,000 of Proposed Well MC 509-E. For details about sonar contacts and avoidances please refer to the Oceaneering Archaeological Assessment (2019).

Wellsite Assessment

The wellsite assessment covers the subsurface conditions within a 500-ft radius of the proposed wellpath from the seafloor to the investigation limit of 7,000 ft BML.

Stratigraphy and Tophole Prognosis. Seven 3-D seismic marker horizons (Horizons 10, 20, 30, 40, 50, 60, and 70) were interpreted at the Proposed Well MC 509-E (Figure W-12). A generalized description of the stratigraphic sequences can be found in Section 1.4 of the previous Berger (2019) Shallow Hazards Assessment. The following is an assessment of the conditions that will be encountered at or near the borehole.

Seafloor to the SBP Penetration Limit. Horizon 10 is the first stratigraphic marker horizon traced on the 3-D seismic data; however, the SBP data provided more detailed information about the sediments within this surficial sequence.

The sequence between the seafloor and the SBP penetration limit is interpreted to comprise approximately 13 ft of clay drape overlying 82 ft of stratified clays and silts to 95 ft BML (Figure W-11). A 45 ft thick clay- and silt-rich mass transport deposit exists between 95 ft and 140 ft BML. Ninety-three feet of stratified clays and silts are interpreted from 140 ft BML to the limit of SBP penetration at approximately 233 ft BML.

Seafloor to Horizon 10. The seismic data between the seafloor and Horizon 10 consists of low-amplitude, parallel and continuous reflections overlying low- to moderate-amplitude, semi-parallel and continuous reflections. These reflectors are interpreted to represent a fine-grained hemipelagic clay drape overlying stratified silt and clay turbidites (Figure W-12). Horizon 10 is expected to be encountered at 269 ft BML (Figure W-12).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-12).

There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas, and a ***negligible*** potential for SWF within this sequence.

Horizon 10 to Horizon 20. The sequence between Horizon 10 and Horizon 20 consists of low amplitude, chaotic reflections interpreted to represent silt and sand dominated mass transport deposits becoming, more sand-prone near the base (Figure W-12). Horizon 20 is expected to be encountered at 401 ft BML (Figure W-12).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-12).

There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas, and a ***negligible*** potential for SWF within this sequence

Horizon 20 to Horizon 30. The sequence between Horizon 20 and Horizon 30 consists of three units. The upper unit, between 401 ft and 497 ft BML, contains low-amplitude, semi-continuous reflectors interpreted to represent silt-and clay-dominated turbidite deposits (Figure W-12). The middle unit, between 497 ft and 816 ft BML, contains low-amplitude, chaotic, and discontinuous reflectors interpreted to represent silt- and clay-dominated mass transport deposits. The lower unit, between 816 ft and 1,229 ft BML, contains low- to moderate-amplitude, chaotic, and discontinuous reflectors interpreted to represent silt-and sand-dominated slump and landslide deposits with isolated sands. The lower unit is interpreted to correlate to the regional SWF Blue Unit. Horizon 30 is estimated to be encountered at 1,229 ft BML (Figure W-12).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-12).

There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas and SWF within the upper unit. There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas, and a ***low*** potential for SWF within the middle unit. There is a ***low*** potential for gas hydrates, a ***negligible*** potential for shallow gas, and a ***moderate*** potential for SWF within the lower unit.

Horizon 30 to Horizon 40. The sequence between Horizon 30 and Horizon 40 consists of two units. The upper unit, between 1,229 ft and 1,700 ft BML, contains low-amplitude, semi-continuous reflectors interpreted to represent clay-dominated slump and mass transport deposits (Figure W-12). The lower unit, between 1,700 ft and 2,041 ft BML, contains low- to moderate-amplitude, chaotic, and discontinuous reflectors interpreted to represent silt-and sand-dominated mass transport and channel deposits with isolated sands. The lower unit is interpreted to correlate to the upper portion of the regional SWF Green Unit.

The base of the gas hydrate stability zone (BGHSZ) at this water depth is estimated to be 1,463 ft BML based on Maekawa et al. (1995).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-12).

The upper unit, between 1,229 ft and 1,700 ft BML, is assessed as having a ***low*** for potential gas hydrates to the BGHSZ (1,463 ft BML) and a n ***negligible*** potential for gas hydrates from the BGHSZ (1,463 ft BML) to 1,700 ft BML, a ***negligible*** for potential for shallow gas, and a ***negligible*** potential for SWF (Figure W-12).

The lower unit, between 1,700 ft and 2,041 ft BML, is assessed as having a ***negligible*** for potential gas hydrates, a ***negligible*** for potential for shallow gas, and a ***negligible*** potential for SWF (Figure W-12).

Horizon 40 to Horizon 50. The sequence between Horizon 40 and Horizon 50 consists of low- to moderate-amplitude, chaotic reflections interpreted to represent fine-grained mass transport deposits overlying low-amplitude, semi-continuous reflections interpreted to represent sand- and silt-rich turbidite deposits (Figure W-12). The sequence is interpreted as the lower part of the Regional SWF Green Unit. Horizon 50 is expected to be encountered at 2,600 ft BML (Figure W-12).

There is one amplitude anomaly within this interval located 500 ft northeast of the proposed location (Map W-12). The anomaly is small and isolated and not considered to have connectivity with the proposed wellbore.

There is a ***negligible*** potential for gas hydrates, a ***low*** potential for shallow gas, and a ***moderate*** potential for SWF within this sequence (Figure W-12).

Horizon 50 to Horizon 60. The sequence between Horizon 50 and Horizon 60 consists of low-amplitude, chaotic to semi-continuous reflections interpreted to represent fine-grained mass transport and turbidite deposits with thin sand intervals possible (Figure W-12). Horizon 60 is estimated to be encountered at 3,307 ft BML (Figure W-12).

There are two amplitude anomalies within this interval located 205 ft northwest and 445 ft north-northeast of the proposed location (Map W-12). The anomaly to the northwest is small and isolated with no connectivity with the proposed wellbore. The anomaly to the north-northeast occurs along an erosion surface and is considered to represent lithologic variation.

There is a ***negligible*** potential for gas hydrates, a ***low*** potential for shallow gas, and a ***low*** potential for SWF within this sequence (Figure W-12).

Horizon 60 to Horizon 70. The sequence between Horizon 60 and Horizon 70 consists of low-amplitude, chaotic reflections interpreted to represent fine-grained mass transport deposits

(Figure W-12). A fault is interpreted at the depth of Horizon 70, 4,323 ft BML. The fault is a buried fault and is not considered to be active (Figure W-12).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-12).

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

Horizon 70 to the Limit of Investigation. The interval below Horizon 70 to the limit of investigation (7,000 ft BML) contains low- to moderate-amplitude, semi-parallel reflectors interpreted to represent clay- and silt-dominated turbidites (Figure W-12). A fault will be penetrated within this interval at 6,832 ft BML. The fault is a buried fault and is not considered to be active (Figure W-12).

There are no amplitude anomalies within 500 ft of the proposed wellbore in this interval (Map W-12).

There is a ***negligible*** potential for gas hydrates, a ***low*** potential for shallow gas, and a ***low*** potential for SWF within this interval (Figure W-12).

Faults. The proposed vertical wellbore will intersect two buried faults at 4,323 ft and 6,832 ft BML (Figure W-12).

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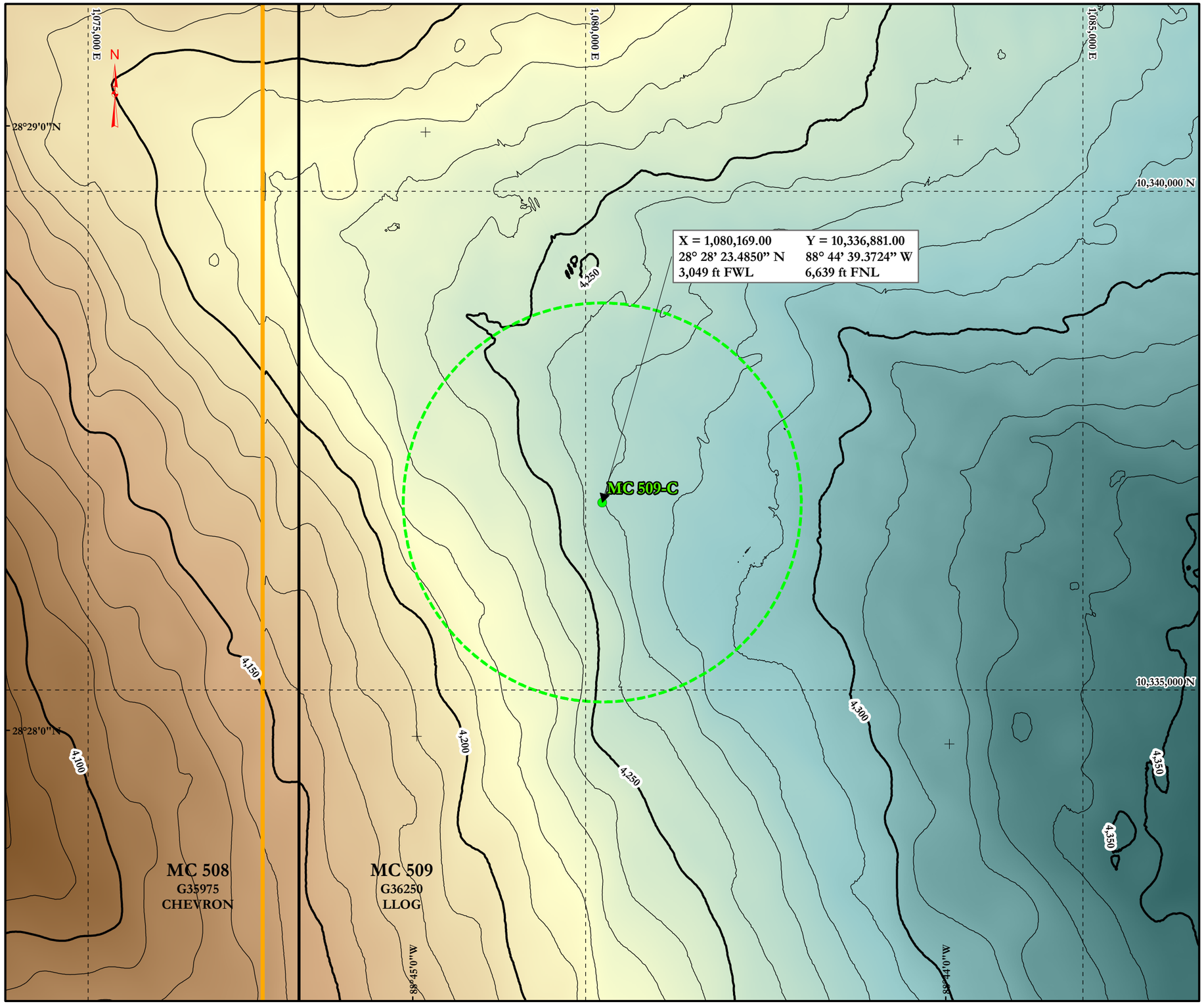


Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- AUV Survey Area
- Proposed Well
- 2,000-ft Radius Circle
- 10-ft Contours
- 50-ft Contours

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

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

Rendering Illumination:
Azimuth: 300°
Elevation : 45°
Vertical Exaggeration: 5X

Depths
(Below Sea Level)

4,079 ft

4,357 ft

IMPORTANT NOTICE
This map is not intended for navigation purposes.
Public information obtained from BOEM database (August 2021).

Geodetic Datum: NAD27
Projection: UTM
Zone: 16N
Grid Units: Feet

Interpretation By: S. Ul-Hadi
Cartography: T. Nguyen
Project No.: 21-04-26
Date: August 2021

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

Scale =1:12,000

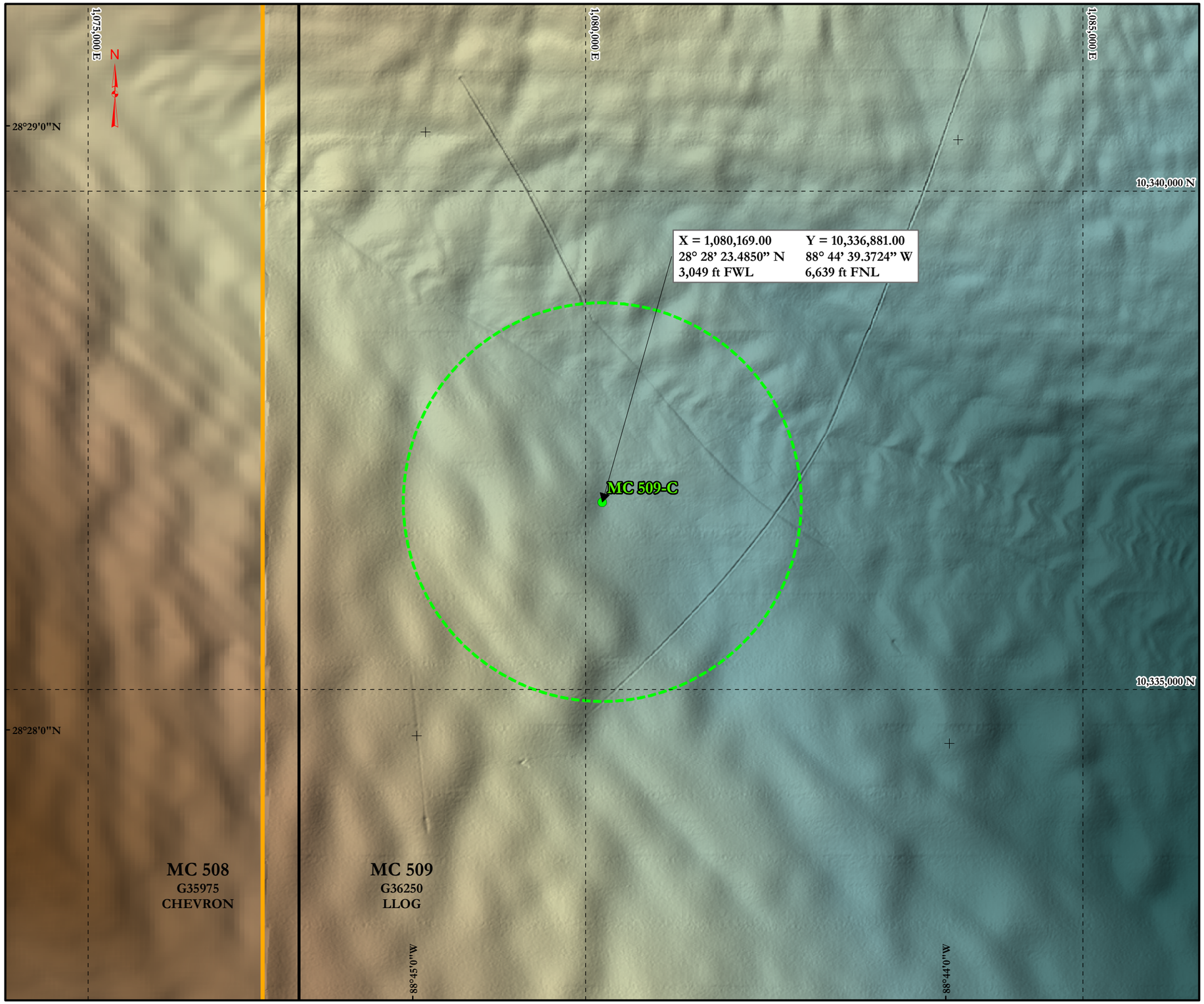
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-1
Bathymetry
Proposed Well MC 509-C
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- AUV Survey Area
- Proposed Well
- 2,000-ft Radius Circle

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

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

Rendering Illumination:
Azimuth: 300°
Elevation : 45°
Vertical Exaggeration: 5X

Depths
(Below Sea Level)

4,079 ft

4,357 ft

IMPORTANT NOTICE
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Public information obtained from BOEM database (August 2021).

Geodetic Datum: NAD27
Projection: UTM
Zone: 16N
Grid Units: Feet

Interpretation By: S. Ul-Hadi
Cartography: T. Nguyen
Project No.: 21-04-26
Date: August 2021

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

Scale =1:12,000

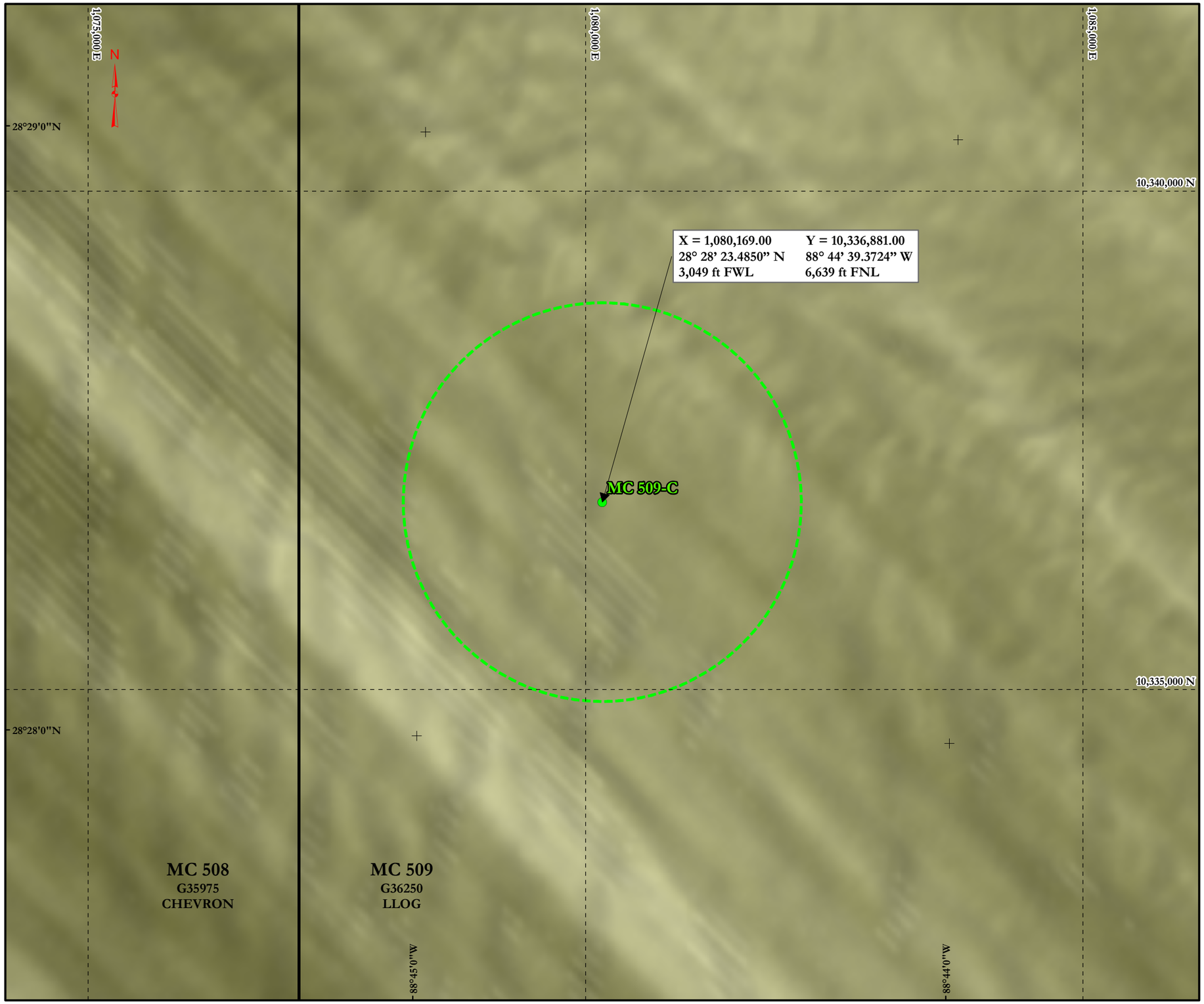
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-2
Seafloor Rendering
Proposed Well MC 509-C
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Proposed Well
- 2,000-ft Radius Circle

Amplitude
(Peak)
High
Low

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

Rendering Illumination:
Azimuth: 300°
Elevation : 45°
Vertical Exaggeration: 5X

IMPORTANT NOTICE
This map is not intended for navigation purposes.
Public information obtained from BOEM database (August 2021).

Geodetic Datum: NAD27
Projection: UTM
Zone: 16N
Grid Units: Feet

Interpretation By: S. Ul-Hadi
Cartography: T. Nguyen
Project No.: 21-04-26
Date: August 2021

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

Scale =1:12,000

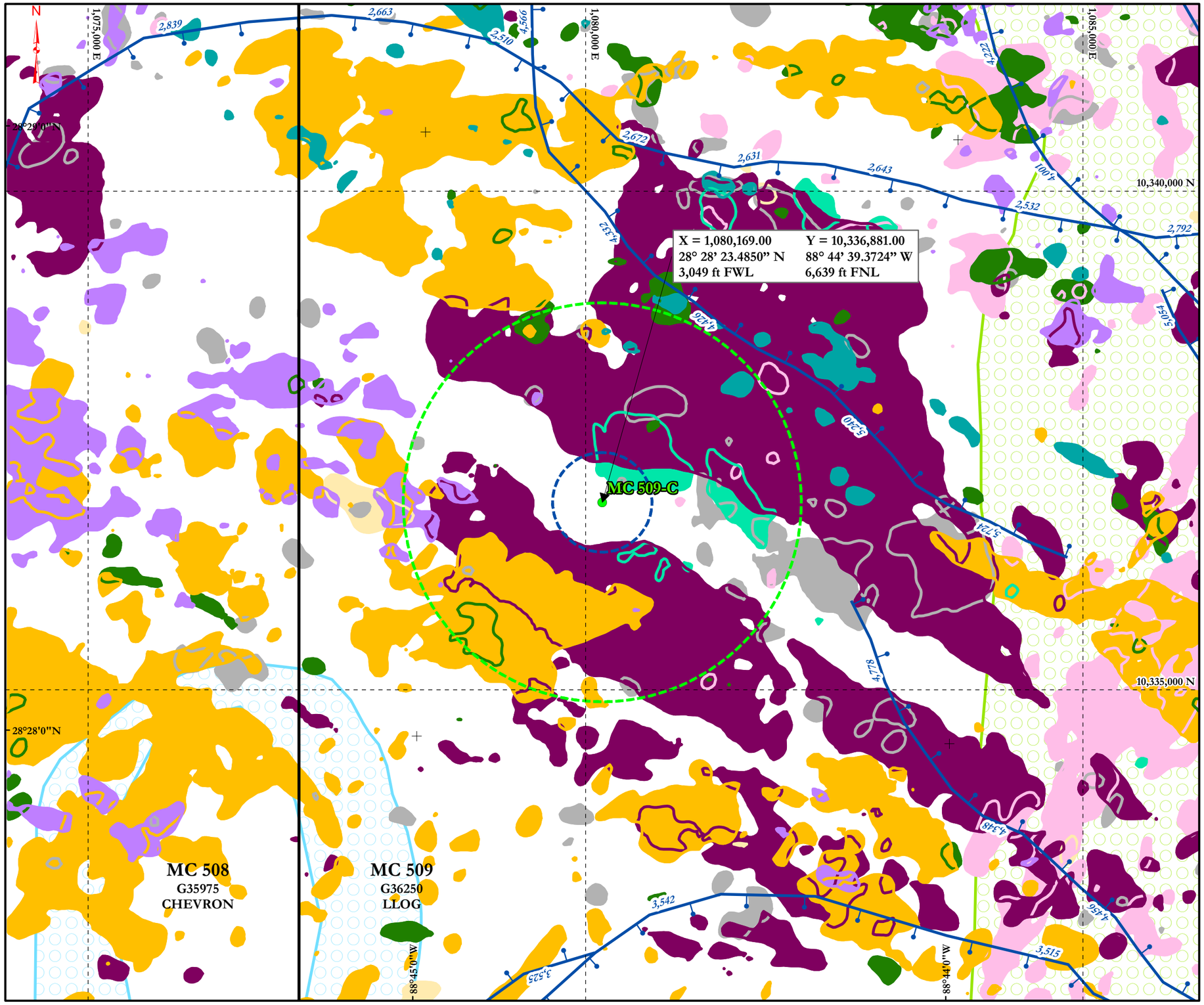
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-3
Seafloor Amplitude Rendering
Proposed Well MC 509-C
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Proposed Well
- 2,000-ft Radius Circle
- 500-ft Radius Circle
- Buried Faults with depth to top of fault in feet BML (Tics represent the downthrown side)
- Channel Between Horizons 30 and 40
- Channel Between Horizons 50 and 60

Amplitude Anomalies

- Between Horizon 10 and Horizon 20
- Between Horizon 20 and Horizon 30
- Between Horizon 30 and Horizon 40
- Along Horizon 40
- Between Horizon 40 and Horizon 50
- Along Horizon 50
- Between Horizon 50 and Horizon 60
- Between Horizon 60 and Horizon 70
- Between Horizon 70 and Limit of Investigation

IMPORTANT NOTICE
This map is not intended for navigation purposes.
Public information obtained from BOEM database (August 2021).

Geodetic Datum: NAD27
Projection: UTM
Zone: 16N
Grid Units: Feet

Interpretation By: S. Ul-Hadi
Cartography: T. Nguyen
Project No.: 21-04-26
Date: August 2021

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

Scale =1:12,000

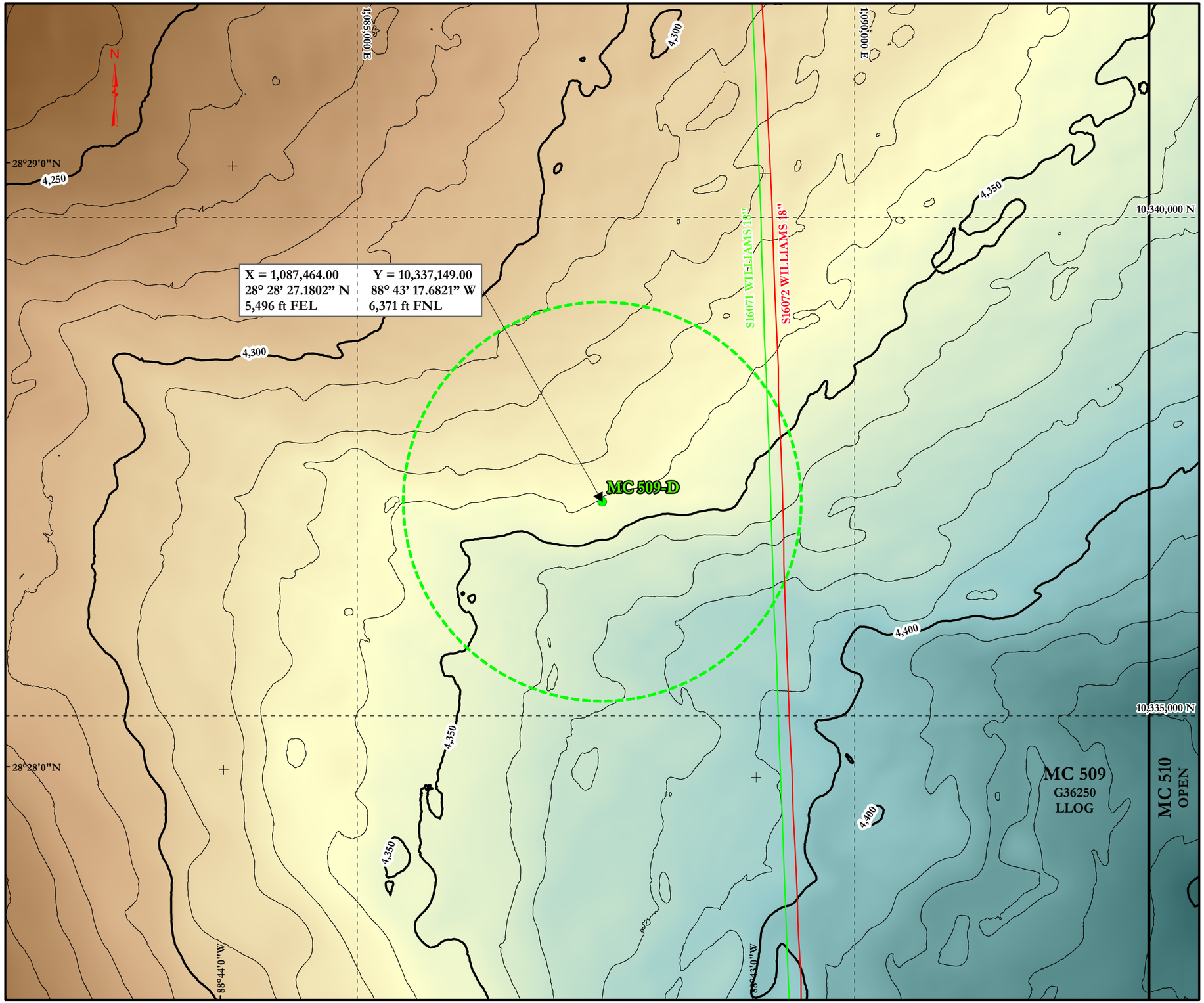
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-4
Geologic Feature
Proposed Well MC 509-C
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Oil Pipeline, Active
- Gas Pipeline, Active
- Proposed Well
- 2,000-ft Radius Circle
- 10-ft Contours
- 50-ft Contours

Depths
(Below Sea Level)

4,227 ft

4,452 ft

Grid Information:
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 (August 2021).

Geodetic Datum: NAD27 Projection: UTM Zone: 16N Grid Units: Feet	Interpretation By: S. Ul-Hadi Cartography: T. Nguyen Project No.: 21-04-26 Date: August 2021

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

Scale =1:12,000

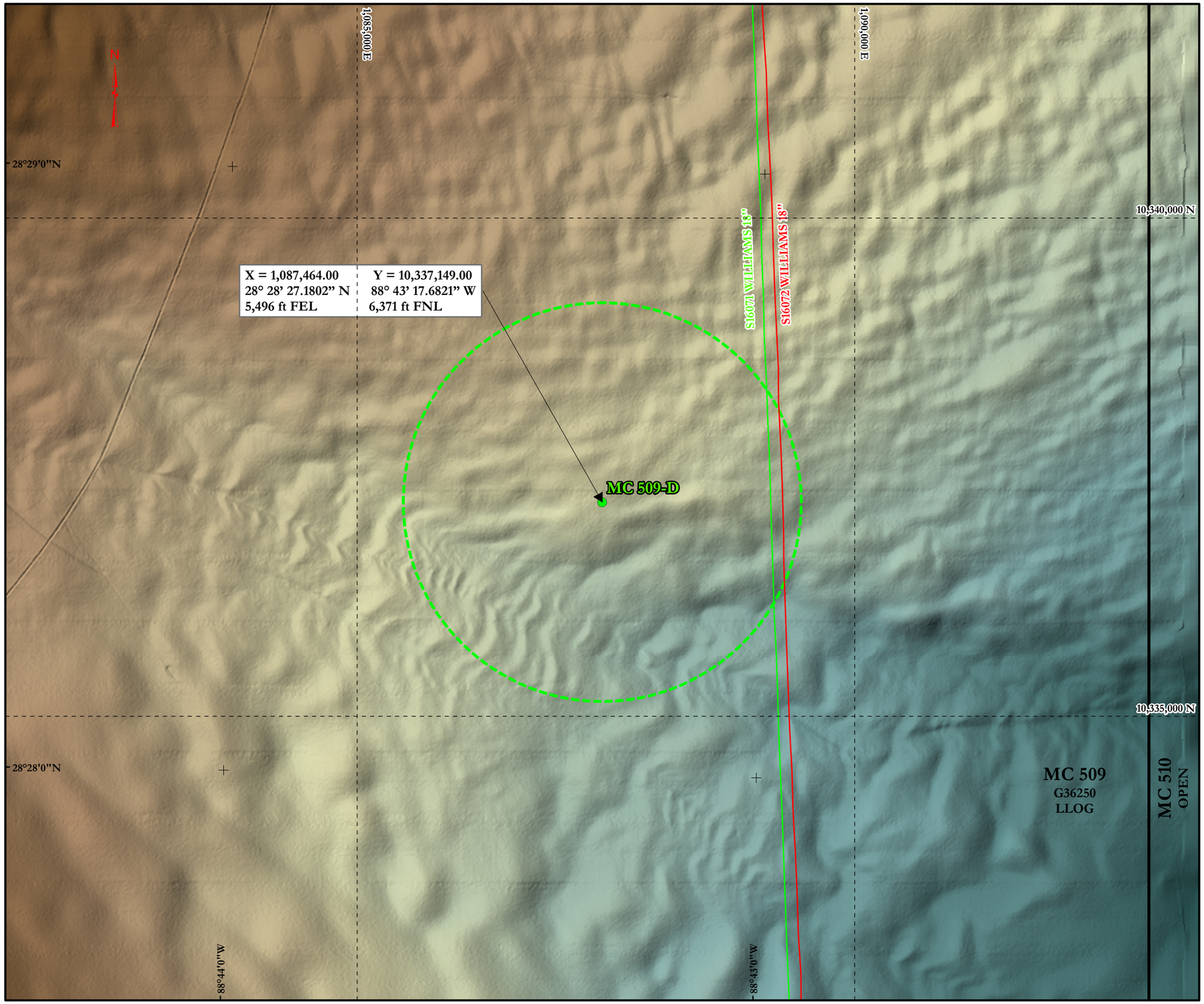
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-5
Bathymetry
Proposed Well MC 509-D
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Oil Pipeline, Active
- Gas Pipeline, Active
- Proposed Well
- 2,000-ft Radius Circle

Depths
(Below Sea Level)

4,227 ft

4,452 ft

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

Rendering Illumination:
Azimuth: 300°
Elevation : 45°
Vertical Exaggeration: 5X

IMPORTANT NOTICE
This map is not intended for navigation purposes.
Public information obtained from BOEM database (August 2021).

Geodetic Datum: NAD27
Projection: UTM
Zone: 16N
Grid Units: Feet

Interpretation By: S. Ul-Hadi
Cartography: T. Nguyen
Project No.: 21-04-26
Date: August 2021

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

Scale =1:12,000

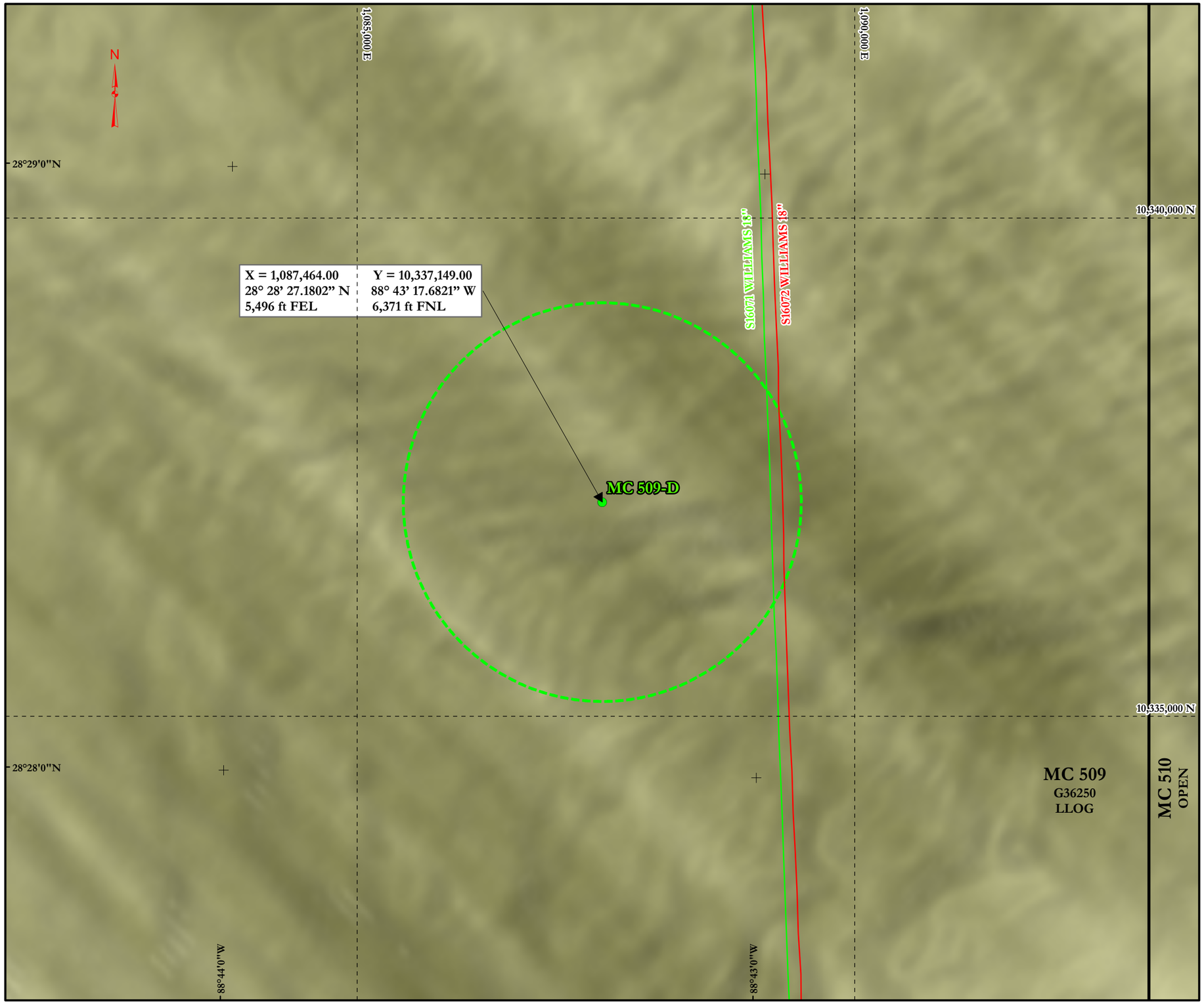
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-6
Seafloor Rendering
Proposed Well MC 509-D
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Oil Pipeline, Active
- Gas Pipeline, Active
- Proposed Well
- 2,000-ft Radius Circle

Amplitude
(Peak)
High
Low

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

Rendering Illumination:
Azimuth: 300°
Elevation : 45°
Vertical Exaggeration: 5X

IMPORTANT NOTICE
This map is not intended for navigation purposes.
Public information obtained from BOEM database (August 2021).

Geodetic Datum: NAD27
Projection: UTM
Zone: 16N
Grid Units: Feet

Interpretation By: S. Ul-Hadi
Cartography: T. Nguyen
Project No.: 21-04-26
Date: August 2021

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

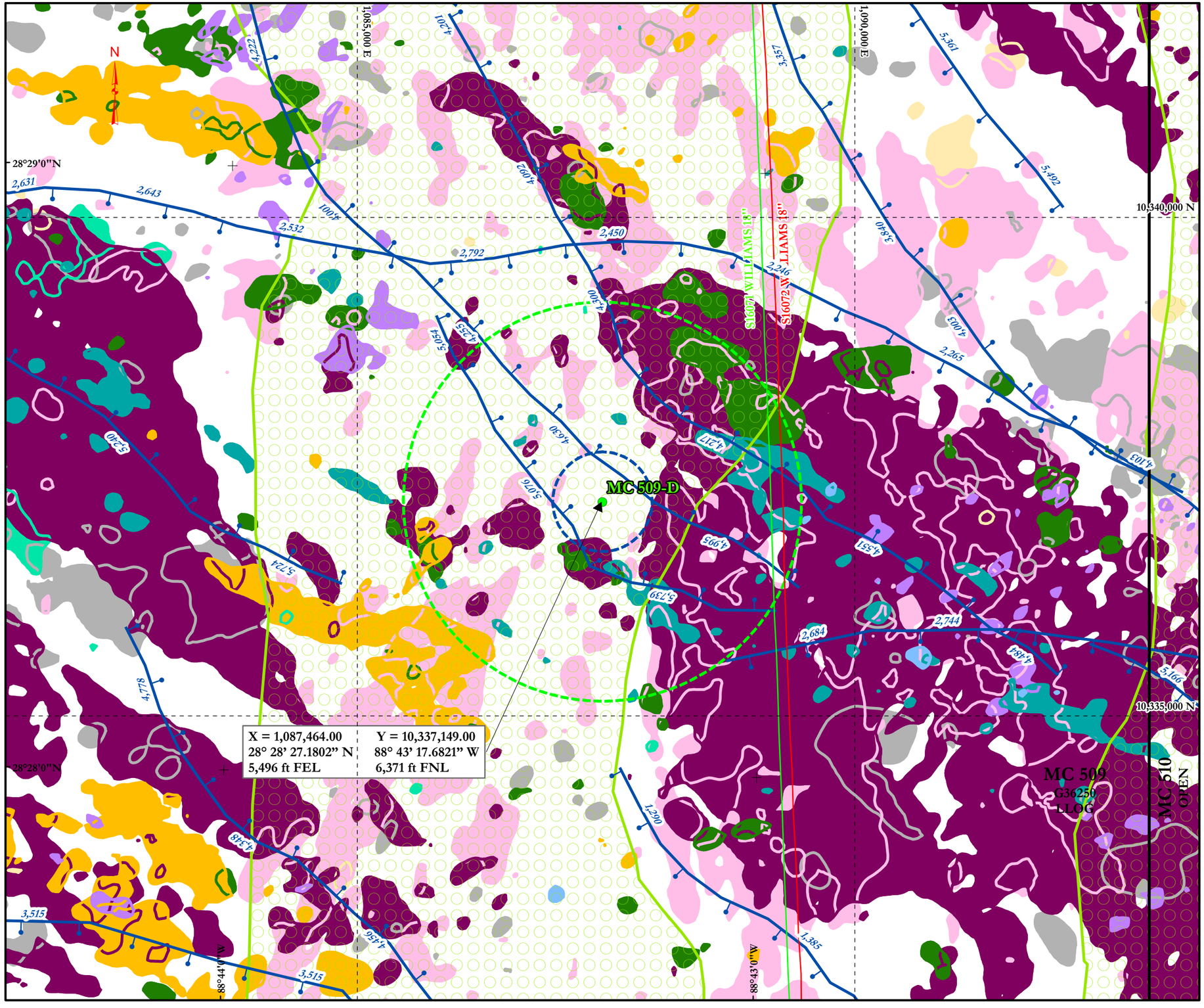
Scale =1:12,000

LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-7
Seafloor Amplitude Rendering
Proposed Well MC 509-D
Lease No. G36250

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Oil Pipeline, Active
- Gas Pipeline, Active
- Proposed Well
- 2,000-ft Radius Circle
- 500-ft Radius Circle
- Buried Faults with depth to top of fault in feet BML (Tics represent the downthrown side)
- Channel Between Horizons 30 and 40
- Channel Between Horizons 50 and 60

Amplitude Anomalies

- Between Seafloor and Horizon 10
- Between Horizon 10 and Horizon 20
- Between Horizon 20 and Horizon 30
- Between Horizon 30 and Horizon 40
- Along Horizon 40
- Between Horizon 40 and Horizon 50
- Along Horizon 50
- Between Horizon 50 and Horizon 60
- Between Horizon 60 and Horizon 70
- Between Horizon 70 and Limit of Investigation

IMPORTANT NOTICE
This map is not intended for navigation purposes.
Public information obtained from BOEM database (August 2021).

Geodetic Datum: NAD27 Projection: UTM Zone: 16N Grid Units: Feet	Interpretation By: S. Ul-Hadi Cartography: T. Nguyen Project No.: 21-04-26 Date: August 2021

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

Scale =1:12,000

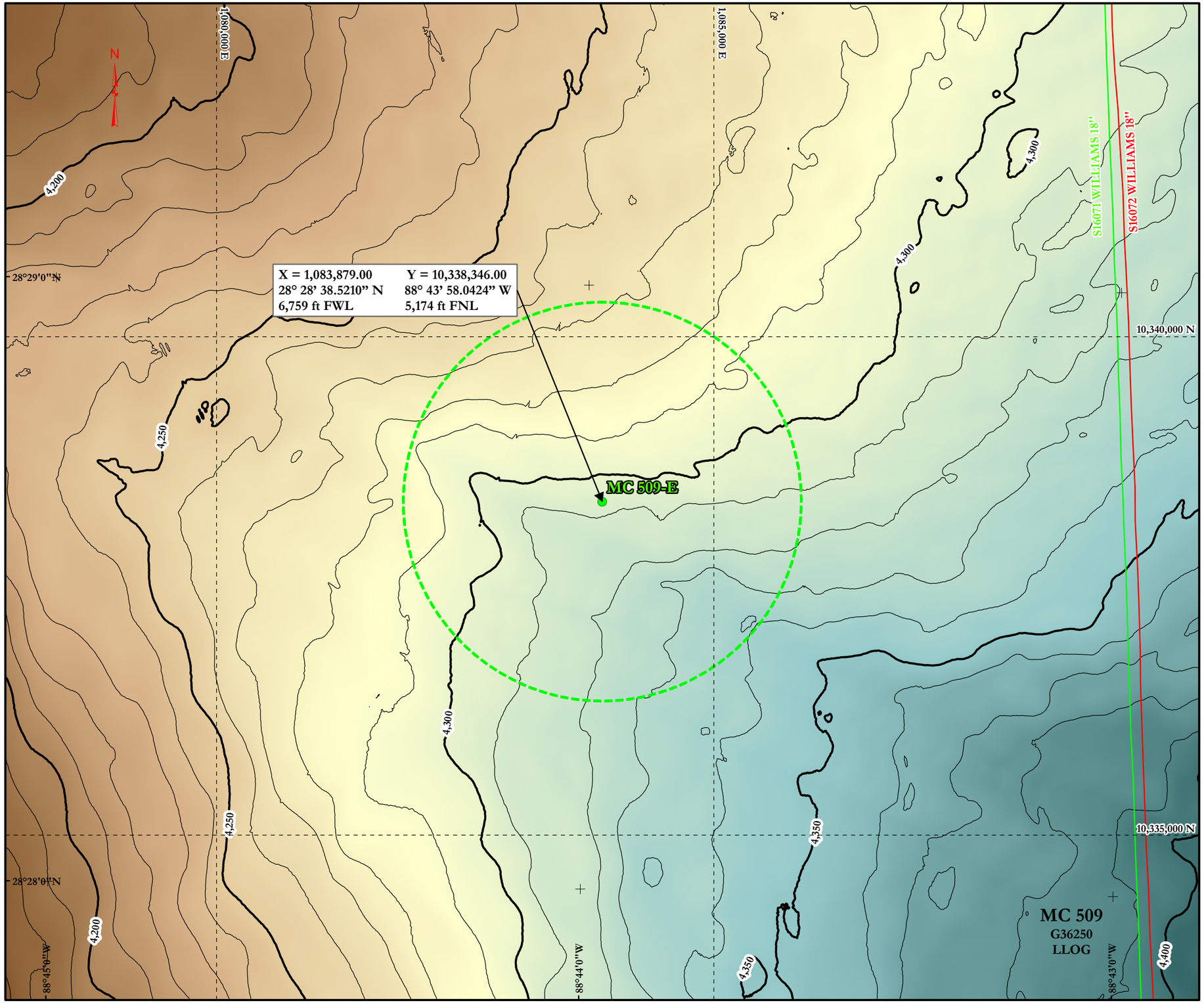
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-8
Geologic Features
Proposed Well MC 509-D
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Oil Pipeline, Active
- Gas Pipeline, Active
- Proposed Well
- 2,000-ft Radius Circle
- 10-ft Contours
- 50-ft Contours

Depths
(Below Sea Level)

4,167 ft

4,407 ft

Grid Information:
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 (August 2021).

Geodetic Datum: NAD27
Projection: UTM
Zone: 16N
Grid Units: Feet

Interpretation By: S. Ul-Hadi
Cartography: T. Nguyen
Project No.: 21-04-26
Date: August 2021

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

Scale =1:12,000

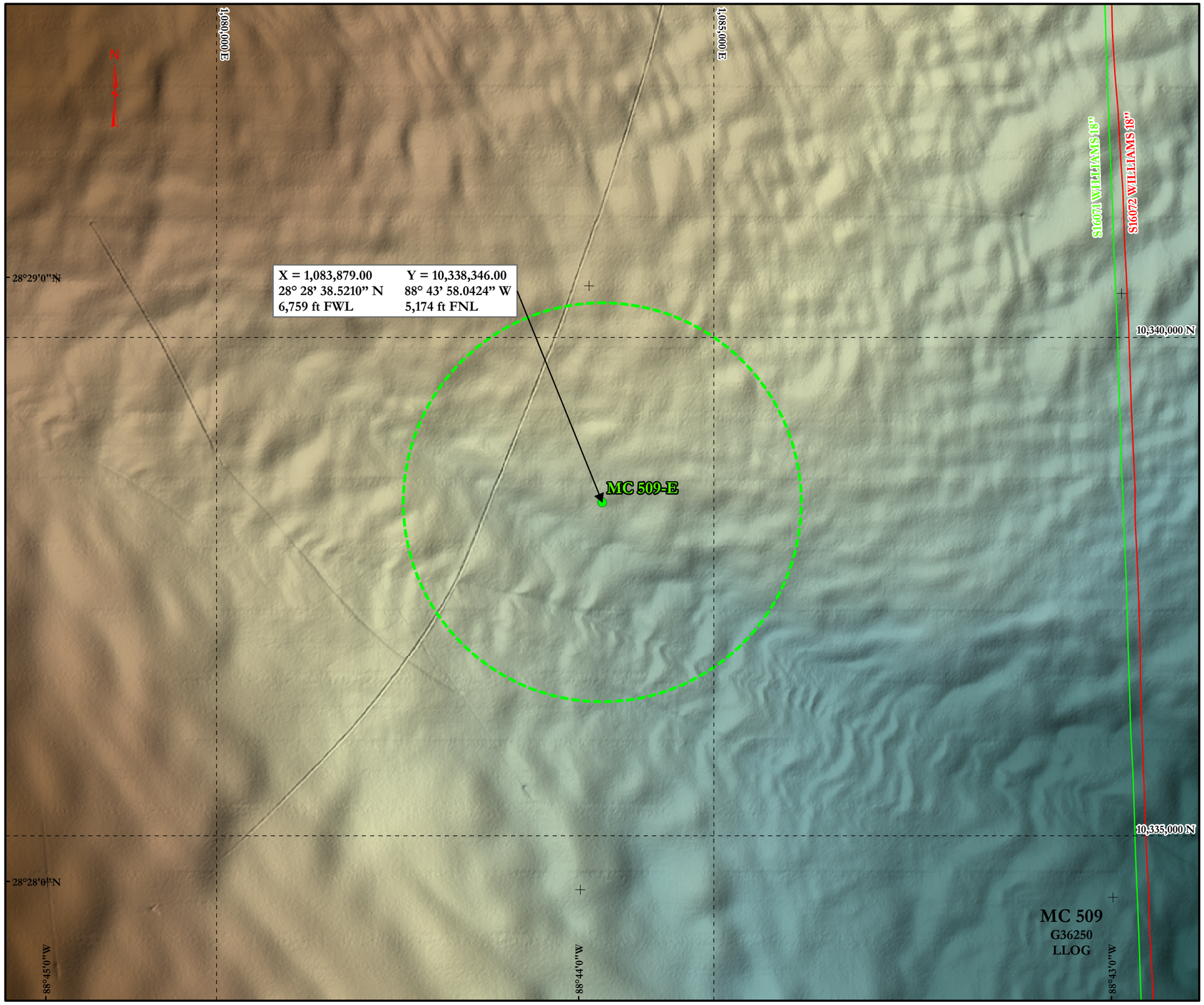
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-9
Bathymetry
Proposed Well MC 509-E
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Oil Pipeline, Active
- Gas Pipeline, Active
- Proposed Well
- 2,000-ft Radius Circle

Depths
(Below Sea Level)

4,167 ft

4,407 ft

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

Rendering Illumination:
Azimuth: 300°
Elevation : 45°
Vertical Exaggeration: 5X

IMPORTANT NOTICE
This map is not intended for navigation purposes.
Public information obtained from BOEM database (August 2021).

Geodetic Datum: NAD27
Projection: UTM
Zone: 16N
Grid Units: Feet

Interpretation By: S. Ul-Hadi
Cartography: T. Nguyen
Project No.: 21-04-26
Date: August 2021

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

Scale =1:12,000

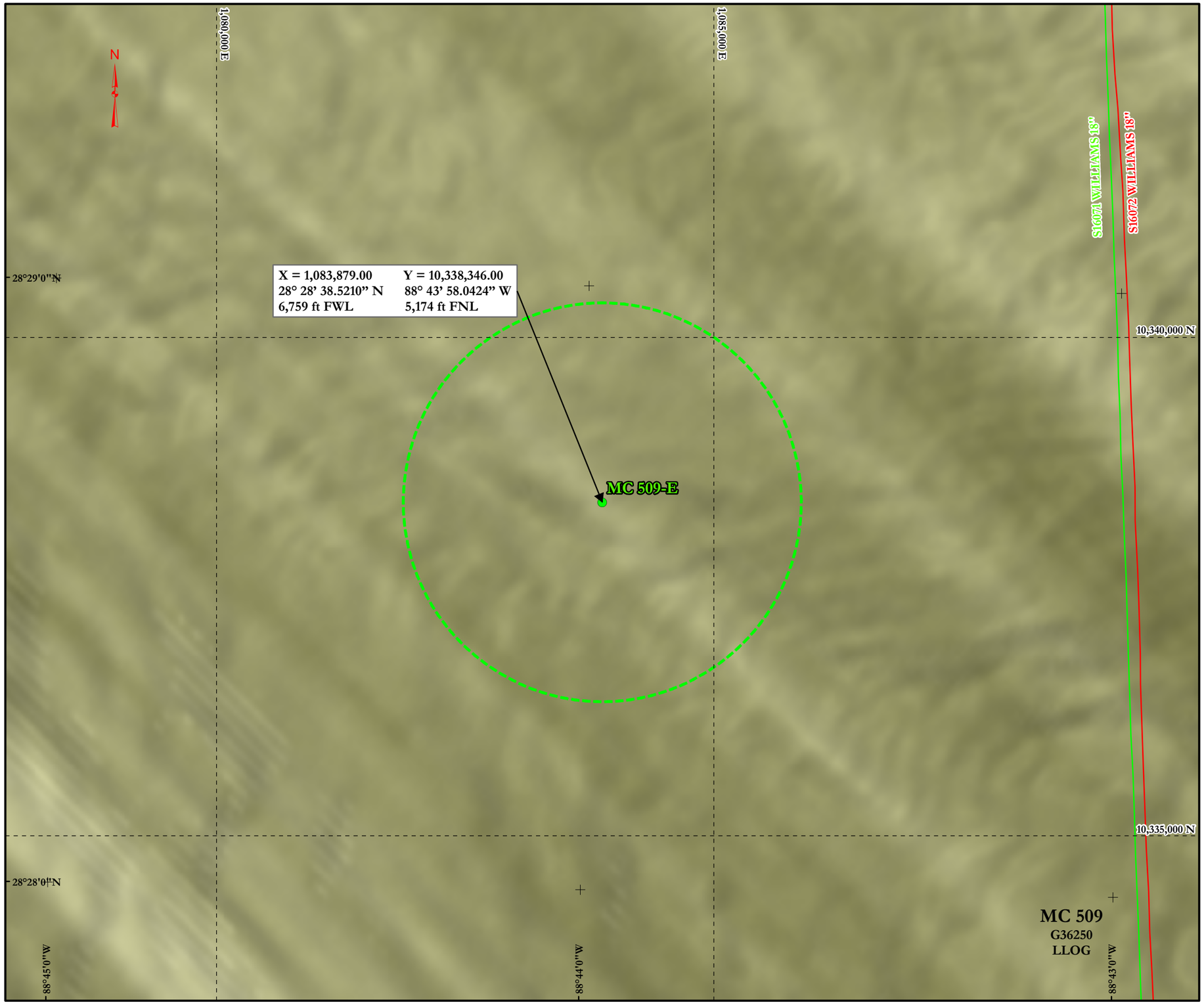
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-10
Seafloor Rendering
Proposed Well MC 509-E
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Oil Pipeline, Active
- Gas Pipeline, Active
- Proposed Well
- 2,000-ft Radius Circle

Amplitude (Peak)
High
Low

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

Rendering Illumination:
Azimuth: 300°
Elevation : 45°
Vertical Exaggeration: 5X

IMPORTANT NOTICE
This map is not intended for navigation purposes.
Public information obtained from BOEM database (August 2021).

Geodetic Datum: NAD27
Projection: UTM
Zone: 16N
Grid Units: Feet

Interpretation By: S. Ul-Hadi
Cartography: T. Nguyen
Project No.: 21-04-26
Date: August 2021

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

Scale =1:12,000

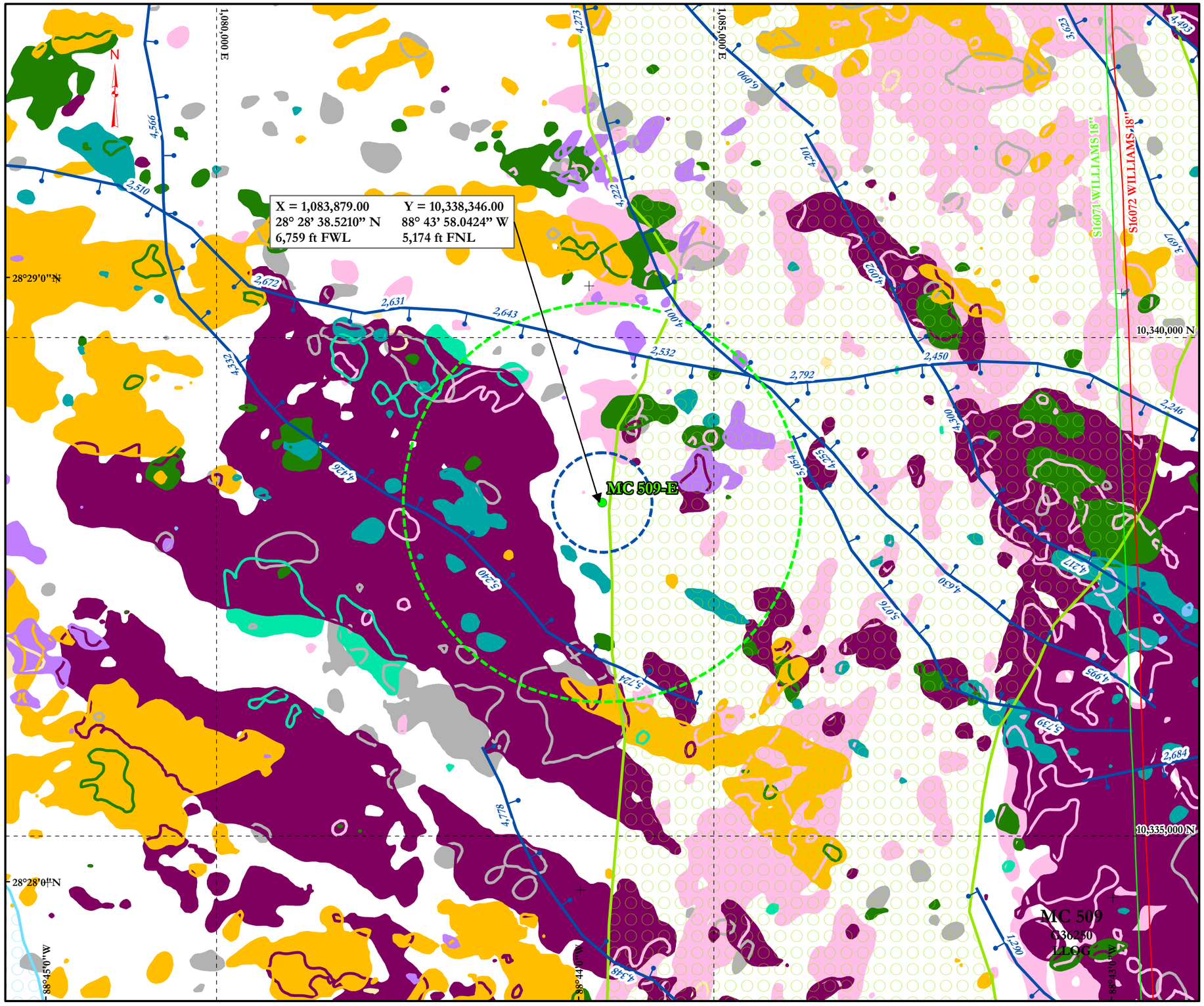
LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-11
Seafloor Amplitude Rendering
Proposed Well MC 509-E
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO



Legend

- Lat/Long Grid Points
- UTM Northing and Easting Grid Lines
- Oil Pipeline, Active
- Gas Pipeline, Active
- Proposed Well
- 2,000-ft Radius Circle
- 500-ft Radius Circle
- Buried Faults with depth to top of fault in feet BML (Tics represent the downthrown side)
- Channel Between Horizons 30 and 40
- Channel Between Horizons 50 and 60

Amplitude Anomalies

- Between Seafloor and Horizon 10
- Between Horizon 10 and Horizon 20
- Between Horizon 20 and Horizon 30
- Between Horizon 30 and Horizon 40
- Along Horizon 40
- Between Horizon 40 and Horizon 50
- Along Horizon 50
- Between Horizon 50 and Horizon 60
- Between Horizon 60 and Horizon 70
- Between Horizon 70 and Limit of Investigation

IMPORTANT NOTICE
This map is not intended for navigation purposes.
Public information obtained from BOEM database (August 2021).

Geodetic Datum: NAD27 Projection: UTM Zone: 16N Grid Units: Feet	Interpretation By: S. Ul-Hadi Cartography: T. Nguyen Project No.: 21-04-26 Date: August 2021

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

Scale =1:12,000

LLOG exploration

Block 509
Mississippi Canyon Area
Gulf of Mexico

Map W-12
Geologic Feature
Proposed Well MC 509-E
Lease No. G36250

Map Prepared by:
Berger Geosciences, LLC.

B-geO

Stratigraphic Column

Attachment C-6
(Proprietary Information)

APPENDIX D
HYDROGEN SULFIDE (H_2S) INFORMATION
(30 CFR Part 550.215 and 550.245)

A. Concentration

LLOG does not anticipate encountering H_2S 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", LLOG requests that the proposed locations be classified H_2S absent. The basis for this determination is the evaluation of Mississippi Canyon 509 #1 (ExxonMobil), Lease OCS-G-21765. This well is H_2S absent to 23,143'. The deeper formations are still unknown.

C. H_2S Contingency Plan

Not applicable for the proposed operations.

D. Modeling Report

Not applicable to the proposed operations.

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

A. High-Density Deepwater Benthic Communities Information

Benthic communities have not been reported within MC 509. The nearest reported benthic community is an unidentified community located in MC 640, about 6 miles south-southwest of the Seafloor Assessment area.

There is no evidence of fluid migration to the seafloor within 2,000 ft of Proposed Well MC 509-A, B, C, D and E. There are no seafloor amplitude anomalies or signs of gas migration within 2,000 ft of the proposed wells. There are no BSRs or other seismic indicators of gas hydrates within 2,000 ft of the proposed wells.

Features or areas that could support high-density chemosynthetic or other benthic communities are not anticipated within 2,000 ft of Proposed Well MC 509-A, MC 509-B, MC 509-C, MC 509-D and MC-509-E.

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 509 is not located within the vicinity of a proposed live bottom (Pinnacle trend) area.

E. Live Bottoms (Low Relief) Map

Mississippi Canyon Block 509 is not located within the vicinity of a proposed live bottom (Low Relief) area.

F. Potentially Sensitive Biological Features Map

Mississippi Canyon Block 509 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 509** is not located in a critical habitat designated under ESA and marine mammals protected under the MMPA although federally protected marine mammals are always anticipated. LLOG will mitigate impact through compliance with BOEM NTL 2016-G01, G02 and NTL 2015 BSEE-G03. See ***Attachment E-1*** for a list of the NOAA Species known in the Gulf of Mexico. In the event federally listed species become present on **Mississippi Canyon Block 509**, LLOG will mitigate impact through compliance with BOEM NTL 2016-G01, G02, NTL 2015 BSEE-G03 and the Biological Opinion of the Endangered Species Act Section 7. See Attachment E-1 for a list of the NOAA Species known in the Gulf of Mexico. Moon pool daily observation log shall be maintained on the bridge. The deck supervisor on tour shall go to the bridge and log time, date, and results of each moon pool inspection. STOP WORK AUTHORITY shall be used and implemented, in a safe and timely manner, for any work that could affect marine life listed on the Endangered Species Act.

H. Archaeological Information

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 509. Pursuant to the public information in the NOAA Automated Wreck and Obstruction Information System and Navigational Charts (NOAA, 2019); no shipwrecks are reported within MC 509. The required archaeological survey was acquired by Oceaneering in 2019 and a report for the vicinity of the proposed well was completed by Oceaneering and was submitted to BOEM under separate cover by letter dated March 7, 2019. For avoidances and sonar contacts please refer to the Oceaneering report.

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)

Endangered Species List Common to the Gulf of Mexico

Geophysical surveys, including the use of airguns and airgun arrays,may have an impact on marine wildlife. Many marine species are protected under the Endangered Species Act (ESA) and all marine mammals (including manatees) are protected under the Marine Mammal Protection Act (MMPA). The following Gulf of Mexico species are listed under the ESA:

Gulf of Mexico Bryde's Whale (Balaenoptera edeni)
Sperm Whale (Physeter macrocephalus)
Green Turtle (Chelonia mydas) – North Atlantic DPS and South Atlantic DPS
Hawksbill Turtle (Eretmochelys imbricata)
Kemp's Ridley Turtle (Lepidochelys kempii)
Leatherback Turtle (Dermochelys coriacea) - Northwest Atlantic
Loggerhead Turtle (Caretta caretta) – Northwest Atlantic Ocean DPS
Gulf Sturgeon (Acipenser oxyrinchus desotoi)
Oceanic Whitetip Shark (Carcharhinus longimanus)
Giant Manta Ray (Manta birostris)
West Indian Manatee (Trichechus manatus)*

Note that this list can change as other species are listed/delisted, and this protocol shall be applied to any ESA protected species (and all marine mammals) that occur in the Gulf of Mexico, including rare and extralimital species.

LLOG's proposed operations in this plan will not impact the critical habitats of the marine species listed in the Endangered Species Act.

*Managed by the US Fish and Wildlife Service

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 DISCHARGE

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	298,168 bbls/well	19,878 bbls/day/well	Discharge overboard	No
Cuttings wetted with water-based fluid	Cuttings generated while using water based drilling fluid.	7,326 bbls/well	488 bbls/day/well	Discharge overboard	No
Cuttings wetted with synthetic-based fluid	Cuttings generated while using synthetic based drilling fluid.	6,419 bbls/well	171 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	54,208 bbls/well	3.9 bbls/hr/well	Discharge overboard (no free oil)	No
Sanitary waste	Processed sanitary waste from living quarters	36,138 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 drillship, with related support vessels and construction barge information.

As evidenced by ***Attachment G-1,*** the worksheets were completed based on the proposed flaring and burning operations.

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 H^2S at concentrations greater than 20 parts per million (ppm)?		X
Do you propose to flare or vent natural gas for more than 48 continuous hours from any proposed well?		X
Do you propose to burn produced hydrocarbon liquids?		X

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 default emission factors 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)

Initial Exploration Plan
OCS-G-36250 Lease
Mississippi Canyon Block 509

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

COMPANY	LLOG Exploration Offhsore, LLC
AREA	Mississippi Canyon
BLOCK	509
LEASE	OCS-G-36250
FACILITY	
WELL	Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E
COMPANY CONTACT	Susan Sachitana
TELEPHONE NO.	985-801-4300
REMARKS	Drill Ship - Drilling & Completion Operations

AIR EMISSIONS COMPUTATION FACTORS

Fuel Usage Conversion Factors	Natural Gas Turbines				Natural Gas Engines		Diesel Recip. Engine		Diesel Turbines			
	SCF/hp-hr	Mississippi Canyon 953			SCF/hp-hr	7.143	GAL/hp-hr	0.0514	GAL/hp-hr	0.0514		

Equipment/Emission Factors	units	OCS-G-36062	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	REF.	DATE	Reference Links
Natural Gas Turbine	g/hp-hr		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	N/A	#VALUE!	N/A	AP42 3.1-1& 3.1-2a	4/00	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s01.pdf
RECIP. 2 Cycle Lean Natural Gas	g/hp-hr		0.1293	0.1293	0.0020	6.5998	0.4082	N/A	1.2009	N/A	AP42 3.2-1	7/00	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf
RECIP. 4 Cycle Lean Natural Gas	g/hp-hr		0.0002	0.0002	0.0020	2.8814	0.4014	N/A	1.8949	N/A	AP42 3.2-2	7/00	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf
RECIP. 4 Cycle Rich Natural Gas	g/hp-hr		0.0323	0.0323	0.0020	7.7224	0.1021	N/A	11.9408	N/A	AP42 3.2-3	7/00	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf
Diesel Recip. < 600 hp	g/hp-hr	1	1	1	0.0279	14.1	1.04	N/A	3.03	N/A	AP42 3.3-1	10/96	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s03.pdf
Diesel Recip. > 600 hp	g/hp-hr	0.32	0.182	0.178	0.0055	10.9	0.29	N/A	2.5	N/A	AP42 3.4-1 & 3.4-2	10/96	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s04.pdf
Diesel Boiler	lbs/bbl	0.0840	0.0420	0.0105	0.0089	1.0080	0.0084	5.14E-05	0.2100	0.0336	AP42 1.3-6; Pb and NH3: WebFIRE (08/2018)	9/98 and 5/10	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s03.pdf https://cfpub.epa.gov/webfire/
Diesel Turbine	g/hp-hr	0.0381	0.0137	0.0137	0.0048	2.7941	0.0013	4.45E-05	0.0105	N/A	AP42 3.1-1 & 3.1-2a	4/00	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s01.pdf
Dual Fuel Turbine	g/hp-hr	0.0381	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	4.45E-05	#VALUE!	0.0000	AP42 3.1-1& 3.1-2a; AP42 3.1-1 & 3.1-2a	4/00	https://cfpub.epa.gov/webfire/
Vessels – Propulsion	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	
Vessels – Drilling Prime Engine, Auxiliary	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data
Vessels – Diesel Boiler	g/hp-hr	0.0466	0.1491	0.1417	0.4400	1.4914	0.0820	3.73E-05	0.1491	0.0003	USEPA 2017 NEI;TSP (units converted) refer to Diesel Boiler Reference	3/19	
Vessels – Well Stimulation	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	
Natural Gas Heater/Boiler/Burner	lbs/MMscf	7.60	1.90	1.90	0.60	190.00	5.50	5.00E-04	84.00	3.2	AP42 1.4-1 & 1.4-2; Pb and NH3: WebFIRE (08/2018)	7/98 and 8/18	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s04.pdf https://cfpub.epa.gov/webfire/
Combustion Flare (no smoke)	lbs/MMscf	0.00	0.00	0.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	
Combustion Flare (light smoke)	lbs/MMscf	2.10	2.10	2.10	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	
Combustion Flare (medium smoke)	lbs/MMscf	10.50	10.50	10.50	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_02-05-18.pdf
Combustion Flare (heavy smoke)	lbs/MMscf	21.00	21.00	21.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	
Liquid Flaring	lbs/bbl	0.42	0.0966	0.0651	5.964	0.84	0.01428	5.14E-05	0.21	0.0336	AP42 1.3-1 through 1.3-3 and 1.3-5	5/10	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s03.pdf
Storage Tank	tons/yr/tank						4.300				2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017	https://www.boem.gov/environment/environmental-studies/2014-gulfwide-emission-inventory
Fugitives	lbs/hr/component						0.0005				API Study	12/93	https://www.api.org/
Glycol Dehydrator	tons/yr/dehydrator						19.240				2011 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2014	https://www.boem.gov/environment/environmental-studies/2011-gulfwide-emission-inventory
Cold Vent	tons/yr/vent						44.747				2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017	https://www.boem.gov/environment/environmental-studies/2014-gulfwide-emission-inventory
Waste Incinerator	lb/ton		15.0	15.0	2.5	2.0	N/A	N/A	20.0	N/A	AP 42 2.1-12	10/96	https://www3.epa.gov/ttnchie1/ap42/ch02/final/c02s01.pdf
On-Ice – Loader	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Other Construction Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Other Survey Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Tractor	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	https://www.epa.gov/moves/nonroad2008a-installation-and-updates
On-Ice – Truck (for gravel island)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Truck (for surveys)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
Man Camp - Operation (max people/day)	tons/person/day		0.0004	0.0004	0.0004	0.006	0.001	N/A	0.001	N/A	BOEM 2014-1001	2014	https://www.boem.gov/sites/default/files/uploadedFiles/BOEM/BOEM_Newsroom/Library/Publications/2014-1001.pdf
Vessels - Ice Management Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data
Vessels - Hovercraft Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data

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

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

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

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

AIR EMISSIONS COMPUTATION FACTORS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
LLOG Exploration Offhsore, LI	Mississippi Canyon	509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E	Susan Sachitana	985-801-4300	Drill Ship - Drilling & Completion Operations

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	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel	61800	3,179	76,305	24	103	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler	0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		BPD																						
DRILLING	Liquid Flaring	0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke		0		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	--	0.00	--
	COMBUSTION FLARE - light smoke		0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke		0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke		0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**	kW			HR/D	D/YR																		
	VESSELS - Ice Management Diesel	0			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	0.00	--	0.00	0.00
2022	**Facility Total Emissions**						**43.60**	**26.30**	**25.51**	**0.63**	**1,044.59**	**30.03**	**0.00**	**163.84**	**0.30**	**53.89**	**32.51**	**31.54**	**0.78**	**1,291.11**	**37.12**	**0.00**	**202.51**	**0.38**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**															**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																							
DRILLING	VESSELS- Crew Diesel	7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel	7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**		GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)	PEOPLE/DAY																						
	VESSELS	kW			HR/D	D/YR																		
	On-Ice – Loader		0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment		0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment		0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor		0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)		0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)		0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation	0			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	--	0.00	
	VESSELS - Hovercraft Diesel	0			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	0.00	0.00	0.00	0.00	0.00
2022	**Non-Facility Total Emissions**						**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS COMPUTATION FACTORS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
LLOG Exploration Offhsore, LLC	Mississippi Canyon	509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E	Susan Sachitana	985-801-4300	Drill Ship - Drilling & Completion Operations

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	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel	61800	3179.3628	76304.71	24	103	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler	0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		BPD																						
DRILLING	Liquid Flaring	0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke		0		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	--	0.00	--
	COMBUSTION FLARE - light smoke		0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke		0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke		0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**	**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel	0			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	0.00	--	0.00	0.00
2023	**Facility Total Emissions**						**43.60**	**26.30**	**25.51**	**0.63**	**1,044.59**	**30.03**	**0.00**	**163.84**	**0.30**	**53.89**	**32.51**	**31.54**	**0.78**	**1,291.11**	**37.12**	**0.00**	**202.51**	**0.38**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**															**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																							
DRILLING	VESSELS- Crew Diesel	7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel	7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**		**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)	**PEOPLE/DAY**																						
	VESSELS	**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader		0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment		0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment		0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor		0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)		0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)		0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation	0			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	--	0.00	
	VESSELS - Hovercraft Diesel	0			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	0.00	0.00	0.00	0.00	0.00
2023	**Non-Facility Total Emissions**						**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS COMPUTATION FACTORS

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		Drill Ship - Drilling & Completion Operations										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61800	3179.3628	76304.71	24	103	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2024	**Facility Total Emissions**							**43.60**	**26.30**	**25.51**	**0.63**	**1,044.59**	**30.03**	**0.00**	**163.84**	**0.30**	**53.89**	**32.51**	**31.54**	**0.78**	**1,291.11**	**37.12**	**0.00**	**202.51**	**0.38**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2024	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS COMPUTATION FACTORS

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E	Susan Sachitana	985-801-4300	Drill Ship - Drilling & Completion Operations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR									ESTIMATED TONS								
	Diesel Engines		HP	GAL/HR	GAL/D																				
	Nat. Gas Engines		HP	SCF/HR	SCF/D																				
	Burners		MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61800	3179.3628	76304.71	24	103	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW			HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2025	**Facility Total Emissions**							**43.60**	**26.30**	**25.51**	**0.63**	**1,044.59**	**30.03**	**0.00**	**163.84**	**0.30**	**53.89**	**32.51**	**31.54**	**0.78**	**1,291.11**	**37.12**	**0.00**	**202.51**	**0.38**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																						
	VESSELS		kW			HR/D	D/YR																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2025	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS COMPUTATION FACTORS

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		Drill Ship - Drilling & Completion Operations										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61800	3179.3628	76304.71	24	103	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2026	**Facility Total Emissions**							**43.60**	**26.30**	**25.51**	**0.63**	**1,044.59**	**30.03**	**0.00**	**163.84**	**0.30**	**53.89**	**32.51**	**31.54**	**0.78**	**1,291.11**	**37.12**	**0.00**	**202.51**	**0.38**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2026	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS COMPUTATION FACTORS

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offshore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		Drill Ship - Drilling & Completion Operations										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61800	3179.3628	76304.71	24	103	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2027	**Facility Total Emissions**							**43.60**	**26.30**	**25.51**	**0.63**	**1,044.59**	**30.03**	**0.00**	**163.84**	**0.30**	**53.89**	**32.51**	**31.54**	**0.78**	**1,291.11**	**37.12**	**0.00**	**202.51**	**0.38**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2027	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS COMPUTATION FACTORS

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		Drill Ship - Drilling & Completion Operations										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61800	3179.3628	76304.71	24	103	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2028	**Facility Total Emissions**							**43.60**	**26.30**	**25.51**	**0.63**	**1,044.59**	**30.03**	**0.00**	**163.84**	**0.30**	**53.89**	**32.51**	**31.54**	**0.78**	**1,291.11**	**37.12**	**0.00**	**202.51**	**0.38**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2028	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS COMPUTATION FACTORS

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		Drill Ship - Drilling & Completion Operations										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61800	3179.3628	76304.71	24	103	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2029	**Facility Total Emissions**							**43.60**	**26.30**	**25.51**	**0.63**	**1,044.59**	**30.03**	**0.00**	**163.84**	**0.30**	**53.89**	**32.51**	**31.54**	**0.78**	**1,291.11**	**37.12**	**0.00**	**202.51**	**0.38**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2029	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS COMPUTATION FACTORS

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		Drill Ship - Drilling & Completion Operations										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61800	3179.3628	76304.71	24	103	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2030	**Facility Total Emissions**							**43.60**	**26.30**	**25.51**	**0.63**	**1,044.59**	**30.03**	**0.00**	**163.84**	**0.30**	**53.89**	**32.51**	**31.54**	**0.78**	**1,291.11**	**37.12**	**0.00**	**202.51**	**0.38**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2030	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS COMPUTATION FACTORS

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		Drill Ship - Drilling & Completion Operations										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61800	3179.3628	76304.71	24	103	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2031	**Facility Total Emissions**							**43.60**	**26.30**	**25.51**	**0.63**	**1,044.59**	**30.03**	**0.00**	**163.84**	**0.30**	**53.89**	**32.51**	**31.54**	**0.78**	**1,291.11**	**37.12**	**0.00**	**202.51**	**0.38**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2031	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL
LLOG Exploration Offhsore, LLC	Mississippi Canyon	509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E

Year	Facility Emitted Substance 953 OCS-G-36062								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2022	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
2023	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
2024	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
2025	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
2026	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
2027	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
2028	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
2029	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
2030	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
2031	53.89	32.51	31.54	0.78	1291.11	37.12	0.00	202.51	0.38
Allowable	1431.90			1431.90	1431.90	1431.90		41730.91	

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

COMPANY	LLOG Exploration Offhsore, LLC
AREA	Mississippi Canyon
BLOCK	509
LEASE	OCS-G-36250
FACILITY	
WELL	Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E
COMPANY CONTACT	Susan Sachitana
TELEPHONE NO.	985-801-4300
REMARKS	DP Semisubmersible - Drilling & Completion Operations

AIR EMISSIONS COMPUTATION FACTORS

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

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

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

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

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

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

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL						CONTACT		PHONE		REMARKS									
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-3625		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E						Susan Sachitana		985-801-4300		DP Semisubmersible - Drilling & Completion Operations									
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61200	3,148	75,564	24	103	43.18	26.05	25.27	0.63	1034.45	29.74	0.00	162.25	0.30	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2022	**Facility Total Emissions**							**43.18**	**26.05**	**25.27**	**0.63**	**1,034.45**	**29.74**	**0.00**	**162.25**	**0.30**	**53.36**	**32.20**	**31.23**	**0.78**	**1,278.57**	**36.76**	**0.00**	**200.54**	**0.37**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2022	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		DP Semisubmersible - Drilling & Completion Operations										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61200	3148.4952	75563.88	24	103	43.18	26.05	25.27	0.63	1034.45	29.74	0.00	162.25	0.30	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2023	**Facility Total Emissions**							**43.18**	**26.05**	**25.27**	**0.63**	**1,034.45**	**29.74**	**0.00**	**162.25**	**0.30**	**53.36**	**32.20**	**31.23**	**0.78**	**1,278.57**	**36.76**	**0.00**	**200.54**	**0.37**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2023	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		DP Semisubmersible - Drilling & Completion Operations										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61200	3148.4952	75563.88	24	103	43.18	26.05	25.27	0.63	1034.45	29.74	0.00	162.25	0.30	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2024	**Facility Total Emissions**							**43.18**	**26.05**	**25.27**	**0.63**	**1,034.45**	**29.74**	**0.00**	**162.25**	**0.30**	**53.36**	**32.20**	**31.23**	**0.78**	**1,278.57**	**36.76**	**0.00**	**200.54**	**0.37**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2024	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E	Susan Sachitana	985-801-4300	DP Semisubmersible - Drilling & Completion Operations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR									ESTIMATED TONS								
	Diesel Engines		HP	GAL/HR	GAL/D																				
	Nat. Gas Engines		HP	SCF/HR	SCF/D																				
	Burners		MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61200	3148.4952	75563.88	24	103	43.18	26.05	25.27	0.63	1034.45	29.74	0.00	162.25	0.30	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2025	**Facility Total Emissions**							**43.18**	**26.05**	**25.27**	**0.63**	**1,034.45**	**29.74**	**0.00**	**162.25**	**0.30**	**53.36**	**32.20**	**31.23**	**0.78**	**1,278.57**	**36.76**	**0.00**	**200.54**	**0.37**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2025	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E	Susan Sachitana	985-801-4300	DP Semisubmersible - Drilling & Completion Operations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR									ESTIMATED TONS								
	Diesel Engines		HP	GAL/HR	GAL/D																				
	Nat. Gas Engines		HP	SCF/HR	SCF/D																				
	Burners		MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61200	3148.4952	75563.88	24	103	43.18	26.05	25.27	0.63	1034.45	29.74	0.00	162.25	0.30	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW			HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2026	**Facility Total Emissions**							**43.18**	**26.05**	**25.27**	**0.63**	**1,034.45**	**29.74**	**0.00**	**162.25**	**0.30**	**53.36**	**32.20**	**31.23**	**0.78**	**1,278.57**	**36.76**	**0.00**	**200.54**	**0.37**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																						
	VESSELS		kW			HR/D	D/YR																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2026	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offshore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		DP Semisubmersible - Drilling & Completion Operations										
OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR									ESTIMATED TONS								
	Diesel Engines		HP	GAL/HR	GAL/D																				
	Nat. Gas Engines		HP	SCF/HR	SCF/D																				
	Burners		MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61200	3148.4952	75563.88	24	103	43.18	26.05	25.27	0.63	1034.45	29.74	0.00	162.25	0.30	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2027	**Facility Total Emissions**							**43.18**	**26.05**	**25.27**	**0.63**	**1,034.45**	**29.74**	**0.00**	**162.25**	**0.30**	**53.36**	**32.20**	**31.23**	**0.78**	**1,278.57**	**36.76**	**0.00**	**200.54**	**0.37**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2027	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offshore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		DP Semisubmersible - Drilling & Completion Operations										
OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR									ESTIMATED TONS								
	Diesel Engines		HP	GAL/HR	GAL/D																				
	Nat. Gas Engines		HP	SCF/HR	SCF/D																				
	Burners		MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61200	3148.4952	75563.88	24	103	43.18	26.05	25.27	0.63	1034.45	29.74	0.00	162.25	0.30	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW			HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2028	**Facility Total Emissions**							**43.18**	**26.05**	**25.27**	**0.63**	**1,034.45**	**29.74**	**0.00**	**162.25**	**0.30**	**53.36**	**32.20**	**31.23**	**0.78**	**1,278.57**	**36.76**	**0.00**	**200.54**	**0.37**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																						
	VESSELS		kW			HR/D	D/YR																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2028	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		DP Semisubmersible - Drilling & Completion Operations										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61200	3148.4952	75563.88	24	103	43.18	26.05	25.27	0.63	1034.45	29.74	0.00	162.25	0.30	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2029	**Facility Total Emissions**							**43.18**	**26.05**	**25.27**	**0.63**	**1,034.45**	**29.74**	**0.00**	**162.25**	**0.30**	**53.36**	**32.20**	**31.23**	**0.78**	**1,278.57**	**36.76**	**0.00**	**200.54**	**0.37**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2029	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offhsore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		DP Semisubmersible - Drilling & Completion Operations										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61200	3148.4952	75563.88	24	103	43.18	26.05	25.27	0.63	1034.45	29.74	0.00	162.25	0.30	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2030	**Facility Total Emissions**							**43.18**	**26.05**	**25.27**	**0.63**	**1,034.45**	**29.74**	**0.00**	**162.25**	**0.30**	**53.36**	**32.20**	**31.23**	**0.78**	**1,278.57**	**36.76**	**0.00**	**200.54**	**0.37**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS- Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2030	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
LLOG Exploration Offshore, LLC	Mississippi Canyon		509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E					Susan Sachitana		985-801-4300		DP Semisubmersible - Drilling & Completion Operations										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61200	3148.4952	75563.88	24	103	43.18	26.05	25.27	0.63	1034.45	29.74	0.00	162.25	0.30	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			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	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			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	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		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	--	0.00	--
	COMBUSTION FLARE - light smoke			0		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	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		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	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		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	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			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	0.00	--	0.00	0.00
2031	**Facility Total Emissions**							**43.18**	**26.05**	**25.27**	**0.63**	**1,034.45**	**29.74**	**0.00**	**162.25**	**0.30**	**53.36**	**32.20**	**31.23**	**0.78**	**1,278.57**	**36.76**	**0.00**	**200.54**	**0.37**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,431.90**			**1,431.90**	**1,431.90**	**1,431.90**		**41,730.91**	
	43.0																								
DRILLING	VESSELS - Crew Diesel		7200	370.4112	8889.87	6	44	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	0.67	0.41	0.39	0.01	16.12	0.46	0.00	2.53	0.00
	VESSELS - Supply Diesel		7200	370.4112	8889.87	10	88	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.24	1.35	1.31	0.03	53.72	1.54	0.00	8.43	0.02
	VESSELS - Tugs 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	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	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	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	0.00	--	0.00	0.00
	Man Camp - Operation		0			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	--	0.00	
	VESSELS - Hovercraft Diesel		0			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	0.00	0.00	0.00	0.00	0.00
2031	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**2.91**	**1.76**	**1.71**	**0.04**	**69.84**	**2.01**	**0.00**	**10.95**	**0.02**

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL
LLOG Exploration Offhsore, LLC	Mississippi Canyon	509	OCS-G-36250		Location A, B, C, D, E and alternate wells Alt A, Alt B, Alt C, Alt D, & Alt E

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2022	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
2023	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
2024	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
2025	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
2026	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
2027	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
2028	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
2029	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
2030	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
2031	53.36	32.20	31.23	0.78	1278.57	36.76	0.00	200.54	0.37
Allowable	1431.90			1431.90	1431.90	1431.90		41730.91	

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, plan was last approved on September 18, 2018 and our biennial update was found to be "in-compliance" on July 21, 2020.

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 386/387**	**Mississippi Canyon Block 509**
Facility Description	Location Well 001 (Revised Location B)	Location A
Distance to Nearest Shoreline (Miles)	58 miles	43 miles
Volume: Storage Tanks (total) Facility Piping (total) Lease Term Pipeline Uncontrolled Blowout (day) Barging **Potential 24 Hour Volume (bbls)**	**396,602 bbls**	**366,100 bbls**
Type of Liquid Hydrocarbon	Crude Oil	Crude Oil
API Gravity	25º	36.0°

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, our plan was last approved on September 18, 2018. Our biennial update was found to be "in-compliance" on July 21, 2020.

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 Exploration Plan for Mississippi Canyon Block 387 is the 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 in Plan R-6763, Revised Exploration Plan, which was approved on November 2, 2018.

The required proprietary data outlined in NTL 2015-N01 was submitted to BOEM within the Confidential Copy of the Revised Exploration Plan, R-6763.

LLOG Exploration Offshore, L.L.C., Company No. 02058 will not use any new or unusual technology in responding to an oil spill.

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 336,100 barrels of crude oil with an API gravity of 36°.

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 a 21% 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 17% or approximately 57,137 barrels of crude oil would be evaporated/dispersed within 24 hours, with approximately 278,963 barrels remaining.

Natural Weathering Data: MC 509, Well Location A	**Barrels of Oil**
WCD Volume	336,100
Less 17% natural evaporation/dispersion	57,137
Remaining volume	278,963

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's and MSRC's spill response equipment with a total derated skimming capacity of 1,216,248 barrels. Temporary storage associated with skimming equipment equals 416,796 barrels. If additional storage is needed, various tank barges with a total of 1.31 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 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 291,303 barrels. Temporary storage associated with skimming equipment equals 9,037 barrels. If additional storage is needed, various tank barges with a total of 301,000+ 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. Master Service Agreements with AMPOL and OMI Environmental will ensure access to 155,350 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 77 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

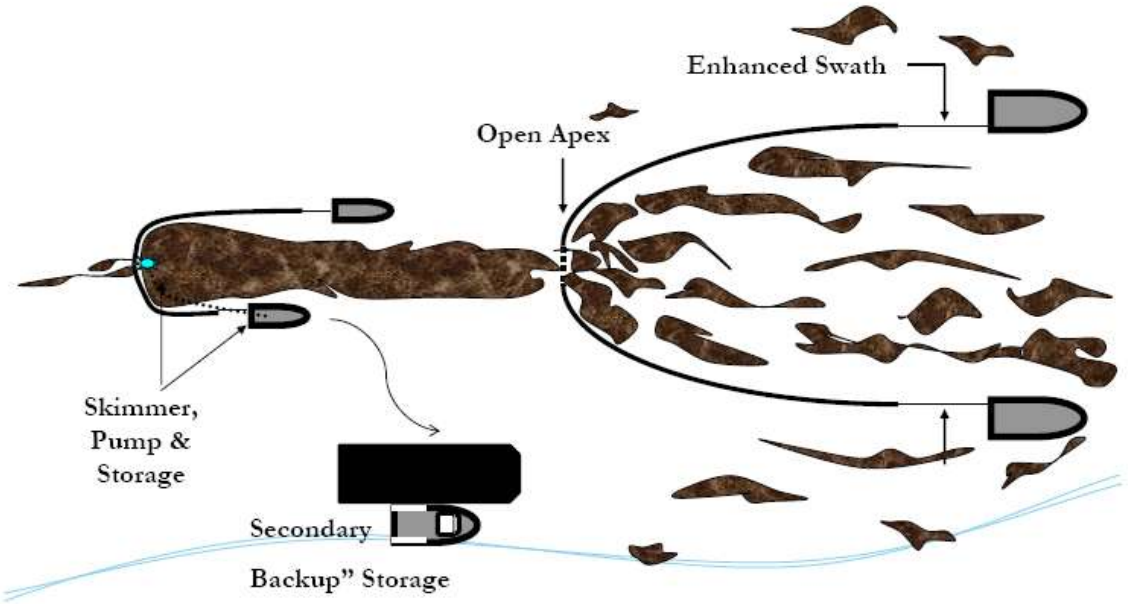
Mechanical Recovery – Deployed on large vessels of opportunity (VOO) the Koseq Rigid Sweeping Arms are high volume surge capacity deployed to increase recovery capacity at the source of a large oil spill in the offshore and outer nearshore environment of the Gulf of Mexico. They are highly mobile and 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.

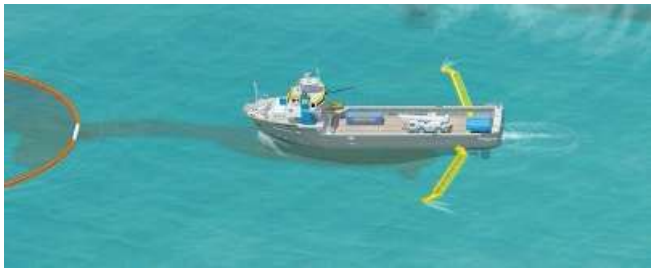
Command and Control – The large OSVs in many cases have state of the art communication and electronic systems, as well as the accommodations to support the function of directing all skimming operations offshore and reporting back to the command post.

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 509, Well Location A *43 miles from shore*	G36250	C57	Cameron, LA Vermilion, LA Terrebonne, LA Lafourche, LA **Plaquemines, LA** St. Bernard, LA Hancock & Harrison, MS Jackson, MS Mobile, AL Baldwin, AL Escambia, AL Okaloosa, FL Walton, FL Bay, FL	1 1 2 2 **21** 3 1 1 1 1 1 1 1 1

WCD Scenario– <u>BASED ON WELL BLOWOUT DURING DRILLING OPERATIONS</u> (43 miles from shore)
278,963 bbls of crude oil (Volume considering natural weathering)
API Gravity 36°

FIGURE 2 – Equipment Response Time to MC 509, 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	0.7	4.7
DC 3	1200	2	Houma	2	2	0.9	4.9
DC 3	1200	2	Houma	2	2	0.9	4.9
Aero Commander	NA	2	Houma	2	2	0.7	4.7
MSRC							
C-130 Spray AC	3,250	2	Melbourne, FL	4	0	1.5	5.5

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	6	2	26
95' FRV	22885	249	NA	6	Leeville	2	0	2	5	1	10
95' FRV	22885	249	NA	6	Venice	2	0	3	2	1	8
95' FRV	22885	249	NA	6	Galveston	2	0	2	19	1	24
95' FRV	22885	249	NA	6	Vermilion	2	0	3	7	1	13
Boom Barge (CGA-300) 42" Auto Boom (25000')	NA	NA	1 Tug 50 Crew	4 (Barge) 2 (Per Crew)	Leeville	8	0	4	14	2	28

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	48	0	4	7	1	60
RO Barge	NA	80000+	1 Tug	6	Venice	48	0	4	7	1	60
RO Barge	NA	80000+	1 Tug	6	Venice	48	0	4	7	1	60
RO Barge	NA	80000+	1 Tug	6	Venice	48	0	4	7	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	48	0	4	7	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	48	0	4	7	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	48	0	4	7	1	60
RO Barge	NA	110000+	1 Tug	6	Venice	48	0	4	7	1	60
RO Barge	NA	130000+	1 Tug	6	Venice	48	0	4	7	1	60
RO Barge	NA	140000+	1 Tug	6	Venice	48	0	4	7	1	60
RO Barge	NA	150000+	1 Tug	6	Venice	48	0	4	7	1	60
RO Barge	NA	160000+	1 Tug	6	Venice	48	0	4	7	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*2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Fort Jackson, LA	2	1	4	5.5	1	13.5
MSRC 452 Offshore Barge 1 Crucial Disk 88/30*2,640' 67" Curtain Pressure Boom*	11122	45000	3 Tugs	9	Fort Jackson, LA	4	1	6	10	1	22
Mississippi Responder 1 Transrec 350 *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Pascagoula, MS	2	1	2	7.5	1	13.5
MSRC 402 Offshore Barge 1 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	11122	40300	3 Tugs	9	Pascagoula, MS	4	1	3	14	1	23
S.T. Benz Responder 1 LFF 100 Brush *2,640' 67" Curtain Pressure Boom*	18086	4000	NA	10	Grand Isle, LA	3	1	1	7.5	1	13.5
Gulf Coast Responder 1 Transrec 350 *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Lake Charles, LA	2	1	4	22	1	30
Texas Responder 1 Transrec 350 *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Galveston, TX	2	1	1	27.5	1	32.5
MSRC 570 Offshore Barge 1 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	11122	56900	3 Tugs	9	Galveston, TX	4	1	2	49	1	57
Southern Responder 1 Transrec 350 *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Ingleside, TX	2	1	2	38	1	44
MSRC 403 Offshore Barge 1 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	11122	40300	3 Tugs	9	Ingleside, TX	4	1	3	68	1	77
Florida Responder 1 Transrec 350 *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Miami, FL	2	1	1	42	1	47
MSRC 360 Offshore Barge 1 Crucial Disk 88/30 *1,320' 67" Curtain Pressure Boom*	11122	36000	3 Tugs	9	Tampa, FL	4	1	3	43	1	52

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
T&T Marine (available through direct contract with CGA)											
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Galveston	4	12	13	4	2	35
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Harvey	4	12	2	4	2	24
Koseq Skimming Arms (10) Lamor brush	228850	60000	10 OSV	60	Galveston	24	24	13	4	2	67
Koseq Skimming Arms (6) Lamor brush	137310	36000	6 OSV	36	Harvey	24	24	2	4	2	56
Koseq Skimming Arms (6) MariFlex 150 HF	108978	36000	6 OSV	36	Harvey	24	24	2	4	2	56
CGA											
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Vermilion	2	6	6	4	1	19
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Galveston	2	6	13	4	1	26
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Aransas Pass	2	6	18	4	1	31
FRU (3) + 100 bbl Tank (6)	12753	600	3 Utility	18	Leeville	2	6	5	4	1	18
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Venice	2	6	2	4	1	15

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											
Crucial Disk 56/30 Skimmer (1)	5671	500	1 Utility	5	Ingleside	1	2	18	4	1	26
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Ingleside	1	2	18	4	1	26
Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Ingleside	1	2	18	4	1	26
Stress I Skimmer (1)	15840	500	1 Utility	5	Ingleside	1	2	18	4	1	26
Walosep W4 Skimmer (1)	3017	500	1 Utility	5	Ingleside	1	2	18	4	1	26
Crucial Disk 88/30 Skimmer (1)	11122	1000	1 PSV	9	Galveston	1	2	13	4	1	21
GT-185 Skimmer w Adaptor (2)	2742	1000	2 Utility	10	Galveston	1	2	13	4	1	21
Walosep W4 Skimmer (1)	3017	500	1 Utility	5	Galveston	1	2	13	4	1	21
Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Galveston	1	2	13	4	1	21
Stress I Skimmer (1)	15840	500	1 Utility	5	Galveston	1	2	13	4	1	21
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Port Arthur	1	2	10	4	1	18
Desmi Skimmer (1)	3017	500	1 Utility	5	Lake Charles	1	2	8	4	1	16
Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Lake Charles	1	2	8	4	1	16
GT-185 Skimmer w Adaptor (2)	2742	1000	2 Utility	10	Lake Charles	1	2	8	4	1	16
Stress I Skimmer (2)	31680	1000	2 Utility	10	Lake Charles	1	2	8	4	1	16
LFF 100 Brush Skimmer (1) *1,320' 67" Curtain Pressure Boom*	18086	1000	1 PSV	9	Lake Charles	1	2	8	4	1	16
LFF 100 Brush Skimmer (1) *1,320' 67" Curtain Pressure Boom*	18086	1000	1 PSV	9	Lake Charles	1	2	8	4	1	16
LFF 100 Brush Skimmer (1) *1,320' 67" Curtain Pressure Boom*	18086	1000	1 PSV	9	Lake Charles	1	2	8	4	1	16
Transrec 350 Skimmer (1) *1,320' 67" Curtain Pressure Boom*	10567	1000	1 PSV	9	Lake Charles	1	2	8	4	1	16
Transrec 350 Skimmer (1) *1,320' 67" Curtain Pressure Boom*	10567	1000	1 PSV	9	Lake Charles	1	2	8	4	1	16

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											
Stress I Skimmer (1)	15840	500	1 Utility	5	Grand Isle	1	2	5	4	1	13
LFF 100 Brush Skimmer (1) *1,320' 67" Curtain Pressure Boom*	18086	1000	1 PSV	9	Houma	1	2	3.5	4	1	11.5
Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Belle Chasse	1	2	2	4	1	10
Foilex 200 Skimmer (1)	1989	500	1 Utility	5	Belle Chasse	1	2	2	4	1	10
Crucial Disk 56/30 Skimmer (1)	5671	500	1 Utility	5	Belle Chasse	1	2	2	4	1	10
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Fort Jackson	1	2	0.5	4	1	8.5
Walosep W4 Skimmer (1)	3017	500	1 Utility	5	Fort Jackson	1	2	0.5	4	1	8.5
Desmi Skimmer (1)	3017	500	1 Utility	5	Fort Jackson	1	2	0.5	4	1	8.5
Stress I Skimmer (1)	15840	500	1 Utility	5	Fort Jackson	1	2	0.5	4	1	8.5
Crucial Disk 88/30 Skimmer (1) *1,320' 67" Curtain Pressure Boom*	11122	1000	1 PSV	9	Fort Jackson	1	2	0.5	4	1	8.5
Crucial Disk 88/30 Skimmer (1) *1,320' 67" Curtain Pressure Boom*	11122	1000	1 PSV	9	Fort Jackson	1	2	0.5	4	1	8.5
GT-185 Skimmer (1)	1371	500	1 Utility	5	Pascagoula	1	2	5.5	4	1	13.5
Crucial Disk 88/30 Skimmer (1)	11122	1000	1 PSV	9	Pascagoula	1	2	5.5	4	1	13.5
Stress I Skimmer (1)	15840	500	1 Utility	5	Pascagoula	1	2	5.5	4	1	13.5
Stress II Skimmer (1)	3017	500	1 Utility	5	Pascagoula	1	2	5.5	4	1	13.5
Stress I Skimmer (1)	15840	500	1 Utility	5	Tampa	1	2	21	4	1	29
Crucial Disk 56/30 Skimmer (1)	5671	500	1 Utility	5	Tampa	1	2	21	4	1	29
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Tampa	1	2	21	4	1	29
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Miami	1	2	27	4	1	35
Walosep W4 Skimmer (1)	3017	500	1 Utility	5	Miami	1	2	27	4	1	35
Desmi Skimmer (1)	3017	500	1 Utility	5	Miami	1	2	27	4	1	35
Stress I Skimmer (1)	15840	500	1 Utility	5	Miami	1	2	27	4	1	35

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	4	6	36
MSRC											
67" Curtain Pressure Boom (53570')	NA	NA	80*	160	Houston	1	2	12	4	1	20
1000' Fire Resistant Boom	NA	NA	3*	6	Galveston	1	4	13	4	6	28
16000' Fire Resistant Boom	NA	NA	3*	6	Houston	1	4	12	4	6	27
2000' Hydro Fire Boom	NA	NA	8*	8	Lake Charles	1	4	8	4	6	23

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

Nearshore Response

Nearshore Equipment Pre-determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
Mid-Ship SWS	22885	249	NA	4	Leeville	2	0	N/A	48	1	51
Mid-Ship SWS	22885	249	NA	4	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	Leeville	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Venice	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Vermilion	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Galveston	2	0	N/A	48	1	51
46' FRV	15257	65	NA	4	Aransas Pass	2	0	2	19	1	24
46' FRV	15257	65	NA	4	Leeville	2	0	2	2	1	7
46' FRV	15257	65	NA	4	Vermilion	2	0	2	10	1	15
46' FRV	15257	65	NA	4	Venice	2	0	2	2	1	7
MSRC											
MSRC Lightning 2 LORI Brush Pack	5000	50	NA	6	Tampa	2	0	1	20	1	24
MSRC Quick Strike 2 LORI Brush Pack	5000	50	NA	6	Lake Charles	2	0	1	10	1	14
Kirby Offshore (available through contract with CGA)											
RO Barge	NA	100000+	1 Tug	6	Venice	48	0	4	7	1	60
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 2603	NA	25000	1 Tug	6	Amelia	25	0	6	16	1	48
CTCo 2604	NA	20000	1 Tug	6	Amelia	25	0	6	16	1	48
CTCo 2605	NA	20000	1 Tug	6	Amelia	25	0	6	16	1	48
CTCo 2606	NA	20000	1 Tug	6	Amelia	25	0	6	16	1	48
CTCo 2607	NA	23000	1 Tug	6	Amelia	25	0	6	16	1	48
CTCo 2608	NA	23000	1 Tug	6	Amelia	25	0	6	16	1	48
CTCo 2609	NA	23000	1 Tug	6	Amelia	25	0	6	16	1	48
CTCo 5001	NA	47000	1 Tug	6	Amelia	25	0	6	16	1	48

Staging Area: Venice

Nearshore Equipment With Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Load Out	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
SWS Egmopol	1810	100	NA	3	Galveston	2	2	13	2	1	20
SWS Egmopol	1810	100	NA	3	Leeville	2	2	4.5	2	1	11.5
SWS Marco	3588	20	NA	3	Vermilion	2	2	8	2	1	15
SWS Marco	3588	34	NA	3	Leeville	2	2	4.5	2	1	11.5
SWS Marco	3588	34	NA	3	Venice	2	2	2	2	1	9
Foilex Skim Package (TDS 150)	1131	50	1 Utility	3	Vermilion	4	12	8	2	2	28
Foilex Skim Package (TDS 150)	1131	50	1 Utility	3	Galveston	4	12	13	2	2	33
Foilex Skim Package (TDS 150)	1131	50	1 Utility	3	Harvey	4	12	2	2	2	22
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Vermilion	2	2	8	2	1	15
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Harvey	2	2	2	2	1	9
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Vermilion	2	2	8	2	1	15
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Harvey	2	2	2	2	1	9
MSRC											
30 ft. Kvichak *Marco I Skimmer*	3588	24	NA	2	Ingleside	1	1	18	2	1	23
30 ft. Kvichak *Marco I Skimmer*	3588	24	NA	2	Galveston	1	1	13	2	1	18
30 ft. Kvichak *Marco I Skimmer*	3588	24	NA	2	Belle Chasse	1	1	2	2	1	7
30 ft. Kvichak *Marco I Skimmer*	3588	24	NA	2	Pascagoula	1	1	5.5	2	1	10.5
AardVac Skimmer (1)	3840	400	1 Utility	4	Lake Charles	1	1	8	2	1	13
AardVac Skimmer (1)	3840	400	1 Utility	4	Pascagoula	1	1	5.5	2	1	10.5
AardVac Skimmer (2)	7680	800	2 Utility	8	Miami	1	1	27	2	1	32
Queensboro Skimmer (1)	905	400	1 Utility	4	Galveston	1	1	13	2	1	18
Queensboro Skimmer (5)	4525	2000	5 Utility	20	Lake Charles	1	1	8	2	1	13
Queensboro Skimmer (1)	905	400	1 Utility	4	Belle Chasse	1	1	2	2	1	7
Queensboro Skimmer (1)	905	400	1 Utility	4	Pascagoula	1	1	5.5	2	1	10.5
WP 1 Skimmer (1)	3017	400	1 Utility	4	Pascagoula	1	1	5.5	2	1	10.5
WP 1 Skimmer (1)	3017	400	1 Utility	4	Tampa	1	1	21	2	1	26
WP 1 Skimmer (1)	3017	400	1 Utility	4	Miami	1	1	27	2	1	32

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
3,200' 18" Boom	2 Crew	4	Venice, LA	2	2	0	2	2	8
12,750' 18" Boom	7 Crew	14	Port Arthur, TX	2	2	10	2	6	22
OMI Environmental (Available through MSA)									
14,000' 18" Boom	6 Crew	12	Belle Chasse, LA	1	1	2	2	3	9
2,000' 18" Boom	1 Crew	2	Galliano, LA	1	1	4	2	3	11
1,800' 18" Boom	1 Crew	2	Gonzalez, LA	1	1	4	2	3	11
11,800' 18" Boom	5 Crew	10	Harvey, LA	1	1	2	2	3	9
2,000' 18" Boom	2 Crew	4	Houma, LA	1	1	4	2	3	11
2,400' 18" Boom	2 Crew	4	Morgan City, LA	1	1	5	2	3	12
3,800' 18" Boom	2 Crew	4	New Iberia, LA	1	1	6	2	3	13
2,300' 18" Boom	2 Crew	4	Port Allen, LA	1	1	5	2	3	12
1,500' 18" Boom	1 Crew	2	Venice, LA	1	1	0	2	3	7
19,000' 18" Boom	6 Crew	12	Deer Park, TX	1	1	12	2	3	19
11,000' 18" Boom	5 Crew	10	La Marque, TX	1	1	13	2	3	20
20,000' 18" Boom	6 Crew	12	Port Arthur, TX	1	1	10	2	3	17

Wildlife Response	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
Wildlife Support Trailer	NA	NA	NA	2	Harvey	2	2	2	1	2	9
Bird Scare Guns (48)	NA	NA	NA	2	Harvey	2	2	2	1	2	9
Bird Scare Guns (12)	NA	NA	NA	2	Galveston	2	2	13	1	2	20
Bird Scare Guns (12)	NA	NA	NA	2	Aransas Pass	2	2	18	1	2	25
Bird Scare Guns (24)	NA	NA	NA	2	Vermilion	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	1,216,248
Offshore Recovered Oil Storage	1,726,796+
Nearshore / Shallow Water EDRC	291,303
Nearshore / Shallow Water Recovered Oil Storage	310,037+

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

B. Incidental Takes

LLOG is sensitive to the marine life and the environment we work in, especially regarding activities in or around the moon pool. LLOG will implement and adhere to, the BSEE NTL No. 2015-G03 "Marine Trash and Debris Awareness Training and Elimination" and BOEM NTL No. 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting", and BOEM NTL No. 2016-G02 "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program". Moon pool daily observation log shall be maintained on the bridge. The deck supervisor on tour shall go to the bridge and log time, date, and results of each moon pool inspection. STOP WORK AUTHORITY shall be used and implemented, in a safe and timely manner, for any work that could affect marine life listed on the Endangered Species Act.

LLOG will operate in accordance with the regulations, agency guidance, and Appendix B of the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion, and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent

materials such as plastic or glass. LLOG will collect and remove flotsam resulting from activities related to proposed operations.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (previously "All Washed Up: The Beach Litter Problem"). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from LLOG management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

Contract vessel operators can avoid marine mammals and reduce potential deaths by maintaining a vigilant watch for marine mammals and maintaining a safe distance of 91 meters or greater from whales and a distance of 45 meters or greater from small cetaceans. When assemblages of cetaceans are observed vessel speeds will be reduced to 10 knots or less. Vessel personnel should use a Gulf of Mexico reference guide to help identify the twenty-one species of whales and dolphins, and the single species of manatee that may be encountered in the Gulf of Mexico OCS. Contract vessel operators will comply with the measures included in Appendix C of the NMFS Biological Opinion, BOEM NTL 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting" and requirements of the Protected Species Lease Stipulation, except under extraordinary circumstances when the safety of the vessel or crew is in doubt or the safety of life at sea is in question.

Vessel personnel must report sightings of any injured or dead protected marine mammal species immediately, regardless of whether the injury or death is caused by their vessel, to the NMFS Southeast Marine Mammal Stranding Hotline at (877) WHALE-HELP (877-942-5343). Additional information may be found at the following website: (https://www.fisheries.noaa.gov/report). Any injured or dead protected species should also be reported to takereport.nmfsser@noaa.gov. In addition, if the injury or death was caused by a collision with the operator's vessel, an entrapment within the operator's equipment or vessel (e.g. moon pool), or an entanglement within the operator's equipment, the operator must further notify BOEM and BSEE within 24 hours of the strike or entrapment/entanglement by email to protectedspecies@boem.gov and protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

These proposed operations may utilize a moon pool(s) to conduct various subsea activities. LLOG's contractor or company representative will provide a dedicated crew member to monitor and continually survey the moon pool area during the operations for sea turtles. If any sea turtle is detected in the moon pool, LLOG will cease operations and contact NMFS at nmfs.psoreview@noaa.gov and BSEE at protectedspecies@bsee.gov and 985-722-7902 for additional guidance and incidental report information. The procedures found in Appendix J of the NMFS Biological Opinion will be employed to free entrapped or entangled marine life safely.

The specific rig that will be used in the proposed operations has not been identified. A deepwater drilling rig, most likely a dual activity dynamically positioned Drillship with a moonpool will be necessary for the operations. Moonpools on Drillships range in size from 35ft to 45ft in width and 70ft to 130ft in length. The moonpool, located underneath the drilling rig rotary floor, is open to the sea below to allow for passage of wellbore equipment necessary for the construction of the well on the seafloor.

The proposed operations covered by this plan include the re-enter and completion of one well on Mississippi Canyon Block 509. The estimated time to conduct these operations through the moonpool involves approximately 103 completion days each for wells MC 509 A, B, C, D & E. It will take approximately 103 days drilling and completion days for each location.

The initial start of each drilling operation consists of 7 days of riserless drilling operations where the drilling tools are tripped in and out through the moonpool to the seabed to drill and install the conductor and surface casings and the subsea wellhead which will be installed 10 feet above the seafloor. After the wellhead is in place and included in this initial 7 day time frame, the Blowout Preventer (BOP) will be run on joints of riser through the moonpool and the BOP will be latched onto the wellhead with the joints of riser pipe extending through the moonpool and connected to the rig floor. The remainder of the drilling operations will be conducted through the inside of the riser pipe. The riser pipe will be the only equipment utilized through the moonpool during this time frame. At the end of the drilling operation, the riser and BOP will be retrieved by pulling the equipment through the moonpool and storing on the rig.

The completion operations will involve running the BOP and riser through the moonpool and latching the BOP to the wellhead with joints of riser pipe extending through the moonpool and connected to the rig floor. The entire completion operation will be conducted through the inside of the riser pipe. The riser pipe will be the only equipment utilized through the moonpool during this operation. At the end of the completion, the BOP and riser will be retrieved by pulling the equipment through the moonpool and storing on the rig. The estimated 103 completion days includes 2 days to run the BOP and riser and 2 days to retrieve the equipment.

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

Minerals Management Service (BOEM) invoked Stipulation No. 4 – Protected Species on Lease OCS-G-36250, Mississippi Canyon Block 509.

Lease Stipulation No. 4 is to reference 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 BOEM NTL No. 2016-G02 "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program", BSEE NTL No. 2015-G03 "Marine Trash and Debris Awareness Training and Elimination"; BOEM NTL No. 2012-G01-JOINT "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"; BOEM NTL No. 2016-G02 "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program."

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 is sensitive to the marine life and the environment we work in, especially regarding activities in or around the moon pool. LLOG will implement and adhere to, the BSEE NTL No. 2015-G03 "Marine Trash and Debris Awareness Training and Elimination"; BOEM NTL No. 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"; and BOEM NTL No. 2016-G02 "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program". LLOG will also comply with the Appendix B, C & J of the Biological Opinion as further stated in Appendix I of this plan.

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. Vessel personnel must report sightings of any injured or dead protected marine mammal species immediately, regardless of whether the injury or death is caused by their vessel, to the NMFS Southeast Marine Mammal Stranding Hotline at (877) WHALE-HELP (877-942-5343). Any injured or dead protected species should also be reported to takereport.nmfsser@noaa.gov. In addition, if the injury or death was caused by a collision with the operator's vessel, an entrapment within the operator's equipment or vessel (e.g. moon pool), or an entanglement within the operator's equipment, the operator must further notify BOEM and BSEE within 24 hours of the strike or entrapment / entanglement by email to protectedspecies@boem.gov and protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

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 509**

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

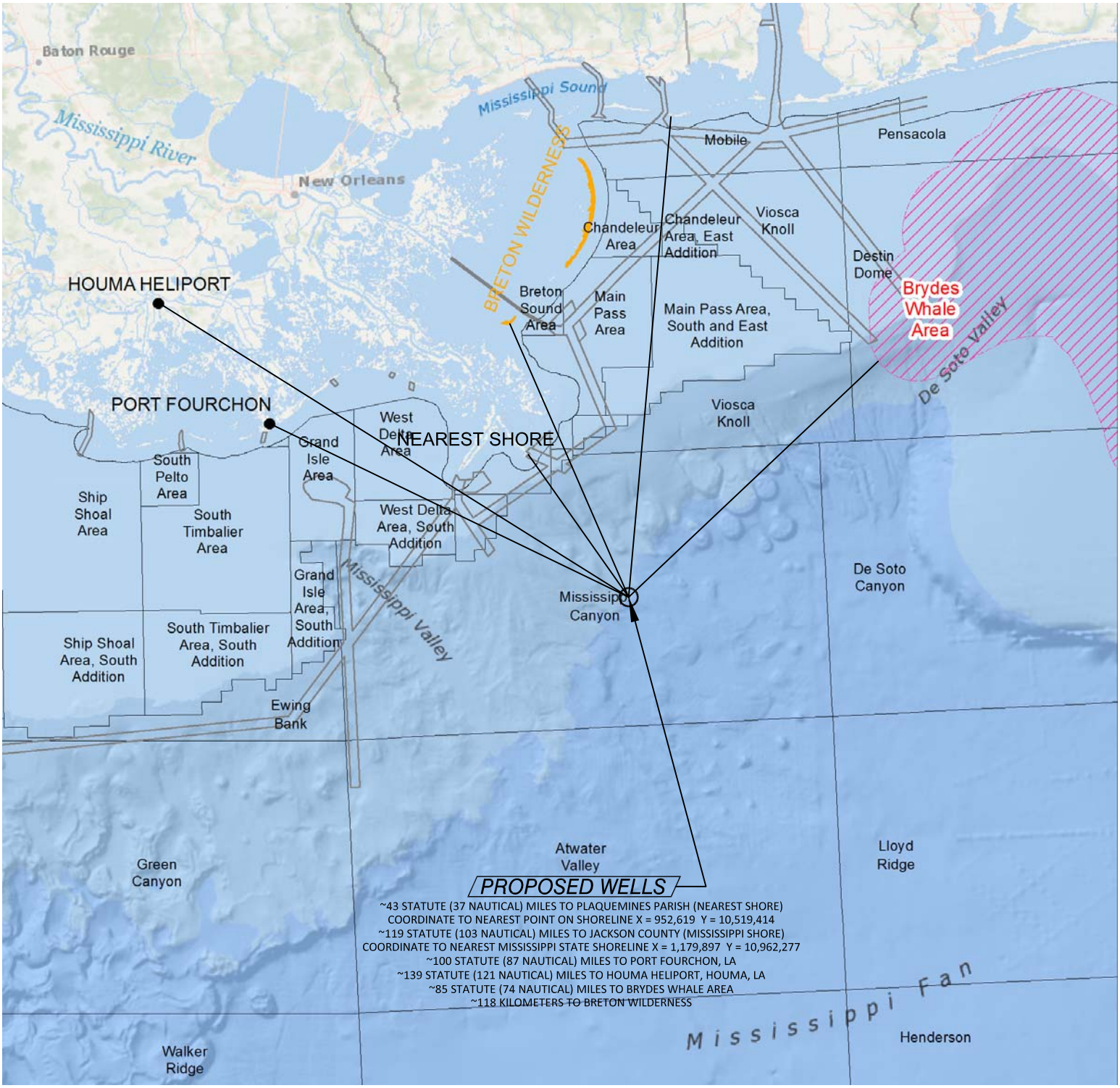
See Table 2 – Wastes you will Transport and/or Dispose of Onshore, located in Appendix F of this Plan.

E. Vicinity Map

Vicinity Plat showing the location of **Mississippi Canyon Blocks 509** relative to the nearest shoreline and onshore base is included as ***Attachment M-1*.** Any rigs, vessels, supply boats, etc. utilized for these proposed activities will not transit the Bryde's whale area.

Vicinity Map

Attachment M-1
(Public Information)



VICINITY MAP

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>.

LLOG EXPLORATION OFFSHORE, L.L.C.

LLOG exploration

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

NOT TO SCALE

EXPLORATION PLAT

PROPOSED WELLS 'A', ALT 'A', 'B', ALT 'B', 'C', ALT 'C', 'D', ALT 'D', 'E' & ALT 'E'
OCS-G 36250 BLOCK 509
MISSISSIPPI CANYON AREA
GULF OF MEXICO

DRAWN BY: RJN	CHK. BY.: MEK	REV. No.: 1	JOB No.: 21-029	DWG No.: 21-029-EXP_REV 1
DATUM: NAD 27	SPHEROID: CLARKE 1866	PROJECTION: U.T.M.	ZONE: 16	DATE: 8/11/2021	REV. DATE: 8/25/2021	SCALE: N.T.S.	SHEET 1 OF 1

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

A. General

The proposed surface disturbances in **Mississippi Canyon Block 509** will be located approximately 43 statute miles from the nearest Louisiana shoreline, and approximately 100 statute miles from the following onshore support base and 139 statute miles from PHI Heliport in Houma, Louisiana, and the proposed surface disturbances:

Name	Location	Existing/New/Modified
GIS Yard	Fourchon, LA	Existing
PHI – Heliport	Houma, 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

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A certificate of Coastal Zone Management Consistency for the State of Louisiana and the State of Mississippi are enclosed as ***Attachment O-1***

B. Other Information

Included as ***Attachment O-2*** are the enforceable policies from the State of Mississippi that are related to OCS Plan Filings.

LLOG has considered all of Louisiana's enforceable policies and certifies the consistency for the proposed operations.

Coastal Zone Management Consistency Statement for the State of Louisiana

Attachment O-1
(Public Information)

Initial Exploration Plan
OCS-G-36250 Lease
Mississippi Canyon Block 509

COASTAL ZONE MANAGEMENT CONSISTENCY CERTIFICATION

INITIAL EXPLORATION PLAN

OCS-G 36250 LEASE

MISSISSIPPI CANYON BLOCK 509

The proposed activities described in detail in the enclosed 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: Kim DeSopo

Kim DeSopo, Certifying Official

Date: **August 27, 2021**

Coastal Zone Management Enforceable Policies for the State of Mississippi

Attachment O-2
(Public Information)

Initial Exploration Plan
OCS-G-36250 Lease
Mississippi Canyon Block 509

COASTAL ZONE MANAGEMENT CONSISTENCY CERTIFICATION

INITIAL EXPLORATION PLAN

OCS-G-36250 Lease
MISSISSIPPI CANYON BLOCK 509

The proposed activities described in detail in the enclosed Initial Exploration Plan comply with Mississippi'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: Kim DeSopo

Kim DeSopo, Certifying Official

Date: **August 27, 2021**

As authorized by the Federal Zone Management Act (CZMA), the State of Mississippi developed a Coastal Management Program (CMP) to allow for the review of proposed Federal license and permit activities affecting any coastal use or resources in or outside the Mississippi Coastal Zone.

The OCS related oil and gas exploration and development activities having potential impact on the Mississippi Coastal Zone are based on the location of the proposed facilities, access to those sites, best practical techniques for drilling locations, drilling equipment guidelines for the prevention of adverse environmental protection, emergency plans and contingency plans.

The proposed activities addressed in this Plan are located approximately 119 miles from the nearest Mississippi Coastline.

Below are the goals identified by the State of Mississippi and LLOG's response:

Goal 1: To provide for reasonable industrial expansion in the coastal area and to ensure the efficient utilization of waterfront industrial sites so that suitable sites are conserved for water dependent industry.

The proposed activities are located in OCS Federal Waters, Gulf of Mexico, approximately 43 miles from the nearest Louisiana shoreline. LLOG Exploration Offshore, L.L.C. (LLOG) will utilize existing facilities in Fourchon, Louisiana. Therefore, there should not be any anticipated or planned adverse impacts to Mississippi's coastal area.

Goal 2: To favor the preservation of the coastal wetlands and ecosystems, except where a specific alternation of specific coastal wetlands would serve a higher public interest in compliance with the public purposes of the public trust in which the coastal wetlands are held.

The proposed activities are located in OCS Federal Waters, Gulf of Mexico, approximately 119 miles from the Mississippi coastline and 43 miles from the nearest Louisiana shoreline. LLOG will utilize existing facilities in Fourchon, Louisiana. Therefore there should not be any anticipated or planned adverse impacts to Mississippi's coastal wetlands and ecosystems.

Goal 3: To protect, propagate and conserve the State's seafood and aquatic life in connection with the revitalization, and conserve the State's seafood and aquatic life in connection with the revitalization of the seafloor industry of the State of Mississippi.

The proposed activities are located in OCS Federal Waters, Gulf of Mexico, approximately 119 miles from the Mississippi coastline and 43 miles from the nearest Louisiana shoreline. LLOG will utilize existing facilities in Fourchon, Louisiana. Therefore, there should not be any anticipated or planned adverse impacts to Mississippi's seafood and aquatic life.

Goal 4: To conserve the air and waters of the State, and to protect, maintain and improve the quality thereof for public use, for the prorogation of wildlife, fish, and aquatic life and for domestic, agricultural, industrial, recreational, and other legitimate beneficial uses.

The activities proposed in this Plan are located in OCS Federal Waters and will use existing facilities located in Louisiana; therefore, there should be no adverse impacts to Mississippi air and water quality.

For the activities scheduled in this Plan, LLOG is proposing to discharge authorized effluents into the receiving waters of the Gulf of Mexico. Overboard discharges (i.e. drilling fluids and associated cuttings) associated with the proposed activities must be tested first for toxicity limitations as mandated by EPA's General Permit GMG290000. Other solid waste such as comminuted food will first pass through a 25 mm type mesh screen, as regulated by the US Coast Guard's Marine Pollution Research and Control Act (MARPOL) of 1987.

Activities proposed in this plan will be conducted in accordance with LLOG's approved Oil Spill Response Plan.

An Air Quality Review has been performed addressing the activities proposed in this Plan and emissions for all parameters are below exemption limitations.

Goal 5: To put to beneficial use to the fullest extent of which they are capable the water resources of the state, and to prevent the waste, unreasonable use, or unreasonable method of use of water.

The activities proposed in this Plan are located in OCS Federal Waters and will use existing facilities located in Louisiana; therefore, there should be no adverse impacts to Mississippi water resources. Activities proposed in this Plan will be conducted in accordance with LLOG's approved Regional Oil Spill Response Plan.

Goal 6: To preserve the state's historical and archaeological resources, to prevent their destruction, and to enhance these resources wherever possible.

The activities proposed in this Plan are located in OCS Federal Waters and will use existing facilities located in Louisiana; therefore, there should be no adverse impacts to Mississippi historical and archaeological resources.

Goal 7: To encourage preservation of natural scenic qualities in the coastal area.

The activities proposed in this Plan are located in OCS Federal Waters and will use existing facilities located in Louisiana; therefore there should be no adverse impacts to Mississippi coastal area natural scenic qualities.

Goal 8: To assist local governments in the provision of public facilities services in a manner consistent with the coastal program.

The activities proposed in this Plan are located in OCS Federal Waters and will use existing facilities located in Louisiana; therefore, there should be no affect on Mississippi local governments.

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

LLOG Exploration Offshore, L. L. C. (LLOG)

Initial Exploration Plan
Mississippi Canyon Block 509
OCS-G 36250

(A) IMPACT PRODUCING FACTORS

ENVIRONMENTAL IMPACT ANALYSIS WORKSHEET

Environment Resources	Impact Producing Factors (IPFs) Categories and Examples Refer to recent GOM OCS Lease Sale EIS for a more complete list of IPFs					
	Emissions (air, noise, light, etc.)	Effluents (muds, cutting, other discharges to the water column or seafloor)	Physical disturbances to the seafloor (rig or anchor emplacements, etc.)	Wastes sent to shore for treatment or disposal	Accidents (e.g., oil spills, chemical spills, H_2S releases)	Discarded Trash & Debris
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)	
Benthic communities			(4)			
Water quality		X			X	
Fisheries		X			X	
Marine Mammals	X(8)	X			X(8)	X
Sea Turtles	X(8)	X			X(8)	X
Air quality	X(9)					
Shipwreck sites (known or potential)			(7)			
Prehistoric archaeological sites			X(7)			
Vicinity of Offshore Location						
Essential fish habitat		X			X(6)	
Marine and pelagic birds					X	X
Public health and safety					(5)	
Coastal and Onshore						
Beaches					X(6)	X
Wetlands					X(6)	
Shore birds and coastal nesting birds					X6)	
Coastal wildlife refuges						
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:
   - 4-mile zone of the Flower Garden Banks, or the 3-mile zone of Stetson Bank;
   - 1000-meter, 1-mile or 3-mile zone of any topographic feature (submarine bank) protected by the Topographic Features Stipulation attached to an OCS lease;
   - Essential Fish Habitat (EFH) criteria of 500 feet from any no-activity zone; or
   - Proximity of any submarine bank (500 foot buffer zone) with relief greater than two meters that is not protected by the Topographic Features 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 H_2S 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 a 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.

TABLE 1: THREATENED AND ENDANGERED SPECIES, CRITICAL HABITAT, AND MARINE MAMMAL INFORMATION

The federally listed endangered and threatened species potentially occurring in the lease area and along the Gulf Coast are provided in the table below

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in the Gulf of Mexico	Gulf of Mexico Range
			Lease Area	Coastal		
Marine Mammals						
Manatee, West Indian	*Trichechus manatus latirostris*	T	--	X	Florida (peninsular)	Coastal Louisiana, Mississippi, Alabama, and Florida
Whale, Blue	*Balaenoptera masculus*	E	X[1]	--	None	GOM
Whale, Bryde's[4]	*Balaenoptera brydei/edeni*	E	X	--	None	Eastern GOM
Whale, Fin	*Balaenoptera physalus*	E	X[1]	--	None	GOM
Whale, Humpback	*Megaptera novaeangliae*	E	X[1]	--	None	GOM
Whale, North Atlantic Right	*Eubalaena glacialis*	E	X[1]	--	None	GOM
Whale, Rice's[4]	*Balaenoptera ricei*	E	X	--	None	GOM
Whale, Sei	*Balaenopiera borealis*	E	X[1]	--	None	GOM
Whale, Sperm	*Physeter catodon (=macrocephalus)*	E	X	--	None	GOM
Terrestrial Mammals						
Mouse, Beach (Alabama, Choctawatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus*	E	-	X	Alabama, Florida (panhandle) beaches	Alabama, Florida (panhandle) beaches
Birds						
Plover, Piping	*Charadrius melodus*	T	-	X	Coastal Texas, Louisiana, Mississippi, Alabama and Florida (panhandle)	Coastal GOM
Crane, Whooping	*Grus Americana*	E	-	X	Coastal Texas	Coastal Texas and Louisiana
Crane, Mississippi sandhill	*Grus canadensis pulla*	E	-	X	Coastal Mississippi	Coastal Mississippi
Curlew, Eskimo	*Numenius borealis*	E	-	X	none	Coastal Texas
Falcon, Northern Aplomado	*Falco femoralis septentrionalis*	E	-	X	none	Coastal Texas

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in the Gulf of Mexico	Gulf of Mexico Range
			Lease Area	Coastal		
Knot, Red	*Calidris canutus rufa*	T	-	X	None	Coastal GOM
Stork, Wood	*Mycteria americana*	T	-	X	None	Coastal Alabama and Florida
Reptiles						
Sea Turtle, Green	*Chelonia mydas*	T/E[3]	X	X	None	GOM
Sea Turtle, Hawksbill	*Eretmochelys imbricata*	E	X	X	None	GOM
Sea Turtle, Kemp's Ridley	*Lepidochelys kempli*	E	X	X	None	GOM
Sea Turtle, Leatherback	*Dermochelys coriacea*	E	X	X	None	GOM
Sea Turtle, Loggerhead	*Caretta caretta*	T	X	X	Texas, Louisiana, Mississippi, Alabama, Florida	GOM
Fish						
Sturgeon, Gulf	*Acipenser oxyrinchus (=oxyrhynchus) desotoi*	T	X	X	Coastal Louisiana, Mississippi, Alabama and Florida (panhandle)	Coastal Louisiana, Mississippi, Alabama and Florida (panhandle)
Shark, Oceanic Whitetip	Carcharhinus longimanus	E	X	_	None	GOM
Sawfish, Smalltooth	Pristis pectinate	E	-	X	None	Florida
Grouper, Nassau	Epinephelus striatus	T	-	X	None	Florida
Ray, Giant Manta	Manta birostris	E	X	--	None	GOM
Corals						
Coral, Elkhorn	*Acopora palmate*	T	X[2]	X	Florida Keys and Dry Tortugas	Flower Garden Banks, Florida, and the Caribbean
Coral, Staghorn	*Acopora cervicornis*	T	X	X	Florida	Flower Garden Banks, Florida, and the Caribbean
Coral, Boulder Star	*Orbicella franksi*	T	X	X	none	Flower Garden Banks and Florida
Coral, Lobed Star	*Orbicella annularis*	T	X	X	None	Flower Garden Banks and Caribbean
Coral, Mountainous Star	*Orbicella faveolate*	T	X	X	None	Flower Garden Banks and Gulf of Mexico
Coral, Rough Cactus	*Mycetophyllia ferox*	T	-	X	None	Florida and Southern Gulf of Mexico

Abbreviations: E = Endangered; T = Threatened

1 The Blue, Fin, Humpback, North Atlantic Right, and Sei Whales are rare or extralimital in the Gulf of Mexico and are unlikely to be present in the lease area.

2 According to the 2017 EIS, Elkhorn Coral, while uncommon, has been found in the Flower Garden Banks. (BOEM 2017-009)

3 Green Sea Turtles are considered threatened throughout the Gulf of Mexico; however, the breeding population off the coast of Florida is considered endangered.

4 The Bryde's whale, also known as the Bryde's whale complex, is a collection of baleen whales that are still being researched to determine if they are the same species or if they are individual species of whales. In 2021, the Rice's whale, formerly known as the Gulf of Mexico Bryde's whale, was determined to be a separate species. There are less than 100 Rice's whales living in the Gulf of Mexico year-round. These whales retain all the protections of the Gulf of Mexico Bryde's whale under the Endangered Species Act while the regulations are being updated to reflect the name change. Other Bryde's whales are migratory and may enter the Gulf of Mexico; however, the migratory Bryde's whales are rare or extralimital in the Gulf of Mexico and are unlikely to be present in the lease area.

(B) Analysis

Site-Specific at Mississippi Canyon Block 509

Proposed operations consist of the drilling and completion of five well locations (A, B, C, D, and E) with five potential mirror locations (Alt A, Alt B, Alt C, Alt D and Alt E). Mirror locations are intended as potential re-spud or relief wells only.

The operations will be conducted with a drillship or dynamically positioned semisubmersible rig.

There are no seismic surveys, pile driving, or pipelines making landfall associated with the operations covered by this Plan.

1. Designated Topographic Features

Potential IPFs to topographic features as a result of the proposed operations include physical disturbances to the seafloor, effluents, and accidents.

Physical disturbances to the seafloor: Mississippi Canyon Block 509 is 51 miles from the closest designated Topographic Features Stipulation Block (Sackett Bank); therefore, no adverse impacts are expected. Additionally, a drillship or dynamically positioned semisubmersible rig is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed.

Effluents: Mississippi Canyon Block 509 is 51 miles from the closest designated Topographic Features Stipulation Block (Sackett Bank); therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills cause damage to benthic organisms only if the oil contacts the organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 meter depth. At this depth, the oil is found only at concentrations several orders of magnitude lower than the amount shown to have an effect on corals. Because the crests of topographic features in the Northern Gulf of Mexico are found below 10 meters, oil from a surface spill is not expected to reach their sessile biota. Oil from a subsurface spill is not applicable due to the distance of these blocks from a topographic area. The activities proposed in this plan will be covered by LLOG's Regional OSRP (refer to information submitted in **Appendix H**).

If dispersants were utilized as a response method, the fate and effects of spilled oil would be impacted. Dispersants have been utilized in previous spill response efforts and were used extensively in the response to the Deepwater Horizon oil spill, with both surface and sub-surface applications. Reports on dispersant usage on surface oil indicate that a majority of the dispersed oil remains in the top 10 meters of the water column, with 60 percent of the oil in the top two meters of water (McAuliffe et al, 1981; Lewis and Aurand, 1997; OCS Report BOEM 2017-007). Lubchenco et al. (2010) report that most chemically dispersed surface oil from the

Deepwater Horizon explosion and oil spill remained in the top six meters of the water column where it mixed with surrounding waters and biodegraded (BOEM 2017-007). None of the topographic features or potentially sensitive biological features in the GOM are shallower than 10 meters (33 feet), and only the Flower Garden Banks are shallower than 20 meters (66 feet).

In one extraordinary circumstance with an unusual combination of meteorological and oceanographic conditions, a tropical storm forced a large volume of Deepwater Horizon oil spill-linked surface oil/dispersant mixture to as deep as 75 meters (246 feet), causing temporary exposure to mesophotic corals in the Pinnacle Trend area and leading to some coral mortality and sublethal impacts (Silva et al., 2015; BOEM 2017-007).

Additionally, concentrations of dispersed and dissolved oil in the Deepwater Horizon oil-spill subsea plume were reported to be in the parts per million range or less and were generally lower away from the water's surface and away from the well head (Adcroft et al., 2010; Haddad and Murawski, 2010; Joint Analysis Group, 2010; Lubchenco et al, 2010; BOEM 2017-007).

In the case of subsurface spills like a blowout or pipeline leak, dispersants may be injected at the seafloor. This will increase oil concentrations near the source but tend to decrease them further afield, especially at the surface. Marine organisms in the lower water column will be exposed to an initial increase of water-soluble oil compounds that will dilute in the water column over time (Lee et al., 2013a; NAS 2020).

Dispersant application involves a trade-off between decreasing the risk to the surface and shoreline habitat and increasing the risk beneath the surface. The optimal trade-off must account for various factors, including the type of oil spilled, the spill volume, the weather and sea state, the water depth, the degree of turbulence, and the relative abundance and life stages of organisms (NRC, 2005; NAS 2020).

Chemical dispersants may increase the risk of toxicity to subsurface organisms by increasing bioavailability of the oil. However, it is important to note that at the 1:20 dispersant-to-oil ratio recommended for use during response operations, the dispersants currently approved for use are far less acutely toxic than oil is. Toxicity of chemically dispersed oil is primarily due to the oil itself and its enhanced bioavailability (Lee et al., 2015; NAS 2020).

With the exception of special Federal management areas or designated exclusion areas, dispersants have been preapproved for surface use, which provides the USCG On-Scene Coordinator with the authority to approve the use of dispersants. However, that approval would only be granted upon completion of the protocols defined in the appropriate Area Contingency Plan (ACP) and the Regional Response Team (RRT) Dispersant Plan. The protocols include conducting an environmental benefit analysis to determine if the dispersant use will prevent a substantial threat to the public health or welfare or minimize serious environmental damage. The Regional Response Team would be notified immediately to provide technical support and guidance in determining if the dispersant use meets the established criteria and provide an

environmental benefit. Additionally, there is currently no preapproval for subsea dispersant injection and the USCG On-Scene Coordinator must approve use of this technology before any subsea application. Due to the unprecedented volume of dispersants applied for an extended period of time, the U.S. National Response Team has developed guidance for atypical dispersant operations to ensure that planning and response activities will be consistent with national policy (BOEM 2017-007).

Dispersants were used extensively in the response to the Deepwater Horizon oil spill, both surface and sub-surface applications. However, during a May 2016 significant oil spill (approximately 1,926 barrels) in the Gulf of Mexico dispersants were not utilized as part of the response. The Regional Response Team was consulted and recommended that dispersants not be used, despite acknowledging the appropriate protocols were correctly followed and that there was a net environmental benefit in utilizing dispersants. This demonstrates that the federal authorities (USCG and RRT) will be extremely prudent in their decision-making regarding dispersant use authorizations.

Due to the distance of these blocks from a topographic area and the coverage of the activities proposed in this plan by LLOG's Regional OSRP (refer to information submitted in **Appendix H**), impacts to topographic features from surface or sub-surface oil spills are not expected.

There are no other IPFs (including emissions and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact topographic features.

2. Pinnacle Trend Area Live Bottoms

Potential IPFs to pinnacle trend area live bottoms from the proposed operations include physical disturbances to the seafloor, emissions (noise / sound), effluents, and accidents.

Physical disturbances to the seafloor: Mississippi Canyon Block 509 is 54.2 miles from the closest live bottom (pinnacle trend) area; therefore, no adverse impacts are expected. Additionally, a drillship or dynamically positioned semisubmersible rig is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed.

Emissions (noise / sound): All routine OCS oil-and gas-related activities have some element of sound generation. Common sound sources include propeller cavitation, rotating machinery, and reciprocating machinery, which are associated with routine OCS oil-and gas-related activities such as vessel traffic, drilling, construction, and oil and gas production, processing, and transport. Sound introduced into the marine environment as a result of human activities has the potential to affect marine organisms. Although there is little information available on sound detection and sound-mediated behaviors for marine invertebrates, the overall impacts on pinnacle and low-relief feature communities from anthropogenic noise are expected to be negligible (BOEM 2017-009). Additionally, Mississippi Canyon Block 509 is 54.2 miles from the closest live bottom (pinnacle trend) area; therefore, no adverse impacts are expected.

Effluents: Mississippi Canyon Block 509 is 54.2 miles from the closest live bottom (pinnacle trend) area; therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills have the potential to foul benthic communities and cause lethal and sublethal effects on live bottom organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 meter depth. At this depth, the oil is found only at concentrations several orders of magnitude lower than the amount shown to have an effect on marine organisms. Oil from a subsurface spill is not expected to impact pinnacle trend area live bottoms due to the distance of these blocks from a live bottom (pinnacle trend) area and the coverage of the activities proposed in this plan by LLOG's Regional OSRP (refer to information submitted in **Appendix H**).

If dispersants were utilized as a response method, the fate and effects of spilled oil would be impacted. A detailed discussion on dispersants, their usage during the Deepwater Horizon oil spill, and their impacts on different levels of benthic communities can be found in **Item 1**.

There are no other IPFs (including wastes sent to shore for treatment or disposal) from the proposed activities that are likely to impact a live bottom (pinnacle trend) area.

3. Eastern Gulf Live Bottoms

Potential IPFs on Eastern Gulf live bottoms from the proposed operations include physical disturbances to the seafloor, emissions (noise / sound), effluents, and accidents.

Physical disturbances to the seafloor: Mississippi Canyon Block 509 is not located in an area characterized by the existence of live bottoms, and this lease does not contain a Live-Bottom Stipulation requiring a photo documentation survey and survey report. Additionally, a drillship or dynamically positioned semisubmersible rig is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed.

Emissions (noise / sound): All routine OCS oil-and gas-related activities have some element of sound generation. Common sound sources include propeller cavitation, rotating machinery, and reciprocating machinery, which are associated with routine OCS oil-and gas-related activities such as vessel traffic, drilling, construction, and oil and gas production, processing, and transport. Sound introduced into the marine environment as a result of human activities has the potential to affect marine organisms. Although there is little information available on sound detection and sound-mediated behaviors for marine invertebrates, the overall impacts on pinnacle and low-relief feature communities from anthropogenic noise are expected to be negligible (BOEM 2017-009). Additionally, Mississippi Canyon Block 509 is not located in an area characterized by the existence of live bottoms; therefore, no adverse impacts are expected.

Effluents: Mississippi Canyon Block 509 is not located in an area characterized by the existence of live bottoms; therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills cause damage to live bottom organisms only if the oil contacts the organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 meter depth. At this depth, the oil is found only at concentrations several orders of magnitude lower than the amount shown to have an effect on marine invertebrates. Oil from a subsurface spill is not expected to impact Eastern Gulf live bottoms due to the distance of these blocks from a live bottom area and coverage of the activities proposed in this plan by LLOG's Regional OSRP (refer to information submitted in **Appendix H**).

If dispersants were utilized as a response method, the fate and effects of spilled oil would be impacted. A detailed discussion on dispersants, their usage during the Deepwater Horizon oil spill, and their impacts on different levels of benthic communities can be found in **Item 1**.

There are no other IPFs (including wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact an Eastern Gulf live bottom area.

4. Deepwater Benthic Communities

There are no IPFs (including emissions (noise / sound), physical disturbances to the seafloor, wastes sent to shore for treatment or disposal, and accidents) from the proposed operations that are likely to cause impacts to deepwater benthic communities.

Mississippi Canyon Block 509 is located in water depths of 984 feet (300 meters) or greater. At such depth high-density, deepwater benthic communities may sometimes be found. However, Mississippi Canyon Block 509 is approximately 7.6 miles from a known deepwater benthic community site (Mississippi Canyon Block 640), listed in NTL 2009-G40. Additionally, a drillship or dynamically positioned semisubmersible rig is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed. Due to the distance from the closest known deepwater benthic community and because physical disturbances to the seafloor will be minimized by the use of a drillship or dynamically positioned semisubmersible rig, LLOG's proposed operations in Mississippi Canyon Block 509 are not likely to impact deepwater benthic communities.

Deepwater benthic communities would potentially be subject to detrimental effects from a catastrophic seafloor blowout due to sediment and oiled sediment from the initial event (BOEM 2017-007). However, this is unlikely due to the distancing requirements described in NTL 2009-G40. Additionally, the potential impacts would be localized due to the directional movement of oil plumes by water currents and the scattered, patchy distribution of sensitive habitats. Although

widely dispersed, biodegraded particles of a passing oil plume might impact patchy habitats, no significant impacts would be expected to the Gulfwide population. Most deepwater benthic communities are expected to experience no impacts from a catastrophic seafloor blowout due to the directional movement of oil plumes by the water currents and their scattered, patchy distribution. Impacts may be expected if a spill were to occur close to a deepwater benthic habitat, however, beyond the localized area of impact particles would become increasingly biodegraded and dispersed. Localized impacts to deepwater benthic organisms would be expected to be mostly sublethal (BOEM 2017-007).

If dispersants were utilized as a response method, the fate and effects of spilled oil would be impacted. A detailed discussion on dispersants, their usage during the Deepwater Horizon oil spill, and their impacts on different levels of benthic communities can be found in **Item 1**.

5. Water Quality

Potential IPFs that could result in water quality degradation from the proposed operations in Mississippi Canyon Block 509 include disturbances to the seafloor, effluents, and accidents.

Physical disturbances to the seafloor: Bottom area disturbances resulting from the emplacement of drill rigs, the drilling of wells and the installation of platforms and pipelines would increase water-column turbidity and re-suspension of any accumulated pollutants, such as trace metals and excess nutrients. This would cause short-lived impacts on water quality conditions in the immediate vicinity of the emplacement operations. Additionally, a drillship or dynamically positioned semisubmersible rig is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed.

Effluents: Levels of contaminants in drilling muds and cuttings and produced water discharges, discharge-rate restrictions and monitoring and toxicity testing are regulated by the EPA NPDES permit, thereby eliminating many significant biological or ecological effects. Operational discharges are not expected to cause significant adverse impacts to water quality. Additionally, an analysis of the best available information from the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico (NMFS, 2020) concludes that exposures to toxicants in discharges from oil and gas activities are not likely to adversely affect ESA-listed species.

Accidents: IPFs related to OCS oil- and gas-related accidental events primarily involve drilling fluid spills, chemical spills, and oil spills.

Drilling Fluid Spills

Water-based fluid (WBF) and Synthetic-based fluid (SBF) spills may result in elevated turbidity, which would be short term, localized, and reversible. The WBF is normally discharged to the seafloor during riserless drilling, which is allowable due to its low toxicity. For the same reasons,

a spill of WBF would have negligible impacts. The SBF has low toxicity, and the discharge of SBF is allowed to the extent that it adheres onto drill cuttings. Both USEPA Regions 4 and 6 permit the discharge of cuttings wetted with SBF as long as the retained SBF amount is below a prescribed percent, meets biodegradation and toxicity requirements, and is not contaminated with the formation oil or PAH. A spill of SBF may cause a temporary increase in biological oxygen demand and locally result in lowered dissolved oxygen in the water column. Also, a spill of SBF may release an oil sheen if formation oil is present in the fluid. Therefore, impacts from a release of SBF are considered to be minor. Spills of SBF typically do not require mitigation because SBF sinks in water and naturally biodegrades, seafloor cleanup is technically difficult, and SBF has low toxicity. (BOEM 2017-009)

Chemical Spills

Accidental chemical spills could result in temporary localized impacts on water quality, primarily due to changing pH. Chemicals spills are generally small volume compared with spills of oil and drilling fluids. During the period of 2007 to 2014, small chemical spills occurred at an average annual volume of 28 barrels, while large chemical spills occurred at an average annual volume of 758 barrels. These chemical spills normally dissolve in water and dissipate quickly through dilution with no observable effects. Also, many of these chemicals are approved to be commingled in produced water for discharge to the ocean, which is a permitted activity. Therefore, impacts from chemical spills are considered to be minor and do not typically require mitigation because of technical feasibility and low toxicity after dilution (BOEM 2017-009).

Oil Spills

Oil spills have the greatest potential of all OCS oil-and gas-related activities to affect water quality. Small spills (<1,000 barrels) are not expected to substantially impact water quality in coastal or offshore waters because the oil dissipates quickly through dispersion and weathering while still at sea. Reasonably foreseeable larger spills (≥1,000 barrels), however, could impact water quality in coastal and offshore waters (BOEM 2017-007). However, based on data provided in the BOEM 2016 Update of Occurrence Rates for Offshore Oil Spills, it is unlikely that an accidental surface or subsurface spill of a significant volume would occur from the proposed activities. Between 2001 and 2015 OCS operations produced eight billion barrels of oil and spilled 0.062 percent of this oil, or one barrel for every 1,624 barrels produced. (The overall spill volume was almost entirely accounted for by the 2010 Deepwater Horizon blowout and subsequent discharge of 4.9 million barrels of oil. Additional information on unlikely scenarios and impacts from very large oil spills are discussed in the Catastrophic Spill Event Analysis white paper (BOEM 2017-007).

If a spill were to occur, the water quality of marine waters would be temporarily affected by the dissolved components and small oil droplets. Dispersion by currents and microbial degradation would remove the oil from the water column and dilute the constituents to background levels. Historically, changes in offshore water quality from oil spills have only been detected during the life of the spill and up to several months afterwards. Most of the components of oil are insoluble in water and therefore float. Dispersants will only be used if approved by the Regional Response

Team in coordination with the RRT Dispersant Plan and RRT Biological Assessment for Dispersants.

Oil spills, regardless of size, may allow hydrocarbons to partition into the water column in a dissolved, emulsion, and/or particulate phase. Therefore, impacts from reasonably foreseeable oil spills are considered moderate. Mitigation efforts for oil spills may include booming, burning, and the use of dispersants (BOEM 2017-009).

These methods may cause short-term secondary impacts to water quality, such as the introduction of additional hydrocarbon into the dissolved phase through the use of dispersants and the sinking of hydrocarbon residuals from burning. Since burning and the use of dispersants put additional hydrocarbons into the dissolved phase, impacts to water quality after mitigation efforts are still considered to be moderate, because dissolved hydrocarbons extend down into the water column. This results in additional exposure pathways via ingestion and gill respiration and may result in acute or chronic effects to marine life (BOEM 2017-009).

Most oil-spill response strategies and equipment are based upon the simple principle that oil floats. However, as evident during the Deepwater Horizon explosion, oil spill, and response, this is not always true. Sometimes it floats and sometimes it suspends within the water column or sinks to the seafloor (BOEM 2017-009).

Oil that is chemically dispersed at the surface moves into the top six meters of the water column where it mixes with surrounding waters and begins to biodegrade (U.S. Congress, Office of Technology Assessment, 1990). Dispersant use, in combination with natural processes, breaks up oil into smaller components that allows them to dissipate into the water and degrade more rapidly (Nalco, 2010). Dispersant use must be in accordance with an RRT Preapproved Dispersant Use Manual and with any conditions outlined within an RRT's site-specific, dispersant approval given after a spill event. Consequently, dispersant use must be in accordance with the restrictions for specific water depths, distances from shore, and monitoring requirements. At this time, neither the Region IV nor the Region VI RRT dispersant use manuals, which cover the GOM region, give preapproval for the application of dispersant use subsea (BOEM 2017-009).

The operations proposed in this plan will be covered by LLOG's Regional Oil Spill Response Plan, which discusses potential response actions in more detail (refer to information submitted in **Appendix H**).

There are no other IPFs (including emissions, physical disturbances to the seafloor, and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact water quality.

6. Fisheries

There are multiple species of fish in the Gulf of Mexico, including the endangered and threatened species listed in **Table 1** at the beginning of this Environmental Impact Assessment. More information regarding the endangered gulf sturgeon (**Item 20.2**), oceanic whitetip shark (**Item 20.3**), and giant manta ray (**Item 20.4**) can be found below. Potential IPFs to fisheries as a result of the proposed operations in Mississippi Canyon Block 509 include physical disturbances to the seafloor, emissions (noise / sound), effluents, and accidents.

Physical disturbances to the seafloor: The emplacement of a structure or drilling rig results in minimal loss of bottom trawling area to commercial fishermen. Pipelines cause gear conflicts which result in losses of trawls and shrimp catch, business downtime and vessel damage. Most financial losses from gear conflicts are covered by the Fishermen's Contingency Fund (FCF). The emplacement and removal of facilities are not expected to cause significant adverse impacts to fisheries. Additionally, a drillship or dynamically positioned semisubmersible rig is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed.

Emissions (noise / sound): All routine OCS oil-and gas-related activities have some element of sound generation. Common sound sources include propeller cavitation, rotating machinery, and reciprocating machinery, which are associated with routine OCS oil-and gas-related activities such as vessel traffic, drilling, construction, and oil and gas production, processing, and transport. Sound introduced into the marine environment as a result of human activities has the potential to affect marine organisms by stimulating behavioral response, masking biologically important signals, causing temporary or permanent hearing loss (Popper et al., 2005; Popper et al., 2014), or causing physiological injury (e.g., barotrauma) resulting in mortality (Popper and Hastings, 2009). The potential for anthropogenic sound to affect any individual organism is dependent on the proximity to the source, signal characteristics, received peak pressures relative to the static pressure, cumulative sound exposure, species, motivation, and the receiver's prior experience. In addition, environmental conditions (e.g., temperature, water depth, and substrate) affect sound speed, propagation paths, and attenuation, resulting in temporal and spatial variations in the received signal for organisms throughout the ensonified area (Hildebrand, 2009).

Sound detection capabilities among fishes vary. For most fish species, it is reasonable to assume hearing sensitivity to frequencies below 500 Hertz (Hz) (Popper et al., 2003 and 2014; Popper and Hastings, 2009; Slabbekoorn et al., 2010; Radford et al., 2014). The band of greatest interest to this analysis, low-frequency sound (30-500 Hz), has come to be dominated by anthropogenic sources and includes the frequencies most likely to be detected by most fish species. For example, the noise generated by large vessel traffic typically results from propeller cavitation and falls within 40-150 Hz (Hildebrand, 2009; McKenna et al., 2012). This range is similar to that of fish vocalizations and hearing, and could result in a masking effect.

Masking occurs when background noise increases the threshold for a sound to be detected; masking can be partial or complete. If detection thresholds are raised for biologically relevant signals, there is a potential for increased predation, reduced foraging success, reduced

reproductive success, or other effects. However, fish hearing and sound production may be adapted to a noisy environment (Wysocki and Ladich, 2005). There is evidence that fishes are able to efficiently discriminate between signals, extracting important sounds from background noise (Popper et al., 2003; Wysocki and Ladich, 2005). Sophisticated sound processing capabilities and filtering by the sound sensing organs essentially narrows the band of masking frequencies, potentially decreasing masking effects. In addition, the low-frequency sounds of interest propagate over very long distances in deep water, but these frequencies are quickly lost in water depths between ½ and ¼ the wavelength (Ladich, 2013). This would suggest that the potential for a masking effect from low-frequency noise on behaviors occurring in shallow coastal waters may be reduced by the receiver's distance from sound sources, such as busy ports or construction activities.

Pulsed sounds generated by OCS oil-and gas-related activities (e.g., impact-driven piles and airguns) can potentially cause behavioral response, reduce hearing sensitivity, or result in physiological injury to fishes and invertebrate resources. However, there are no pulsed sound generation activities proposed for these operations.

Support vessel traffic, drilling, production facilities, and other sources of continuous sounds contribute to a chronic increase in background noise, with varying areas of effect that may be influenced by the sound level, frequencies, and environmental factors (Hildebrand, 2009; Slabbekoorn et al., 2010; McKenna et al., 2012). These sources have a low potential for causing physiological injury or injuring hearing in fishes and invertebrates (Popper et al., 2014). However, continuous sounds have an increased potential for masking biologically relevant sounds than do pulsed signals. The potential effects of masking on fishes and invertebrates is difficult to assess in the natural setting for communities and populations of species, but evidence indicates that the increase to background noise as a result of OCS oil and gas operations would be relatively minor. Therefore, it is expected that the cumulative impact to fishes and invertebrate resources would be minor and would not extend beyond localized disturbances or behavioral modification.

Despite the importance of many sound-mediated behaviors and the potential biological costs associated with behavioral response to anthropogenic sounds, many environmental and biological factors limit potential exposure and the effects that OCS oil-and gas-related sounds have on fishes and invertebrate resources. The overall impact to fishes and invertebrate resources due to anthropogenic sound introduced into the marine environment by OCS oil-and gas-related routine activities is expected to be minor.

Effluents: Effluents such as drilling fluids and cuttings discharges contain components and properties which are detrimental to fishery resources. Moderate petroleum and metal contamination of sediments and the water column can occur out to several hundred meters down-current from the discharge point. Offshore discharges are expected to disperse and dilute to very near background levels in the water column or on the seafloor within 3,000 meters of the discharge point, and are expected to have negligible effect on fisheries. Additionally, an analysis of the best available information from the National Marine Fisheries Service Endangered Species

Act (ESA) Section 7 Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico (NMFS, 2020) concludes that exposures to toxicants in discharges from oil and gas activities are not likely to adversely affect ESA-listed species.

Accidents: Collisions between support vessels and ESA-listed fish, would be unusual events, however, should one occur, death or injury to ESA-listed fish is possible. Contract vessel operators can avoid protected aquatic species and reduce potential deaths by maintaining a vigilant watch and a distance of 50 meters or greater, with the exception of animals that approach the vessel. Vessel personnel should use a Gulf of Mexico reference guide that includes identifying information on marine mammals, sea turtles, and other marine protected species (i.e., Endangered Species Act listed species such as Gulf sturgeon, giant manta ray, or oceanic whitetip shark) that may be encountered in the Gulf of Mexico Outer Continental Shelf (OCS).

Contract vessel operators will comply with the measures included in Appendix C of the NMFS Biological Opinion and requirements of the Protected Species Lease Stipulation, except under extraordinary circumstances when the safety of the vessel or crew is in doubt or the safety of life at sea is in question.

Should an ESA-listed fish (e.g. giant manta ray, oceanic whitetip shark, or Gulf sturgeon) be entrapped, entangled, or injured, personnel should contact the ESA Section 7 biologist at (301) 427-8413 (nmfs.psoreview@noaa.gov) and report all incidents to takereport.nmfsser@noaa.gov. After making the appropriate notifications, LLOG may call BSEE at (985) 722-7902 for questions or additional guidance on recovery assistance needs, continued monitoring requirements, and incidental report information which at minimum is detailed below. Additional information may be found at the following website: https://www.fisheries.noaa.gov/report. Any injured or dead protected species should also be reported to takereport.nmfsser@noaa.gov. In addition, if the injury or death was caused by a collision with the operator's vessel, an entrapment within the operator's equipment or vessel (e.g. moon pool), or an entanglement within the operator's equipment, the operator must further notify BOEM and BSEE within 24 hours of the strike or entrapment/entanglement by email to protectedspecies@boem.gov and protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

An accidental oil spill has the potential to cause some detrimental effects on fisheries; however, it is unlikely that such an event would occur from the proposed activities (refer to **Item 5**, Water Quality). The effects of oil on mobile adult finfish or shellfish would likely be sublethal and the extent of damage would be reduced to the capacity of adult fish and shellfish to avoid the spill, to metabolize hydrocarbons, and to excrete both metabolites and parent compounds. The activities proposed in this plan will be covered by LLOG's Regional OSRP (refer to information submitted in **Appendix H**).

There are no other IPFs (including wastes sent to shore for treatment or disposal) from the proposed operations that are likely to cause impacts to fisheries.

7. Marine Mammals

The latest population estimates for the Gulf of Mexico revealed that cetaceans of the continental shelf and shelf-edge were almost exclusively bottlenose dolphin and Atlantic spotted dolphin. Squid eaters, including dwarf and pygmy killer whale, Risso's dolphin, rough-toothed dolphin, and Cuvier's beaked whale, occurred most frequently along the upper slope in areas outside of anticyclones. The Rice's whale (née Gulf of Mexico Bryde's whale) is the only commonly occurring baleen whale in the northern Gulf of Mexico and has been sighted off western Florida and in the De Soto Canyon region. Florida manatees have been sighted along the entire northern GOM but are mainly found in the shallow coastal waters of Florida, which are unassociated with the proposed actions. A complete list of all endangered and threatened marine mammals in the GOM may be found in **Table 1** at the beginning of this Environmental Impact Assessment. More information regarding the endangered Rice's whale can be found in **Item 20.1** below. Potential IPFs to marine mammals as a result of the proposed operations in Mississippi Canyon Block 509 include emissions (noise / sound), effluents, discarded trash and debris, and accidents.

Emissions (noise / sound): Noises from drilling activities, support vessels and helicopters (i.e. non-impulsive anthropogenic sound) may elicit a startle reaction from marine mammals. This reaction may lead to disruption of marine mammals' normal activities. Stress may make them more vulnerable to parasites, disease, environmental contaminants, and/or predation (Majors and Myrick, 1990). Responses to sound exposure may include lethal or nonlethal injury, temporary hearing impairment, behavioral harassment and stress, or no apparent response. Noise-induced stress is possible, but it is little studied in marine mammals. Tyack (2008) suggests that a more significant risk to marine mammals from sound are these less visible impacts of chronic exposure. There is little conclusive evidence for long-term displacements and population trends for marine mammals relative to noise.

Vessels are the greatest contributors to increases in low-frequency ambient sound in the sea (Andrew et al. 2011). Sound levels and tones produced are generally related to vessel size and speed. Larger vessels generally emit more sound than smaller vessels, and vessels underway with a full load, or those pushing or towing a load, are noisier than unladen vessels. Cetacean responses to aircraft depend on the animals' behavioral state at the time of exposure (e.g., resting, socializing, foraging or traveling) as well as the altitude and lateral distance of the aircraft to the animals (Luksenburg and Parsons 2009). The underwater sound intensity from aircraft is less than produced by vessels, and visually, aircraft are more difficult for whales to locate since they are not in the water and move rapidly (Richter et al. 2006). Perhaps not surprisingly then, when aircraft are at higher altitudes, whales often exhibit no response, but lower flying aircraft (e.g., approximately 500 meters or less) have been observed to elicit short-term behavioral responses (Luksenburg and Parsons 2009; NMFS 2017b; NMFS 2017f; Patenaude et al. 2002; Smultea et al. 2008a; Wursig et al. 1998). Thus, aircraft flying at low altitude, at close lateral distances and above shallow water elicit stronger responses than aircraft flying higher, at greater lateral distances and over deep water (Patenaude et al. 2002; Smultea et al. 2008a). Routine OCS helicopter traffic would not be expected to disturb animals for extended periods, provided pilots do not alter their flight patterns to more closely observe or photograph marine mammals. Helicopters, while flying offshore, generally maintain altitudes above 700 feet

during transit to and from a working area, and at an altitude of about 500 feet between platforms. The duration of the effects resulting from a startle response is expected to be short-term during routine flights, and the potential effects will be insignificant to sperm whales and Rice's whales. Therefore, we find that any disturbance that may result from aircraft associated with the proposed action is not likely to adversely affect ESA-listed whales.

Drilling and production noise would contribute to increases in the ambient noise environment of the GOM, but they are not expected in amplitudes sufficient to cause either hearing or behavioral impacts (BOEM 2017-009). There is the possibility of short-term disruption of movement patterns and/or behavior caused by vessel noise and disturbance; however, these are not expected to impact survival and growth of any marine mammal populations in the GOM. Additionally, the National Marine Fisheries Service published a final recovery plan for the sperm whale, which identified anthropogenic noise as either a low or unknown threat to sperm whales in the GOM (USDOC, NMFS, 2010b). Sirenians (i.e. manatees) are not located within the area of operations. Additionally, there were no specific noise impact factors identified in the latest BOEM environmental impact statement for sirenians related to GOM OCS operations (BOEM 2017-009). See **Item 20.1** for details on the Rice's whale.

Impulsive sound impacts (i.e. pile driving, seismic surveys) are not included among the activities proposed under this plan.

Effluents: Drilling fluids and cuttings discharges contain components which may be detrimental to marine mammals. Most operational discharges are diluted and dispersed upon release. Any potential impact from drilling fluids would be indirect, either as a result of impacts on prey items or possibly through ingestion in the food chain (API, 1989).

Discarded trash and debris: Both entanglement in and ingestion of debris have caused the death or serious injury of marine mammals (Laist, 1997; MMC, 1999). The limited amount of marine debris, if any, resulting from the proposed activities is not expected to substantially harm marine mammals. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies, including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

LLOG will operate in accordance with the regulations, agency guidance, and Appendix B of the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. LLOG will also collect and remove flotsam resulting from activities related to proposed operations.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from LLOG management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

Accidents: Collisions between support vessels and marine mammals, including cetaceans, would be unusual events; however, should one occur, death or injury to marine mammals is possible. Contract vessel operators can avoid marine mammals and reduce potential deaths by maintaining a vigilant watch for marine mammals and maintaining a safe distance of 500 meters or greater from baleen whales, 100 meters or greater from sperm whales, and a distance of 50 meters or greater from all other aquatic protected species, with the exception of animals that approach the vessel. If unable to identify the marine mammal, the vessel will act as if it were a baleen whale and maintain a distance of 500 meters or greater. If a manatee is sighted, all vessels in the area will operate at "no wake/idle" speeds in the area, while maintaining proper distance. When assemblages of cetaceans are observed, including mother/calf pairs, vessel speeds will be reduced to 10 knots or less. Vessel personnel should use a Gulf of Mexico reference guide that includes identifying information on marine mammals, sea turtles, and other marine protected species (i.e., Endangered Species Act listed species such as Gulf sturgeon, giant manta ray, or oceanic whitetip shark) that may be encountered in the Gulf of Mexico Outer Continental Shelf (OCS).

Contract vessel operators will comply with the measures included in Appendix C of the NMFS Biological Opinion and requirements of the Protected Species Lease Stipulation, except under extraordinary circumstances when the safety of the vessel or crew is in doubt or the safety of life at sea is in question.

Vessel personnel must report sightings of any injured or dead protected marine mammal species immediately, regardless of whether the injury or death is caused by their vessel, to the NMFS Southeast Marine Mammal Stranding Hotline at (877) WHALE-HELP (877-942-5343). Additional information may be found at the following website: https://www.fisheries.noaa.gov/report. Any injured or dead protected species should also be reported to takereport.nmfsser@noaa.gov. In addition, if the injury or death was caused by a collision with the operator's vessel, an entrapment within the operator's equipment or vessel (e.g. moon pool), or an entanglement within the operator's equipment, the operator must further notify BOEM and BSEE within 24 hours of the strike or entrapment/entanglement by email to protectedspecies@boem.gov and protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

These proposed operations may utilize a moon pool(s) to conduct various subsea activities. Details on moon pool operations, monitoring, and descriptions are included in Appendix I of the Initial Exploration Plan. If any marine mammal is detected in the moon pool, LLOG will cease operations and contact NMFS at nmfs.psoreview@noaa.gov and BSEE at protectedspecies@bsee.gov and 985-722-7902 for additional guidance and incident report information.

Oil spills have the potential to cause sublethal oil-related injuries and spill-related deaths to marine mammals. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Oil spill response activities may increase vessel traffic in the area, which could impact cetacean behavior and/or distribution, thereby causing additional stress to the animals. The effect of oil dispersants on cetaceans is not known. Removing oil from the surface would reduce the likelihood of oil adhering to marine mammals. Laboratory experiments have shown that the dispersants used during the Deepwater Horizon response are cytotoxic to sperm whale cells; however it is difficult to determine actual exposure levels in the GOM. Therefore, dispersants will only be used if approved by the Regional Response Team in coordination with the RRT Dispersant Plan and RRT Biological Assessment for Dispersants. The acute toxicity of oil dispersant chemicals included in LLOG's OSRP is considered to be low when compared with the constituents and fractions of crude oils and diesel products. The activities proposed in this plan will be covered by LLOG's OSRP (refer to information submitted in accordance with **Appendix H**).

The NMFS Office of Protected Resources coordinates agency assessment of the need for response and leads response efforts for spills that may impact cetaceans. If a spill may impact cetaceans, NMFS Protected Resources Contacts should be notified (see contact details below), and they will initiate notification of other relevant parties.

NMFS Protected Resources Contacts for the Gulf of Mexico:

- Marine mammals – Southeast emergency stranding hotline 1-877-433-8299
- Other endangered or threatened species – ESA section 7 consulting biologist: nmfs.ser.emergency.consult@noaa.gov

There are no other IPFs (including physical disturbances to the seafloor) from the proposed operations that are likely to impact marine mammals.

8. Sea Turtles

GulfCet II studies sighted most loggerhead, Kemp's ridley and leatherback sea turtles over shelf waters. Historically these species have been sighted up to the shelf's edge. They appear to be more abundant east of the Mississippi River than they are west of the river (Fritts et al., 1983b; Lohoefener et al., 1990). Deep waters may be used by all species as a transitory habitat. A complete list of endangered and threatened sea turtles in the GOM may be found in **Table 1** at the beginning of this Environmental Impact Assessment. Additional details regarding the

loggerhead sea turtle's critical habitat in the GOM are located in **Item 20.5**. Potential IPFs to sea turtles as a result of the proposed operations include emissions (noise / sound), effluents, discarded trash and debris, and accidents.

Emissions (noise / sound): Noise from drilling activities, support vessels, and helicopters (i.e. non-impulsive anthropogenic sound) may elicit a startle reaction from sea turtles, but this is a temporary disturbance. Responses to sound exposure may include lethal or nonlethal injury, temporary hearing impairment, behavioral harassment and stress, or no apparent response. Vessels are the greatest contributors to increases in low-frequency ambient sound in the sea (Andrew et al. 2011). Sound levels and tones produced are generally related to vessel size and speed. Larger vessels generally emit more sound than smaller vessels, and vessels underway with a full load, or those pushing or towing a load, are noisier than unladen vessels. Routine OCS helicopter traffic would not be expected to disturb animals for extended periods, provided pilots do not alter their flight patterns to more closely observe or photograph marine mammals. Helicopters, while flying offshore, generally maintain altitudes above 700 feet during transit to and from a working area, and at an altitude of about 500 feet between platforms. The duration of the effects resulting from a startle response is expected to be short-term during routine flights and the potential effects will be insignificant to sea turtles. Therefore, we find that any disturbance that may result from aircraft associated with the proposed action is not likely to adversely affect sea turtles. Construction and operational sounds other than pile driving should have insignificant effects on sea turtles; effects would be limited to short-term avoidance of construction activity itself rather than the sound produced. As a result, sound sources associated with support vessel movement as part of the proposed operations are insignificant and therefore are not likely to adversely affect sea turtles.

Overall noise impacts on sea turtles from the proposed activities are expected to be negligible to minor depending on the location of the animal(s) relative to the sound source and the frequency, intensity, and duration of the source. The National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion Appendix C explains how operators must implement measures to minimize the risk of vessel strikes to protected species and report observations of injured or dead protected species. This guidance should also minimize the chance of sea turtles being subject to the increased noise level of a service vessel in very close proximity.

Effluents: Drilling fluids and cuttings discharges are not known to be lethal to sea turtles. Most operational discharges are diluted and dispersed upon release. Any potential impact from drilling fluids would be indirect, either as a result of impacts on prey items or possibly through ingestion in the food chain (API, 1989).

Discarded trash and debris: Both entanglement in, and ingestion of, debris have caused the death or serious injury of sea turtles (Balazs, 1985). The limited amount of marine debris, if any, resulting from the proposed activities is not expected to substantially harm sea turtles. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies,

including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

LLOG will operate in accordance with the regulations, agency guidance, and Appendix B of the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. LLOG will also collect and remove flotsam resulting from activities related to proposed operations.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from LLOG management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

Accidents: Collisions between support vessels and sea turtles would be unusual events; however, should one occur, death or injury to sea turtles is possible. Contract vessel operators can avoid sea turtles and reduce potential deaths by maintaining a vigilant watch for sea turtles and maintaining a safe distance of 50 meters or greater when they are sighted, with the exception of sea turtles that approach the vessel. Vessel crews should use a reference guide to help identify the five species of sea turtles that may be encountered in the Gulf of Mexico OCS as well as other marine protected species (i.e. Endangered Species Act listed species). Contract vessel operators will comply with the measures included in Appendix C of the NMFS Biological Opinion and requirements of the Protected Species Lease Stipulation, except under extraordinary circumstances when the safety of the vessel or crew is in doubt or the safety of life at sea is in question.

Vessel crews must report sightings of any injured or dead protected sea turtle species immediately, regardless of whether the injury or death is caused by their vessel, to the State Coordinators for the Sea Turtle Stranding and Salvage Network (STSSN) at http://www.sefsc.noaa.gov/species/turtles/stranding_coordinators.htm (phone numbers vary by state). Additional information may be found at the following website: https://www.fisheries.noaa.gov/report. Any injured or dead protected species should also be reported to takereport.nmfsser@noaa.gov. In addition, if the injury or death was caused by a collision with the operator's vessel, an entrapment within the operator's equipment or vessel (e.g. moon pool), or an entanglement within the operator's equipment, the operator must further notify BOEM and BSEE within 24 hours of the strike or entrapment/entanglement by email to

protectedspecies@boem.gov and protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

These proposed operations may utilize a moon pool(s) to conduct various subsea activities. Details on moon pool operations, monitoring, and descriptions are included in Appendix I of the Initial Exploration Plan. If any sea turtle is detected in the moon pool, LLOG will cease operations and contact NMFS at nmfs.psoreview@noaa.gov and BSEE at protectedspecies@bsee.gov and 985-722-7902 for additional guidance and incidental report information. The procedures found in Appendix J of the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion will be employed to free entrapped or entangled marine life safely.

All sea turtle species and their life stages are vulnerable to the harmful effects of oil through direct contact or by fouling of their food. Exposure to oil can be fatal, particularly to juveniles and hatchlings. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Oil spill response activities may increase vessel traffic in the area, which could add to the possibility of collisions with sea turtles. The activities proposed in this plan will be covered by LLOG's Regional Oil Spill Response Plan (refer to information submitted in accordance with **Appendix H**).

The NMFS Office of Protected Resources coordinates agency assessment of the need for response and leads response efforts for spills that may impact sea turtles. If a spill may impact sea turtles, the following NMFS Protected Resources Contacts should be notified, and they will initiate notification of other relevant parties.

- Dr. Brian Stacy at brian.stacy@noaa.gov and 352-283-3370 (cell); or
- Stacy Hargrove at stacy.hargrove@noaa.gov and 305-781-7453 (cell)

There are no other IPFs (including physical disturbances to the seafloor) from the proposed operations that are likely to impact sea turtles.

9. Air Quality

Potential IPFs to air quality as a result of the proposed operations include accidents.

Mississippi Canyon Block 509 is located 73.5 miles from the Breton Wilderness Area and 43 miles from shore. Applicable emissions data is included in **Appendix G** of the Plan.

There would be a limited degree of air quality degradation in the immediate vicinity of the proposed activities. Plan Emissions for the proposed activities do not exceed the annual exemption levels as set forth by BOEM. Accidents and blowouts can release hydrocarbons or chemicals, which could cause the emission of air pollutants. However, these releases would not

impact onshore air quality because of the prevailing atmospheric conditions, emission height, emission rates, and the distance of Mississippi Canyon Block 509 from the coastline.

There are no other IPFs (including effluents, physical disturbances to the seafloor, and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact air quality.

10. Shipwreck Sites (known or potential)

In accordance with BOEM NTL 2005-G07, LLOG will submit an archaeological resource report per 30 CFR 550.194 if directed to do so by the Regional Director.

Potential IPFs to known or unknown shipwreck sites as a result of the proposed operations in Mississippi Canyon Block 509 include physical disturbances to the seafloor and accidents.

Physical disturbances to the seafloor: A drillship or dynamically positioned semisubmersible rig is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed. Because physical disturbances to the seafloor will be minimized by the use of a drillship or dynamically positioned semisubmersible rig, LLOG's proposed operations in Mississippi Canyon Block 509 that are likely to impact shipwreck sites.

Accidents: An accidental oil spill has the potential to cause some detrimental effects to shipwreck sites if the release were to occur subsea. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by LLOG's Regional Oil Spill Response Plan (refer to information submitted in accordance with **Appendix H**).

Additionally, Mississippi Canyon Block 509 is not located in or adjacent to an OCS block designated by BOEM as having a high probability for occurrence of shipwrecks. Should LLOG discover any evidence of a shipwreck, they will immediately halt operations within a 1000-foot radius, report to BOEM within 48 hours, and make every reasonable effort to preserve and protect that cultural resource.

There are no other IPFs (including emissions, effluents, and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact shipwreck sites.

11. Prehistoric Archaeological Sites

In accordance with BOEM NTL 2005-G07, LLOG will submit an archaeological resource report per 30 CFR 550.194 if directed to do so by the Regional Director.

Potential IPFs to prehistoric archaeological sites as a result of the proposed operations in Mississippi Canyon Block 509 are physical disturbances to the seafloor and accidents. Should

LLOG discover any object of prehistoric archaeological significance, they will immediately halt operations within a 1000-foot radius, report to BOEM within 48 hours, and make every reasonable effort to preserve and protect that cultural resource. Well site clearance surveys were performed for the proposed well locations by Berger Geosciences, LLC, which indicated that there are no archaeologically significant contacts identified within 2,000 feet of the well locations. Well site clearance letters from Berger Geosciences, LLC for the well locations A and B are dated May 3, 2019, and clearance letters for well locations C, D, and E are dated August 17, 2021.

Physical Disturbances to the seafloor: Although the operations proposed will be conducted by utilizing a drillship or dynamically positioned semisubmersible rig, which would cause only an insignificant amount of seafloor to be disturbed, Mississippi Canyon Block 509 is located inside the Archaeological Prehistoric high probability lines. As mentioned above, impacts to archaeological resources are not expected as well site clearance surveys indicated that there are no archaeologically significant contacts identified within 2,000 feet of the well locations. LLOG will report to BOEM the discovery of any object of prehistoric archaeological significance and make every reasonable effort to preserve and protect that cultural resource.

Accidents: An accidental oil spill has the potential to cause some detrimental effects to prehistoric archaeological sites if the release were to occur subsea. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by LLOG's Regional Oil Spill Response Plan (refer to information submitted in accordance with **Appendix H**).

There are no other IPFs (including emissions, effluents, and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact prehistoric archeological sites.

Vicinity of Offshore Location

12. Essential Fish Habitat (EFH)

Potential IPFs to EFH as a result of the proposed operations in Mississippi Canyon Block 509 include physical disturbances to the seafloor, effluents, and accidents. EFH includes all estuarine and marine waters and substrates in the Gulf of Mexico.

Physical disturbances to the seafloor: Turbidity and sedimentation resulting from the bottom disturbing activities included in the proposed operations would be short term and localized. Fish are mobile and would avoid these temporarily suspended sediments. Additionally, the Live Bottom Low Relief Stipulation, the Live Bottom (Pinnacle Trend) Stipulation, and the Eastern Gulf Pinnacle Trend Stipulation have been put in place to minimize the impacts of bottom disturbing activities. Additionally, a drillship or dynamically positioned semisubmersible rig is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed. Therefore, the bottom disturbing activities from the proposed operations would have a negligible impact on EFH.

Effluents: The Live Bottom Low Relief Stipulation, the Live Bottom (Pinnacle Trend) Stipulation, and the Eastern Gulf Pinnacle Trend Stipulation would prevent most of the potential impacts on live-bottom communities and EFH from operational waste discharges. Levels of contaminants in drilling muds and cuttings and produced-water discharges, discharge-rate restrictions, and monitoring and toxicity testing are regulated by the EPA NPDES permit, thereby eliminating many significant biological or ecological effects. Operational discharges are not expected to cause significant adverse impacts to EFH.

Accidents: An accidental oil spill has the potential to cause some detrimental effects on EFH. Oil spills that contact coastal bays and estuaries, as well as OCS waters when pelagic eggs and larvae are present, have the greatest potential to affect fisheries. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by LLOG's Regional OSRP (refer to information submitted in **Appendix H**).

There are no other IPFs (including emissions and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact essential fish habitat.

13. Marine and Pelagic Birds

Potential IPFs to marine birds as a result of the proposed activities include emissions (air, noise / sound), accidental oil spills, and discarded trash and debris from vessels and the facilities.

Emissions:

Air Emissions

Emissions of pollutants into the atmosphere from these activities are far below concentrations which could harm coastal and marine birds.

Noise / Sound Emissions

The OCS oil-and gas-related helicopters and vessels have the potential to cause noise and disturbance. However, flight altitude restrictions over sensitive habitat, including that of birds, may make serious disturbance unlikely. Birds are also known to habituate to noises, including airport noise. It is an assumption that the OCS oil-and gas-related vessel traffic would follow regular routes; if so, seabirds would find the noise to be familiar. Therefore, the impact of OCS oil-and gas-related noise from helicopters and vessels to birds would be expected to be negligible.

The use of explosives for decommissioning activities may potentially kill one or more birds from barotrauma if a bird (or several birds because birds may occur in a flock) is present at the location of the severance. For the impact of underwater sound, a threshold of 202 dB sound exposure level (SEL) for injury and 208 dB SEL for barotrauma was recommended for the Brahyramphus marmoratus, a diving seabird (USDOI, FWS, 2011). However, the use of

explosive severance of facilities for decommissioning are not included in these proposed operations, therefore these impacts are not expected.

Accidents: An oil spill would cause localized, low-level petroleum hydrocarbon contamination. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Marine and pelagic birds feeding at the spill location may experience chronic, nonfatal, physiological stress. It is expected that few, if any, coastal and marine birds would actually be affected to that extent. The activities proposed in this plan will be covered by LLOG's Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: Marine and pelagic birds could become entangled and snared in discarded trash and debris, or ingest small plastic debris, which can cause permanent injuries and death. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies, including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

LLOG will operate in accordance with the regulations, agency guidance, and Appendix B of the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. LLOG will also collect and remove flotsam resulting from activities related to proposed operations.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from LLOG management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE. Debris, if any, from these proposed activities will seldom interact with marine and pelagic birds; therefore, the effects will be negligible.

ESA bird species: Seven species found in the GOM are listed under the ESA. BOEM consults on these species and requires mitigations that would decrease the potential for greater impacts due to small population size.

There are no other IPFs (including effluents, physical disturbances to the seafloor, and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact marine and pelagic birds.

14. Public Health and Safety Due to Accidents.

There are no IPFs (including emissions, effluents, physical disturbances to the seafloor, wastes sent to shore for treatment or disposal, and accidents, including an accidental H_2S release) from the proposed activities that are likely to impact public health and safety. In accordance with NTL No.'s 2008-G04, 2009-G27, and 2009-G31, sufficient information is included in **Appendix D** to justify our request that our proposed operations be classified by BSEE as H_2S absent.

Coastal and Onshore

15. Beaches

Potential IPFs to beaches from the proposed operations include accidents and discarded trash and debris.

Accidents: Oil spills contacting beaches would have impacts on the use of recreational beaches and associated resources. Due to the distance from shore (43 miles) and the response capabilities that would be implemented, no significant adverse impacts are expected. The operations proposed in this plan will be covered by LLOG's Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: Trash on the beach is recognized as a major threat to the enjoyment and use of beaches. There will only be a limited amount of marine debris, if any, resulting from the proposed activities. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies, including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

LLOG will operate in accordance with the regulations, agency guidance, and Appendix B of the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. LLOG will also collect and remove flotsam resulting from activities related to proposed operations.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About

It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from LLOG management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (including emissions, effluents, physical disturbances to the seafloor, and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact beaches.

16. Wetlands

Potential IPFs to wetlands from the proposed operations include accidents and discarded trash and debris.

Accidents: It is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Due to the distance from shore (43 miles) and the response capabilities that would be implemented, no impacts are expected. The operations proposed in this plan will be covered by LLOG's Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: There will only be a limited amount of marine debris, if any, resulting from the proposed activities. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies, including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

LLOG will operate in accordance with the regulations, agency guidance, and Appendix B of the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. LLOG will also collect and remove flotsam resulting from activities related to proposed operations.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from LLOG management or the designated lease operator management that

emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (including emissions, effluents, physical disturbances to the seafloor, and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact wetlands.

17. Shore Birds and Coastal Nesting Birds

Potential IPFs to shore birds and coastal nesting birds as a result of the proposed operations include accidents and discarded trash and debris.

Accidents: Oil spills could cause impacts to shore birds and coastal nesting birds. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Given the distance from shore (43 miles) and the response capabilities that would be implemented, no impacts are expected. The operations proposed in this plan will be covered by LLOG's Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: Coastal and marine birds are highly susceptible to entanglement in floating, submerged, and beached marine debris: specifically, plastics. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

LLOG will operate in accordance with the regulations, agency guidance, and Appendix B of the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. LLOG will also collect and remove flotsam resulting from activities related to proposed operations.

Informational placards will be posted on vessels and every facility that has sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from LLOG management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (including emissions, effluents, physical disturbances to the seafloor, and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact shore birds and coastal nesting birds.

18. Coastal Wildlife Refuges

Potential IPFs to coastal wildlife refuges as a result of the proposed operations include accidents and discarded trash and debris.

Accidents: An accidental oil spill from the proposed activities could cause impacts to coastal wildlife refuges. However, it is unlikely that an oil spill would occur from the proposed activities (refer to Item 5, Water Quality). Due to the distance from shore (43 miles) and the response capabilities that would be implemented, no impacts are expected. The operations proposed in this plan will be covered by LLOG's Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act and regulations imposed by various agencies, including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

LLOG will operate in accordance with the regulations, agency guidance, and Appendix B of the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. LLOG will also collect and remove flotsam resulting from activities related to proposed operations.

Informational placards will be posted on vessels and every facility that has sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from LLOG management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (including emissions, effluents, physical disturbances to the seafloor, and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact coastal wildlife refuges.

19. Wilderness Areas

Potential IPFs to wilderness areas as a result of the proposed operations include accidents and discarded trash and debris.

Accidents: An accidental oil spill from the proposed activities could cause impacts to wilderness areas. However, it is unlikely that an oil spill would occur from the proposed operations (refer to **Item 5**, Water Quality). Due to the distance from the nearest designated Wilderness Area (73.5 miles) and the response capabilities that would be implemented, no significant adverse impacts are expected. The operations proposed in this plan will be covered by LLOG's Regional OSRP (refer to information submitted in **Appendix H).**

Discarded trash and debris: Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

LLOG will operate in accordance with the regulations, agency guidance, and Appendix B of the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. LLOG will also collect and remove flotsam resulting from activities related to proposed operations.

Informational placards will be posted on vessels and every facility that has sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from LLOG management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (including emissions, effluents, physical disturbances to the seafloor, and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact wilderness areas.

20. Other Environmental Resources Identified

20.1 – Rice's Whale (née Gulf of Mexico Bryde's whale)

The Bryde's whale, also known as the Bryde's whale complex, is a collection of baleen whales that are still being researched to determine if they are the same species or if they are individual species of whales. In 2021, the Rice's whale, formerly known as the Gulf of Mexico Bryde's whale, was determined to be a separate species from other Bryde's whales. There are less than 100 Rice's whales living in the Gulf of Mexico year-round. These whales retain all the protections of the Gulf of Mexico Bryde's whale under the Endangered Species Act while the regulations are being updated to reflect the name change.

The Rice's whale (née Gulf of Mexico Bryde's whale) is the only commonly occurring baleen whale in the northern Gulf of Mexico and has been sighted off western Florida and in the De Soto Canyon region. The Rice's whale area is over 52 miles from the proposed operations. Additionally, vessel traffic associated with the proposed operations will not flow through the Rice's whale area. Therefore, there are no IPFs from the proposed operations that are likely to impact the Rice's whale. Additional information on marine mammals may be found in **Item 7**.

20.2 – Gulf Sturgeon

The Gulf sturgeon resides primarily in inland estuaries and rivers from Louisiana to Florida and a small population of the species enters the Gulf of Mexico seasonally in western Florida. Potential IPFs to the Gulf sturgeon from the proposed operations include accidents, emissions (noise / sound), and discarded trash and debris. Additional information on ESA-listed fish may be found in **Item 6**.

Accidents: Collisions between support vessels and the Gulf sturgeon would be unusual events; however, should one occur, death or injury to the Gulf sturgeon is possible. Contract vessel operators can avoid protected aquatic species and reduce potential deaths by maintaining a vigilant watch and a distance of 50 meters or greater, with the exception of animals that approach the vessel. Vessel personnel should use a Gulf of Mexico reference guide that includes identifying information on marine mammals, sea turtles, and other marine protected species (i.e., Endangered Species Act listed species such as Gulf sturgeon, giant manta ray, or oceanic whitetip shark) that may be encountered in the Gulf of Mexico Outer Continental Shelf (OCS).

Contract vessel operators will comply with the measures included in Appendix C of the NMFS Biological Opinion and requirements of the Protected Species Lease Stipulation, except under extraordinary circumstances when the safety of the vessel or crew is in doubt or the safety of life at sea is in question.

Should an ESA-listed fish (e.g. giant manta ray, oceanic whitetip shark, or Gulf sturgeon) be entrapped, entangled, or injured, personnel should contact the ESA Section 7 biologist at (301) 427-8413 (nmfs.psoreview@noaa.gov) and report all incidents to takereport.nmfsser@noaa.gov. After making the appropriate notifications, LLOG may call BSEE at (985) 722-7902 for

questions or additional guidance on recovery assistance needs, continued monitoring requirements, and incidental report information which at minimum is detailed below. Additional information may be found at the following website: https://www.fisheries.noaa.gov/report. Any injured or dead protected species should also be reported to takereport.nmfsser@noaa.gov. In addition, if the injury or death was caused by a collision with the operator's vessel, an entrapment within the operator's equipment or vessel (e.g. moon pool), or an entanglement within the operator's equipment, the operator must further notify BOEM and BSEE within 24 hours of the strike or entrapment/entanglement by email to protectedspecies@boem.gov and protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

Due to the distance from the nearest identified Gulf sturgeon critical habitat (110.3 miles) and the response capabilities that would be implemented during a spill, no significant adverse impacts are expected to the Gulf sturgeon. Considering the information from the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion, the location of this critical habitat in relation to proposed operations, the likely dilution of oil reaching nearshore areas, and the on-going weathering and dispersal of oil over time, we do not anticipate the effects from oil spills will appreciably diminish the value of Gulf sturgeon designated critical habitat for the conservation of the species. The operations proposed in this plan will be covered by LLOG's Regional OSRP (refer to information submitted in **Appendix H)**.

Emissions (noise / sound): All routine OCS oil-and gas-related activities have some element of sound generation. Common sound sources include propeller cavitation, rotating machinery, and reciprocating machinery, which are associated with routine OCS oil-and gas-related activities such as vessel traffic, drilling, construction, and oil and gas production, processing, and transport. Sound introduced into the marine environment as a result of human activities has the potential to affect marine organisms**.** The National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion found that construction and operational sounds other than pile driving will have insignificant effects on Gulf sturgeon (NMFS, 2020). There are no pile driving activities associated with the proposed operations, therefore noise impacts are not expected to significantly affect Gulf sturgeon.

Discarded trash and debris: Trash and debris are not expected to impact the Gulf sturgeon. There will only be a limited amount of marine debris, if any, resulting from the proposed activities. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

LLOG will operate in accordance with the regulations, agency guidance, and Appendix B of the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and

disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. LLOG will also collect and remove flotsam resulting from activities related to proposed operations.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from LLOG management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (including effluents, physical disturbances to the seafloor, and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact the Gulf sturgeon.

20.3 – Oceanic Whitetip Shark

Oceanic whitetip sharks may be found in tropical and subtropical waters around the world, including the Gulf of Mexico (Young 2016). According to the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion, Essential Fish Habitat (EFH) for the oceanic whitetip shark includes localized areas in the central Gulf of Mexico and Florida Keys. Oceanic whitetip sharks were listed as threatened under the Endangered Species Act in 2018 due to worldwide overfishing. Oceanic whitetip sharks had an abundant worldwide population, which has been threatened in recent years by inadequate regulatory measures governing fisheries; therefore, there is little research regarding the impact of oil and gas operations on oceanic whitetip sharks (NMFS, 2020). IPFs that have been determined by NMFS to be discountable to oceanic whitetip sharks include vessel strike, emissions (noise / sound), discharges, entanglement and entrapment, and marine debris. Potential IPFs to oceanic whitetip sharks as a result of the proposed operations in Mississippi Canyon Block 509 include accidents. Additional information on ESA-listed fish may be found in **Item 6**.

Accidents: Collisions between support vessels and the oceanic whitetip shark would be unusual events, however, should one occur, death or injury to the oceanic whitetip shark is possible. Contract vessel operators can avoid protected aquatic species and reduce potential deaths by maintaining a vigilant watch and a distance of 50 meters or greater, with the exception of animals that approach the vessel. Vessel personnel should use a Gulf of Mexico reference guide that includes identifying information on marine mammals, sea turtles, and other marine protected species (i.e., Endangered Species Act listed species such as Gulf sturgeon, giant manta ray, or oceanic whitetip shark) that may be encountered in the Gulf of Mexico Outer Continental Shelf (OCS).

Contract vessel operators will comply with the measures included in Appendix C of the NMFS Biological Opinion and requirements of the Protected Species Lease Stipulation, except under extraordinary circumstances when the safety of the vessel or crew is in doubt or the safety of life at sea is in question.

Should an ESA-listed fish (e.g. giant manta ray, oceanic whitetip shark, or Gulf sturgeon) be entrapped, entangled, or injured, personnel should contact the ESA Section 7 biologist at (301) 427-8413 (nmfs.psoreview@noaa.gov) and report all incidents to takereport.nmfsser@noaa.gov. After making the appropriate notifications, LLOG may call BSEE at (985) 722-7902 for questions or additional guidance on recovery assistance needs, continued monitoring requirements, and incidental report information which at minimum is detailed below. Additional information may be found at the following website: https://www.fisheries.noaa.gov/report. Any injured or dead protected species should also be reported to takereport.nmfsser@noaa.gov. In addition, if the injury or death was caused by a collision with the operator's vessel, an entrapment within the operator's equipment or vessel (e.g. moon pool), or an entanglement within the operator's equipment, the operator must further notify BOEM and BSEE within 24 hours of the strike or entrapment/entanglement by email to protectedspecies@boem.gov and protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

There is little information available on the impacts of oil spills or dispersants on oceanic whitetip sharks. It is expected that exposure of oil or dispersants to oceanic whitetip sharks would likely result in effects similar to other marine species, including fitness reduction and the possibility of mortality (NMFS, 2020). Due to the sparse population in the Gulf of Mexico, it is possible that a small number of oceanic whitetip sharks could be impacted by an oil spill. However, it is unlikely that such an event would occur from the proposed activities (refer to **Item 5**, Water Quality). The operations proposed in this plan will be covered by LLOG's Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: There is little available information on the effects of marine debris on oceanic whitetip sharks. Since these sharks are normally associated with surface waters, they may be susceptible to entanglement. However, due to the small, widely dispersed, and highly mobile population in the Gulf of Mexico, and the localized and patchy distribution of marine debris, it is extremely unlikely that oceanic whitetip sharks would be impacted by marine debris.

There will only be a limited amount of marine debris, if any, resulting from the proposed activities. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies, including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

LLOG will operate in accordance with the regulations, agency guidance, and Appendix B of the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. LLOG will also collect and remove flotsam resulting from activities related to proposed operations.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from LLOG management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no IPFs (including effluents, physical disturbances to the seafloor, and wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact oceanic whitetip sharks.

20.4 – Giant Manta Ray

According to the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion, the giant manta ray lives in tropical, subtropical, and temperate oceanic waters and productive coastlines throughout the Gulf of Mexico. While uncommon in the Gulf of Mexico, there is a population of approximately 70 giant manta rays in the Flower Garden Banks National Marine Sanctuary (Miller and Klimovich 2017). Giant manta rays were listed as threatened under the Endangered Species Act in 2018 due to worldwide overfishing. Giant manta rays had an abundant worldwide population, which has been threatened in recent years by inadequate regulatory measures governing fisheries; therefore, there is little research regarding the impact of oil and gas operations on giant manta rays (NMFS, 2020). IPFs that have been determined by NMFS to be discountable to giant manta rays include vessel strike, emissions (noise / sound), discharges, entanglement and entrapment, and marine debris. Potential IPFs to giant manta rays as a result of the proposed operations in Mississippi Canyon Block 509 include accidents. Additional information on ESA-listed fish may be found in **Item 6**.

Accidents: Collisions between support vessels and the giant manta ray would be unusual events, however, should one occur, death or injury to the giant manta ray is possible. Contract vessel operators can avoid protected aquatic species and reduce potential deaths by maintaining a vigilant watch and a distance of 50 meters or greater, with the exception of animals that approach the vessel. Vessel personnel should use a Gulf of Mexico reference guide that includes identifying information on marine mammals, sea turtles, and other marine protected species (i.e.,

Endangered Species Act listed species such as Gulf sturgeon, giant manta ray, or oceanic whitetip shark) that may be encountered in the Gulf of Mexico Outer Continental Shelf (OCS).

Contract vessel operators will comply with the measures included in Appendix C of the NMFS Biological Opinion and requirements of the Protected Species Lease Stipulation, except under extraordinary circumstances when the safety of the vessel or crew is in doubt or the safety of life at sea is in question.

Should an ESA-listed fish (e.g. giant manta ray, oceanic whitetip shark, or Gulf sturgeon) be entrapped, entangled, or injured, personnel should contact the ESA Section 7 biologist at (301) 427-8413 (nmfs.psoreview@noaa.gov) and report all incidents to takereport.nmfsser@noaa.gov. After making the appropriate notifications, LLOG may call BSEE at (985) 722-7902 for questions or additional guidance on recovery assistance needs, continued monitoring requirements, and incidental report information which at minimum is detailed below. Additional information may be found at the following website: https://www.fisheries.noaa.gov/report. Any injured or dead protected species should also be reported to takereport.nmfsser@noaa.gov. In addition, if the injury or death was caused by a collision with the operator's vessel, an entrapment within the operator's equipment or vessel (e.g. moon pool), or an entanglement within the operator's equipment, the operator must further notify BOEM and BSEE within 24 hours of the strike or entrapment/entanglement by email to protectedspecies@boem.gov and protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

There is little information available on the impacts of oil spills or dispersants on giant manta rays. It is expected that exposure of oil or dispersants to giant manta rays would likely result in effects similar to other marine species, including fitness reduction and the possibility of mortality (NMFS, 2020). It is possible that a small number of giant manta rays could be impacted by an oil spill in the Gulf of Mexico. However, due to the distance to the Flower Garden Banks (199.5 miles), the low population dispersed throughout the Gulf of Mexico, and the response capabilities that would be implemented during a spill, no significant adverse impacts are expected to impact giant manta rays. Additionally, it is unlikely that such an event would occur from the proposed activities (refer to **Item 5**, Water Quality). The operations proposed in this plan will be covered by LLOG's Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: There is little available information on the effects of marine debris on giant manta rays. Since these sharks are normally associated with surface waters, they may be susceptible to entanglement. However, due to the small, widely dispersed, and highly mobile population in the Gulf of Mexico, and the localized and patchy distribution of marine debris, it is extremely unlikely that oceanic whitetip sharks would be impacted by marine debris.

There will only be a limited amount of marine debris, if any, resulting from the proposed activities. Operators are prohibited from deliberately discharging debris as mandated by

MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies, including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

LLOG will operate in accordance with the regulations, agency guidance, and Appendix B of the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. LLOG will also collect and remove flotsam resulting from activities related to proposed operations.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from LLOG management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (including effluents, physical disturbances to the seafloor, and wastes sent to shore for disposal) from the proposed operations that are likely to impact giant manta rays.

20.5 – Loggerhead Sea Turtle

The loggerhead sea turtles are large sea turtles that inhabit continental shelf and estuarine environments throughout the temperate and tropical regions of the Atlantic Ocean, with nesting beaches along the northern and western Gulf of Mexico. NMFS issued a Final Rule in 2014 (79 FR 39855) designating a critical habitat including 38 marine areas within the Northwest Atlantic Ocean, with seven of those areas residing within the Gulf of Mexico. These areas contain one or a combination of habitat types: nearshore reproductive habitats, winter areas, breeding areas, constricted migratory corridors, and/or *Sargassum* habitats.

There are multiple IPFs that may impact loggerhead sea turtles (see **Item 8**). However, the closest loggerhead critical habitat is located 121.8 miles from Mississippi Canyon Block 509; therefore, no adverse impacts are expected to the critical habitat. Additionally, considering the information from the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion, we do not expect proposed operations to affect the ability of *Sargassum* to support adequate prey abundance and cover for loggerhead turtles.

20.6 - Protected Corals

Protected coral habitats in the Gulf of Mexico range from Florida, the Flower Garden Banks National Marine Sanctuary, and into the Caribbean, including Puerto Rico, the U.S. Virgin Islands, and Navassa Island. Four counties in Florida (Palm Beach, Broward, Miami-Dade, and Monroe Counties) were designated as critical habitats for elkhorn (Acropora palmata) and staghorn (Acropora cervicornis) corals. These coral habitats are located outside of the planning area and are not expected to be impacted by the proposed actions. Elkhorn coral can also be found in the Flower Garden Banks along with three additional coral species, boulder star coral (Orbicella franksi), lobed star coral (Orbicella annularis), and mountainous star coral (Orbicella faveolatta). Potential IPFs to protected corals from the proposed operations include accidents.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed operations (refer to statistics in **Item 5**, Water Quality). Oil spills cause damage to corals only if the oil contacts the organisms. Due to the distance from the Flower Garden Banks (199.5 miles) and other critical coral habitats, no adverse impacts are expected. The operations proposed in this plan will be covered by LLOG's Regional OSRP (refer to information submitted in **Appendix H**).

There are no other IPFs (including emissions, effluents, physical disturbances to the seafloor, and wastes sent to shore for disposal) from the proposed operations that are likely to impact protected corals.

20.7 - Endangered Beach Mice

There are four subspecies of endangered beach mouse that are found in the dune systems along parts of Alabama and northwest Florida. Due to the location of Mississippi Canyon Block 509 and the beach mouse critical habitat (above the intertidal zone), there are no IPFs that are likely to impact endangered beach mice.

20.8 - Navigation

The current system of navigation channels around the northern GOM is believed to be generally adequate to accommodate traffic generated by the future Gulfwide OCS Program. As exploration and development activities increase on deepwater leases in the GOM, port channels may need to be expanded to accommodate vessels with deeper drafts and longer ranges. However, current navigation channels will not be changed, and new channels will not be required as a result of the operations proposed in this plan.

(C) IMPACTS ON PROPOSED ACTIVITIES

The site–specific environmental conditions have been taken into account for the proposed activities. No impacts are expected on the proposed operations from site-specific environmental conditions.

(D) ENVIRONMENTAL HAZARDS

During the hurricane season, June through November, the Gulf of Mexico is impacted by an average of ten tropical storms (39-73 mph winds), of which six become hurricanes (> 74 mph winds). Due to its location in the Gulf, Mississippi Canyon Block 509 may experience hurricane and tropical storm force winds and related sea currents. These factors can adversely impact the integrity of the operations covered by this plan. A significant storm may present physical hazards to operators and vessels, damage exploration or production equipment, or result in the release of hazardous materials (including hydrocarbons). Additionally, the displacement of equipment may disrupt the local benthic habitat and pose a threat to local species.

The following preventative measures included in this plan may be implemented to mitigate these impacts:

1. Drilling & completion
    a. Secure well
    b. Secure rig / platform
    c. Evacuate personnel

Drilling activities will be conducted in accordance with NTL No.'s 2008-G09, 2009-G10, and 2010-N10.

2. Structure Installation
   Operator will not conduct structure installation operations during Tropical Storm or Hurricane threat.

(E) ALTERNATIVES

No alternatives to the proposed operations were considered to reduce environmental impacts.

(F) MITIGATION MEASURES

No mitigation measures other than those required by regulation will be employed to avoid, diminish, or eliminate potential impacts on environmental resources.

(G) CONSULTATION

No agencies or persons were consulted regarding potential impacts associated with the proposed operations. Therefore, a list of such entities has not been provided.

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Although not cited in the same manner as above, the following were utilized in preparing this EIA:

- Hazard Surveys and Well Site Clearance Letters

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
Shallow Hazards Assessment and Benthic Communities Evaluation, Block 509, Mississippi Canyon Area	Berger Geosciences	2019 and 2021
BOEMRE Environmental Impact Statement Report – No. 2009-053	Bureau of Ocean Energy Management, Regulation, and Enforcement	2009
Regional Oil Spill Response Plan	LLOG Exploration Offshore, L.L.C.	2020