UNITED STATES GOVERNMENT June 14, 2024
MEMORANDUM

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

Subject: Public Information copy of plan

Control # - S-08150

Type - Supplemental Development Operations Coordinations Document

Lease(s) - OCS-G33335 Block - 642 Keathley Canyon Area
OCS-G33336 Block - 643 Keathley Canyon Area
OCS-G33341 Block - 686 Keathley Canyon Area
OCS-G33918 Block - 687 Keathley Canyon Area
OCS-G36077 Block - 736 Keathley Canyon Area
OCS- Block - 689 Keathley Canyon Area

Operator - LLOG Exploration Offshore, L.L.C.

Description - Subsea Wells No. 001, 001 Alt. 001, OO3, 002, 4 and Alt. 4 in KC 686, No. 001, G, G Alt in KC 736

Rig Type - Not Found

Attached is a copy of the subject plan.

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

Chiquita Hill
Plan Coordinator

Site Type/Name	Botm Lse/Area/Blk	Surface Location	Surf Lse/Area/Blk
????/A		6820 FSL, 7080 FWL	/KC/689
WELL/001	G33336/KC/643	940 FNL, 1190 FEL	G33341/KC/686
WELL/001	G33918/KC/687	940 FNL, 1190 FEL	G33341/KC/686
WELL/001 ALT	G33918/KC/687	990 FNL, 1193 FEL	G33341/KC/686
WELL/001 ALT	G33336/KC/643	902 FNL, 1001 FEL	G33341/KC/686
WELL/002	G33335/KC/642	859 FNL, 1376 FEL	G33341/KC/686
WELL/003	G33341/KC/686	938 FNL, 1192 FEL	G33341/KC/686
WELL/4	G33341/KC/686	927 FNL, 1001 FEL	G33341/KC/686
WELL/4 ALT	G33341/KC/686	902 FNL, 1001 FEL	G33341/KC/686
WELL/G	G36077/KC/736	2426 FSL, 6516 FWL	G36077/KC/736

JOINT INITIAL DEVELOPMENT OPERATIONS COORDINATION DOCUMENT

PLAN CONTROL NUMBER S-8150

Keathley Canyon Blocks 642 / 686 / 687 / 736 / 689 / 643
OCS-G 33335 / OCS-G 33341 / OCS-G-33918 /
OCS-G-36077 / OCS-G-19619 / OCS-G-33336 Leases

RECORD OF CHANGES

Date of Submittal	***Section/Page***	***Brief Synopsis***
4/8/2024	Appendix J	Amended section to only reflect operations occurring in KC 686.
	Appendix Q	Amended section to only reflect operations occurring in KC 686

LLOG Exploration Offshore, L.L.C.
1001 Ochsner Blvd. Suite 100
Covington, Louisiana 70433

SUPPLEMENTAL DEVELOPMENT OPERATIONS COORDINATION DOCUMENT

PUBLIC INFORMATION

Keathley Canyon Blocks 642/686/687/736/689/643 OCS-G 33335 / OCS-G 33341 / OCS-G-33918 / OCS-G-36077 / OCS-G-19619 / OCS-G-33336 Leases

Keathley Canyon Block 686 Unit

PREPARED BY:

Sue Sachitana
Regulatory Specialist
LLOG Exploration Offshore, L.L.C.
(985) 801-4300 Main
(985) 801-4389 Direct
sue.sachitana@llog.com

Dated: April 1, 2024

LLOG EXPLORATION OFFSHORE, L.L.C.

SUPPLEMENTAL DEVELOPMENT OPERATIONS COORDINATION DOCUMENT

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HISTORY OF THE LEASES

History of Leases

OCS-G 33335 Lease, Keathley Canyon Block 642 was acquired by Repsol E&P Inc. at the Gulf of Mexico Lease Sale 208 on March 18, 2009 with an effective date of August 1, 2009 with a 10 year lease term. LLOG Exploration Offshore was designated Operator June 4, 2019. This lease is part of the Keathley Canyon 686 Unit #754319005.

OCS-G 33341 Lease, Keathley Canyon Block 686 was acquired by Repsol E&P USA Inc. and Ecopetrol American Inc at the Gulf of Mexico Lease Sale No. 208 on March 18, 2009, with an effective date of August 1, 2009 with a 10 year lease term. LLOG Exploration Offshore, LLC was designated operator on June 4, 2019. This lease is part of the Keathley Canyon 686 Unit #754319005.

Keathley Canyon 686 UNIT

Unit Agreement No. 754319005 was approved July 1, 2019.

All of Block 686 (OCS-G 33341)
S/2 of Block 642 (OCS-G 33335)
SW/4 of Block 643 (OCS-G 33336)
W/2 of Block 687 (OCS-G 33918)

OCS-G 19619 Lease, Keathley Canyon Block 689 was acquired by Amoco Production Company at the Central Gulf of Mexico Sale N. 168 on August 27, 1997, with an effective date of January 1, 1998, and was relinquished on June 15, 2006. BP Exploration & Production, Inc. was designated Operator of all of Block 689 effective December 21, 2001. Keathley Canyon Block 689 is currently unleased.

OCS-G-33918 Lease, Keathley Canyon Block 687 was acquired by Repsol E&P USA Inc. at the Central Gulf of Mexico Sale N. 213 on March 17, 2010, with an effective date of June 1, 2010. LLOG Exploration Offshore, L. L. C. was designated operator on June 4, 2019 for all of Keathley Canyon 687.

OCS-G- 36077 Lease, Keathley Canyon Block 736 was acquired by LLOG Exploration Offshore, LLC at the Gulf of Mexico Lease Sale 247 on March 22, 2017, with an effective date of August 1, 2017.

OCS-G- 33336 Lease, Keathley Canyon Block 643 was acquired by Repsol E & P USA, Inc. and Ecopetrol America, Inc. at the Gulf of Mexico Lease Sale 208 on March 18, 2009, with an effective date of August 1, 2009. LLOG Exploration Offshore, L.L.C. was designated operator on February 11, 2019 for all of , Keathley Canyon 643.

LLOG Exploration Offshore, LLC has filed by letter dated September 22, 2021, an application for a Right-of-Use and Easement for the Keathley Canyon Block 689 Lease (currently unleased) to cover the installation of a semi-submersible Floating Platform (Platform A) in Keathley Canyon Block 689 and for those portions of the platform anchorage system which will extend into Keathley Canyon Blocks 689, 688, 690, 732, 733 and 734 all of which are currently unleased.

LLOG Exploration Offshore, L.L.C. filed a Suspension of Operations for the Keathley Canyon Block 686 Unit which was approved for the period September 29, 2020 through November 30, 2021. The Suspension of Operations was approved by BSEE on November 13, 2020.

LLOG Exploration Offshore, L.L.C. spud the OCS-G 33342 Lease, Keathley Canyon Block 686, Well No. 3 on August 2, 2019, and the well was temporarily abandoned on September 28, 2019.

LLOG Exploration Offshore, L.L.C. spud the OCS-G 36077 Lease, Keathley Canyon Block 736, Well No. 1 on February 13, 2023, and the well was temporarily abandoned on May 3, 2023.

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

A. Plan information

This Supplemental Development Operations Coordination Document is to amend previously approved plan R-7295 to add a new well location, KC 643 #1 and KC 687 #1 well along with alternate wells to be drilled in the event of a failure. The KC 643 #1 well will be drilled from Keathley Canyon 686, OCS-G-33341 Lease, and will bottom hole in Keathley Canyon 643, OCS-G-33336 Lease. The KC 687 #1 will be drilled from Keathley Canyon 686, OCS-G-33341, and will bottom hole in Keathley Canyon 687, OCS-G-33918 Lease. The KC 687 #1 well has been previously approved under Supplemental EP (S-8025). All other information outlined in Plan R-7295 remains unchanged.

The operations proposed will not utilize pile-driving, nor is Operator proposing any new pipelines expected to make landfall.

A Supplemental Conservation Information Document (CID) that discusses the depletion plans of these wells has been filed under separate cover.

The wells included in this plan for completeness are as follows:

Well Name / Location	Approved under DOCD	Lease	API Number
KC 686 003	N-10177	OCS-G-33341	608084006400
KC 736 001	N-10177	OCS-G-36077	608084007100
KC 642 002	N-10177	OCS-G-33335	608084007600
KC 686 004	N-10177	OCS-G-33341	TBD
KC 736 002	N-10177	OCS-G-36077	TBD
KC 643 001		OCS-G-33336	TBD
KC 687 001		OCS-G-33918	TBD

B. Location

Included as ***Attachment A-1*** is Form BOEM 137 "OCS Plan Information Form", which provides for the installation of the well jumpers and to commence production from the associated wells.

Attachment A-2 – *Well Location Plat*
Attachment A-3 – *Bathymetry Map*
Attachment A-4 – *Proposed pipeline installation*

C. Safety & Pollution Features

Safety of personnel and protection of the environment during the proposed operations are a primary concern for LLOG.

Safety features on the platform 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 involved 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 contaminates 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)
Production	**Dry Oil Tank**	**900**	**1**	**900**	**Avg 37° API**
Production	**Flotation Cell**	**105**	**1**	**105**	**Avg 11° API**
Production	**Wet Oil Tank**	**100**	**1**	**100**	**Avg 37° API**
Production	**HP Flare Scrubber**	**321**	**1**	**321**	**Avg 26° API**
Production	**Production Separator 1 (MBD-1010)**	**137**	**1**	**137**	**Avg 46° API**
Production	**Production Separator 2 (MBD-1020)**	**137**	**1**	**137**	**Avg 48° API**
Production	**LP Flare Scrubber**	**51**	**1**	**51**	**Avg 26° API**
Production	**LP Separator (MBD-1055)**	**321**	**1**	**321**	**Avg 43° API**
Production	**LP Separator Degasser (MBD-1050)**	**219**	**1**	**219**	**Avg 43° API**
Production	**Oil Treater Degasser**	**219**	**1**	**219**	**Avg 39° API**
Production	**Oil Treater**	**471**	**1**	**471**	**Avg 39° API**
Production	**Test Separator (MBD-1000)**	**137**	**1**	**137**	**Avg 46° API**
Production	**Diesel Storage Tank**	**284**	**1**	**284**	**Avg 42° API**

Type of Storage Tank	**Type of Facility**	**Tank Capacity (bbls)**	**Number of tanks**	**Total Capacity (bbls)**	**Fluid Gravity (API)**
Fuel Oil Storage	**Drillship**	16,564	1	16,564	No. 2 Diesel -

Tank					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 550.

G. Cost Recovery Payment

Included as Attachment A-5 is the Pay.gov receipt in the amount of $5,017.00 for cost recovery fee associated with this plan.

OCS Plan Information Form

Attachment A-1

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:		Exploration Plan (EP)	Development Operations Coordination Document (DOCD)	Supplemental

Company Name: LLOG Exploration Offshore, LLC	BOEM Operator Number: GOM 2058
Address:	Contact Person: Sue Sachitana Regulatory Specialist
1001 Ochsner Boulevard, Suite 100	Phone Number: 985-801-4716
Covington, Louisiana 70433	E-Mail Address: sue.sachitana@llog.com

If a service fee is required under 30 CFR 550.125(a), provide the	Amount paid	$5,017.00	Receipt No.	27D4CP52

Project and Worst Case Discharge (WCD) Information

Lease(s): OCS-G 33335/G 33341/G 36077/G33336	Area: Keathley Canyon	Block(s): 391	Project Name (If Applicable): Salamanca

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

Platform/Well Name: KC736 "E"	Total Volume of WCD: ~12.10 MMBO	API Gravity: 31.7°
Distance to Closest Land (Miles): 215 miles	Volume from uncontrolled blowout: 135,476 bbls	

Have you previously provided information to verify the calculations and assumptions for your WCD?	X	Yes		No
If so, provide the Control Number of the EP or DOCD with which this information was provided	S-8023			
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?	X	Yes		No
Do you propose any facility that will serve as a host facility for deepwater subsea development?	X	Yes		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)
See Attached			

SUPPLEMENTAL
DEVELOPMENT OPERATIONS COORDINATION DOCUMENT

Keathley Canyon Blocks 642, 686, 687, 736, 689 and 643
OCS-G 33335, OCS-G 33341, OCS-G-33918, OCS-G 36077 and OCS-G-33336

ACTIVITY SCHEDULE

Drilling & Completion Schedule – wells drilled production

Leon Development		Planned Durations		
Well	**Ops**	**Start**	**Days**	**End**
Leon KC 643 #1	Drill TA	6/1/2024	100	9/9/2024
Leon KC 687 #1	Drill TA	1/1/2025	100	4/1/2025
Leon KC 643 #1	Completion	4/2/2025	100	7/11/2025
Leon KC 687 #1	Completion	6/1/2026	100	9/9/2026
KC 643 Well SS001 Lease Term Jumper		6/12/2025	6	6/18/2025
KC 687 Well SS001 Lease Term Jumper		6/18/2025	6	6/24/2025
Topsides & Subsea Commissioning		6/12/2025	10	6/22/2025
Hook-up and commence production		6/23/2025	1	6/23/2025

***LLOG is requesting 365 days per year for drilling/sidetrack/workover most years since our rig schedule is always fluid (See AQR in Section H for details).**

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): KC 689 "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): 45,260 bbls/day				For structures, volume of all storage and pipelines (Bbls): 2439 bbls		API Gravity of fluid		32.1°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS Unleased	OCS	OCS OCS
Area Name	Keathley Canyon		
Block No.	689		
Blockline Departures (in feet)	N/S Departure: F S L 6820.00'	N/S Departure: F___ L	N/S Departure: F___ L N/S Departure: F___ L N/S Departure: F___ L
	E/W Departure: F W L 7080.00'	E/W Departure: F___ L	E/W Departure: F___ L E/W Departure: F___ L E/W Departure: F___ L
Lambert X-Y coordinates	X: 1,797,000.00	X:	X: X: X:
	Y: 9,542.500.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 26° 17' 51.158"N	Latitude	Latitude Latitude Latitude
	Longitude 92° 31' 18.857"W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 6405'		MD (Feet): / TVD (Feet):	MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet):
Anchor Radius (if applicable) in 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
No. 1	KC	689	X = 1,804,218.80	Y = 9,551,080.79	11,520'
No. 2	KC	689	X = 1,804,929.53	Y = 9,550,429.53	11,520'
No. 3	KC	689	X = 1,805,580.79	Y = 9,549,718.80	11,520'
No. 4	KC	734	X = 1,805,971.47	Y = 9,534,953.38	11,520'
No. 5	KC	733	X = 1,805,290.15	Y = 9,534,209.85	11,520
No. 6	KC	733	X = 1,804,546.62	Y = 9,533,528.53	11,520'
No. 7	KC	733	X = 1,790,109.02	Y = 9,534,309.89	11,520'
No. 8	KC	732	X = 1,789,431.09	Y = 9,534,931.09	11,520'

Form 0137 Page 2 CONTINUED:

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
No.9	KC	732	X = 1,788,809.89	Y = 9,535,609.02	11,520’
No. 10	KC	688	X = 1,788,809.89	Y = 9,549,390.98	11,520’
No. 11	KC	688	X = 1,789,431.09	Y = 9,550,068.91	11,520’
No. 12	KC	689	X = 1,790,109.02	Y = 9,550,690.11	11,520’

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): Well 003				Previously reviewed under an approved EP or DOCD?	X	Yes		No
Is this an existing well or structure?		Yes X		No	If this is an existing well or structure, list the Complex ID or API No. 608084006400	S-7941	
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): 102,017 bbls/day		For structures, volume of all storage and pipelines (Bbls):		API Gravity of fluid	30.3°	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 33341	OCS	OCS OCS
Area Name	Keathley Canyon		
Block No.	686		
Blockline Departures (in feet)	N/S Departure: F N L 938.12'	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 1,192.04'	E/W Departure: F E L	E/W Departure: F L E/W Departure: F L E/W Departure: F L
Lambert X-Y coordinates	X: 1,757,047.96'	X:	X: X: X:
	Y: 9,550,581.88'	Y: 9	Y: Y: Y:
Latitude/ Longitude	Latitude 26° 19' 12.510" N	Latitude	Latitude Latitude Latitude
	Longitude 92° 38' 37.752" W	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 6,147	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): KC 736 001 (Previously Loc. F (#3))					Previously reviewed under an approved EP or DOCD?	X Yes	No
Is this an existing well or structure?		Yes X		No	If this is an existing well or structure, list the Complex ID or API No.	608084007100	
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): 135,476 bbls	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 36077	OCS	OCS OCS
Area Name	Keathley Canyon		
Block No.	736		
Blockline Departures (in feet)	N/S Departure: F S L 2,401.43	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 6,514.96	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: 1,843,954.96	X:	X: X: X:
	Y: 9,522,241.43	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 26° 14' 28.463" N	Latitude	Latitude Latitude Latitude
	Longitude 92° 22' 43.824" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 6,688		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): Well No. 002					Previously reviewed under an approved EP or DOCD?	X	Yes		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.	608084007600			
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): 102,017 bbls/day	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	30.3°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 33341	OCS	OCS OCS
Area Name	Keathley Canyon		
Block No.	686		
Blockline Departures (in feet)	N/S Departure: F N L 859.56'	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 1,376.81'	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: 1,756,863.19	X:	X: X: X:
	Y: 9,550,660.44	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 26° 19' 13.294" N	Latitude	Latitude Latitude Latitude
	Longitude 92° 38' 39.781" W	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 6,147	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. #4					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): 102,017 bbls/day				For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid		30.3°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 33341	OCS	OCS OCS
Area Name	Keathley Canyon		
Block No.	686		
Blockline Departures (in feet)	N/S Departure: F N L 927'	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 1,001'	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: 1,757,239.00	X:	X: X: X:
	Y: 9,550,593.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 26° 19' 12.615" N	Latitude	Latitude Latitude Latitude
	Longitude 92° 38' 35.651" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 6,147		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 #4					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): 102,017 bbls/day				For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid		30.3°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 33341	OCS	OCS OCS
Area Name	Keathley Canyon		
Block No.	686		
Blockline Departures (in feet)	N/S Departure: F N L 902'	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 1,001'	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: 1,757,239.00	X:	X: X: X:
	Y: 9,550,618.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 26° 19' 12.863" N	Latitude	Latitude Latitude Latitude
	Longitude 92° 38' 35.650" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 6,147'		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. G(#2)(previously #4)					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): 135,476 bbls/day	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	31.7°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 36077	OCS	OCS OCS
Area Name	Keathley Canyon		
Block No.	736		
Blockline Departures (in feet)	N/S Departure: F S L 2,426.54	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 6,516.19	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: 1,843,956.19	X:	X: X: X:
	Y: 9,522,266.54	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 26° 14' 28.711" N	Latitude	Latitude Latitude Latitude
	Longitude 92° 22' 43.810" W	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 6,689	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 G(#2)(previously #4)					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): 135,476 bbls/day		For structures, volume of all storage and pipelines (Bbls): N/A			API Gravity of fluid		31.7°	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G 36077	OCS	OCS OCS
Area Name	Keathley Canyon		
Block No.	736		
Blockline Departures (in feet)	N/S Departure: F S L 2,501.54	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 6,516.19	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: 1,843,956.19	X:	X: X: X:
	Y: 9,522,341.54	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 26° 14' 29.454" N	Latitude	Latitude Latitude Latitude
	Longitude 92° 22' 43.809" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 6,684		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): KC 643 001					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): 135,476 bbls				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 33341	OCS	OCS OCS
Area Name	Keathley Canyon		
Block No.	686		
Blockline Departures (in feet)	N/S Departure: F N 940.00 L E/W Departure: F E 1,190.00 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: 1,757,050.00 Y: 9,550,580.00	X: Y:	X: X: X: Y: Y: Y:
Latitude/ Longitude	Latitude 26° 19' 12.492" N Longitude 92° 38' 37.729" W	Latitude Longitude	Latitude Latitude Latitude Longitude Longitude Longitude
Water Depth (Feet): 6,147		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): KC 643 001 Alt					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): 135,476 bbls				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 33341	OCS	OCS OCS
Area Name	Keathley Canyon		
Block No.	686		
Blockline Departures (in feet)	N/S Departure: F N L 902.00	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F E L 1,001.00	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,757,239.00	X:	X: X: X:
	Y: 9,550,618.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 26° 19' 12.863" N	Latitude	Latitude Latitude Latitude
	Longitude 92° 38' 35.650" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 6,147		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): KC 687 001 (Loc E)					Previously reviewed under an approved EP or DOCD?	X	Yes		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): 102,017 BOPD		For structures, volume of all storage and pipelines (Bbls):			API Gravity of fluid 30.3			

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G 33341	OCS	OCS OCS
Area Name	KeathleyCanyon		
Block No.	686		
Blockline Departures (in feet)	N/S Departure: F N L 940'	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 1,190'	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: 1,757,050.00	X:	X: X: X:
	Y: 9,550,580.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 26° 19' 12.492" N	Latitude	Latitude Latitude Latitude
	Longitude 92° 38' 37.729" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 6,285'		MD (Feet): / TVD (Feet):	MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet):
Anchor Radius (if applicable) in 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): KC 687 001 ALT (Loc. Alt E)					Previously reviewed under an approved EP or DOCD?	X	Yes		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): 102,017 BOPD	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid 30.3	

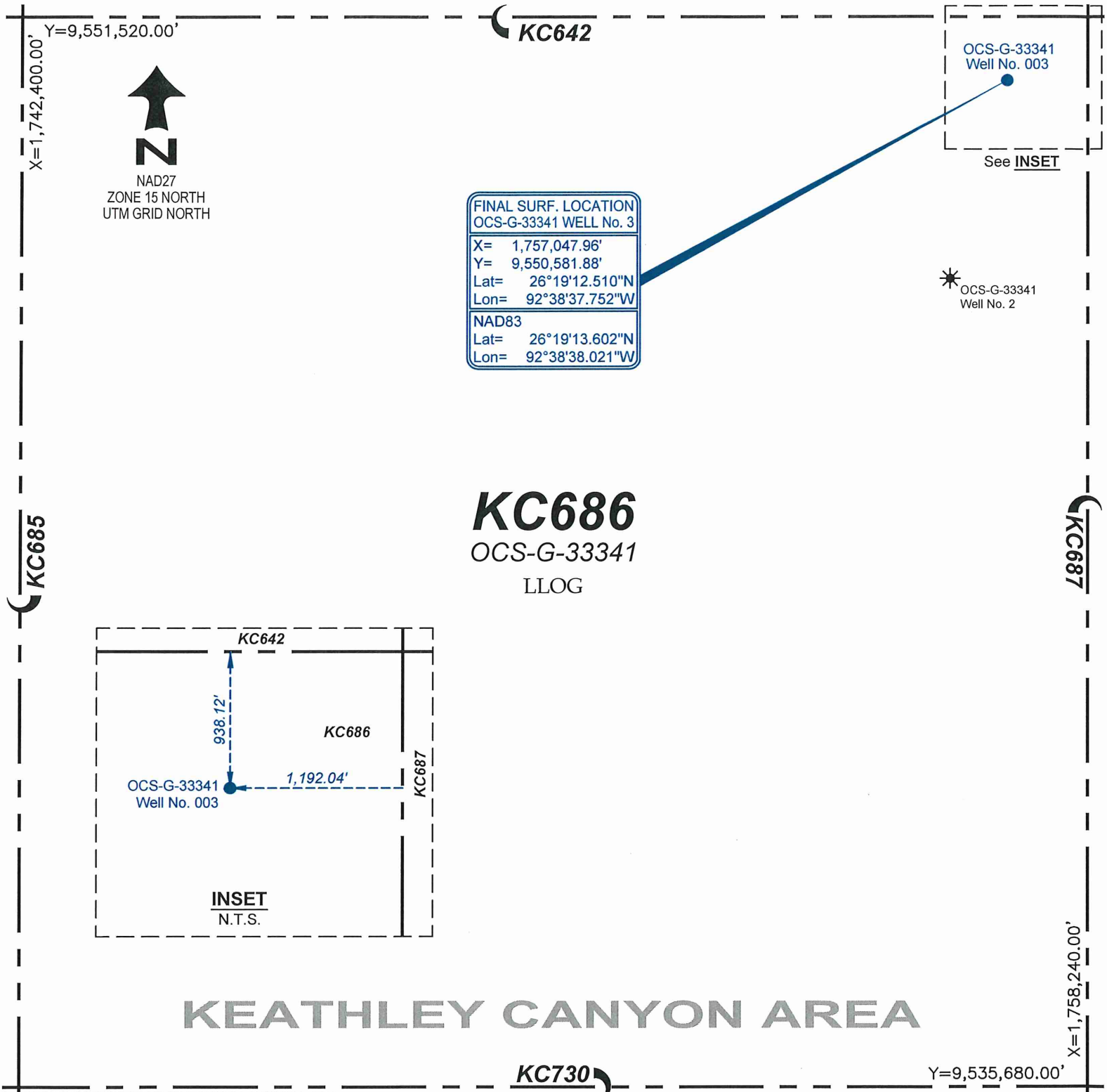
	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G 33341	OCS	OCS OCS
Area Name	KeathleyCanyon		
Block No.	686		
Blockline Departures (in feet)	N/S Departure: F N 990' L	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F E 1,193' 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: 1,757,047.00	X:	X: X: X:
	Y: 9,550,530.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 26° 19' 11.996" N	Latitude	Latitude Latitude Latitude
	Longitude 92° 38' 37.764" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 6,285'		MD (Feet): / TVD (Feet):	MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet):
Anchor Radius (if applicable) in 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 =	

Well Location Plats

Attachment A-2



THE RIG *WEST NEPTUNE* SPUD IN WELL AUGUST 2, 2019
TRANSFORMATION METHOD (WGS84 ≡ NAD83 to NAD27) = NADCON v2.1

PUBLIC INFORMATION

I, RALPH A. COLEMAN, HEREBY CERTIFY THAT THE ABOVE FINAL SURFACE LOCATION IS CORRECT.

STATE OF LOUISIANA
RALPH A. COLEMAN
REG. No. 4691
REGISTERED PROFESSIONAL LAND SURVEYOR

RALPH A. COLEMAN
PROFESSIONAL LAND SURVEYOR
LOUISIANA REGISTRATION No. 4691

LLOG exploration

OCS-G-33341 Well No. 003 ST00BP00

BLOCK 686 - KEATHLEY CANYON AREA

2,000 0 2,000

U.S. SURVEY FEET (1"=2,000')

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000
LA Reg. No. 747

JOB: 200138	DRW: JRD	DATE: AUGUST 2, 2019	
CKD: MCM	APP: RAC	SHEET 1 of 1	REV. 0
DOC: 200138-OII-DRW-ASD-001-01			

SIZE: 8.5" X 11" DATE: 08/02/2019 TIME: 13:29 FILENAME: M:\200138\MAPS\200138-OII-DRW-ASD-001.DWG

Y=9,535,680.00'

X=1,837,440.00'

NOTES:

1. DP RIG *SEADRILL WEST NEPTUNE* SPUDDED WELL ON FEB. 13, 2023.

2. FINAL SURFACE LOCATION REPRESENTS AFT ROTARY POSITION AT TIME OF SPUD IN.

3. OBSERVED ITRF COORDINATES (C-NAV, CURRENT REALIZATION AND EPOCH) TRANSFORMED TO NAD83(2011) VIA HTDP PROCESS EQUIVALENT TO "EPSG:7807, ITRF2008 TO NAD83(2011) (1)".

4. NAD83(2011) COORDINATES TRANSFORMED TO NAD27 VIA NADCON 2.1, EQUIVALENT TO "EPSG:1241, NAD27 TO NAD83 (1)" WHERE NAD83(2011) AND NAD83(86) ARE CONSIDERED FUNCTIONALLY THE SAME.

5. THE NUMBER OF SIGNIFICANT FIGURES OF THE COORDINATE VALUES AND DISTANCES SHOWN HEREON IS FOR THE SAKE OF MAINTAINING COMPUTATIONAL PRECISION/INTER CONVERTIBILITY AND SHOULD NOT BE CONSTRUED AS AN EXPRESSION OF ABSOLUTE SPATIAL ACCURACY.

KC692

OCS-G-22367
Well No. 002

N

NAD27
ZONE 15 NORTH
UTM GRID NORTH

KEATHLEY CANYON AREA

KC735

KC737

KC736

OCS-G-36077

LLOG

OCS-G-36077 WELL No. 001 FINAL SURFACE LOCATION	
X=	1,843,954.96'
Y=	9,522,241.43'
Lat=	26°14'28.463"N
Lon=	92°22'43.824"W
NAD83	
Lat=	26°14'29.555"N
Lon=	92°22'44.050"W

OCS-G-36077
Well No. 001 ST00BP00

6,514.96'

2,401.43'

OCS-G-22367
Well No. 001

KC780

Y=9,519,840.00'

X=1,853,280.00'

PUBLIC INFORMATION

STATE OF LOUISIANA
ROBERT M. FROST
License No. 4573
PROFESSIONAL LAND SURVEYOR
NOT CERTIFIED UNLESS SIGNED & EMBOSSED

I, ROBERT M. FROST, HEREBY CERTIFY THAT THE ABOVE FINAL SURFACE LOCATION IS CORRECT.

ROBERT M. FROST
PROFESSIONAL LAND SURVEYOR
LOUISIANA REGISTRATION No. 4573

Digitally signed by: Robert M. Frost, PLS
Date: 2023.02.14 12:57:30 -06'00'

LLOG exploration

OCS-G-36077 Well No. 001 ST00BP00

BLOCK 736 - KEATHLEY CANYON AREA

2,000 0 2,000

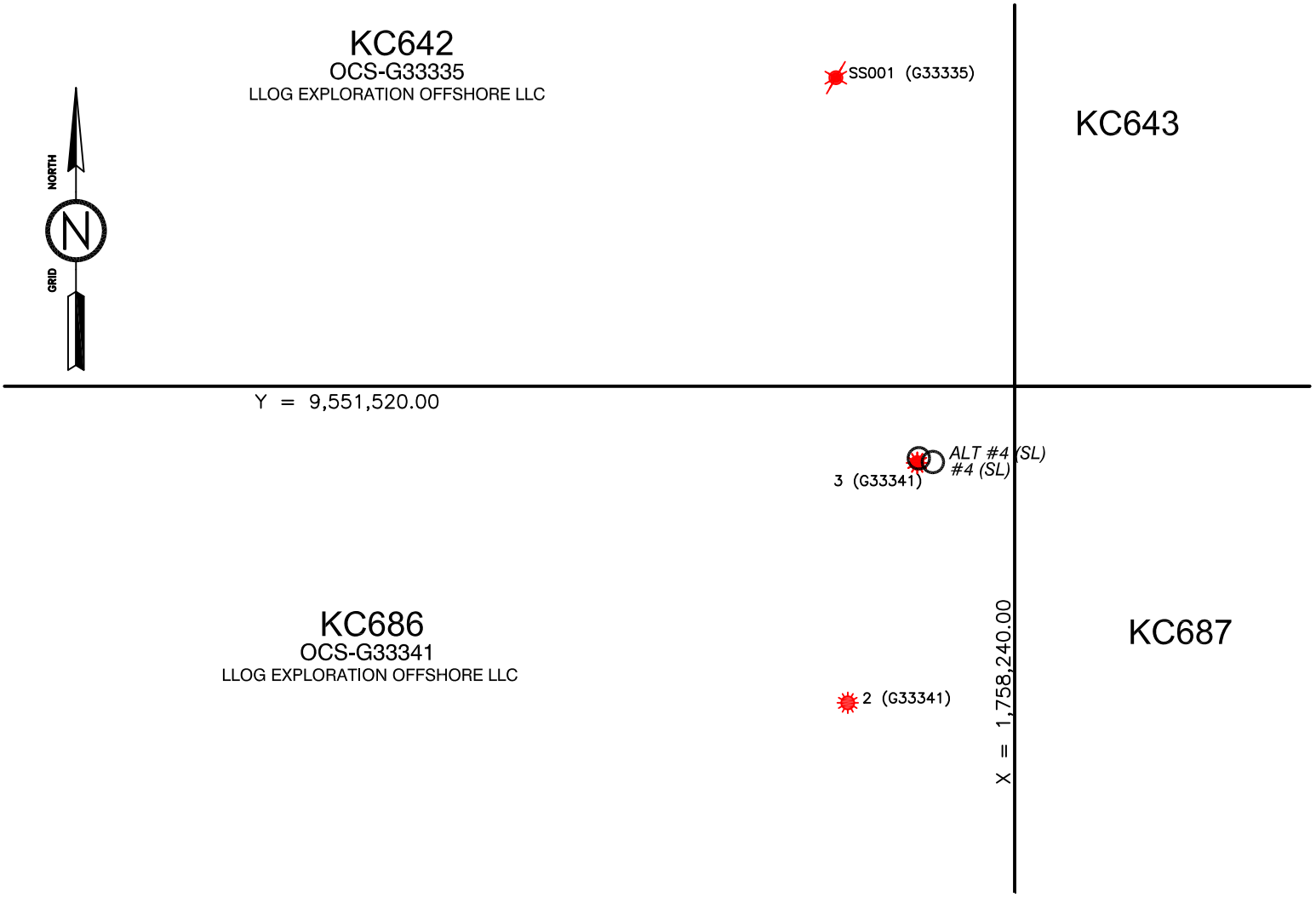
U.S. SURVEY FEET (1"=2,000')

PREPARED BY: OCEANEERING

OCEANEERING INTERNATIONAL, INC.
202 STANTON STREET
BROUSSARD, LA 70518
(337) 210-0000
LA Reg. No. 747

JOB: 220778	DRW: VIT	DATE: FEBRUARY 14, 2023
CKD: ZSS	APP: RMF	SHEET 1 of 1 / REV. 0
DOC: 220778-OII-DRW-ASD-004-01		

SIZE: 8.5" X 11" DATE: 02/14/2023 TIME: 12:12 FILENAME: M:\220778\05_KC736-1\01_OFFICE\MAPPING\220778-OII-DRW-ASD-004.DWG



PROPOSED WELL LOCATIONS

LOCATION	BLOCK	CALLS		COORDINATES		LATITUDE	LONGITUDE	WD	MD	TVD
#4 (SL)	*KC/686*	*1,001.00' FEL*	*927.00' FNL*	*X = 1,757,239.00*	*Y = 9,550,593.00*	*26° 19' 12.615"N*	*92° 38' 35.651"W*	*6,147'*		
ALT #4 (SL)	*KC/686*	*1,001.00' FEL*	*902.00' FNL*	*X = 1,757,239.00*	*Y = 9,550,618.00*	*26° 19' 12.863"N*	*92° 38' 35.650"W*	*6,147'*		

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

DOCD PLAT
PROPOSED WELLS
KC686#4 & ALT #4 (G33341)
BLOCKS 686 & 642
KEATHLEY CANYON AREA
GULF OF MEXICO

DRAWN BY: RJN	CHK. BY.: MEK	REV. No.: 2	JOB No.: 21-038	DWG No.: 21-038-EXP
DATUM: NAD 27	SPHEROID: CLARKE 1866	PROJECTION: U.T.M.	ZONE: 15	DATE: 9/8/2021	REV. DATE: 9/23/2021	SCALE: 1"=2,000'	**SHEET 1 OF 1**

Y= 9,535,680

LLOG EXPLORATION OFFSHORE, INC.

OCS-G 36077

KC 736

X= 1,837,440

X= 1,853,280

Proposed Surface Loc G, Alt G

Y= 9,519,840

Surface Location G:
X: 1,843,956.19 Y: 9,522,266.54
Lat: 26 deg, 14 min, 28.711 sec
Long: 92 deg, 22min, 43.810 sec
6516.19' FWL 2426.54' FSL
(NAD27)

Surface Location Alt G:
X: 1,843,956.19 Y: 9,522,341.54
Lat: 26 deg, 14 min, 29.454 sec
Long: 92 deg, 22min, 43.809 sec
6516.19' FWL 2501.54' FSL
(NAD27)

Public

LLOG exploration

Keathley Canyon Block 736

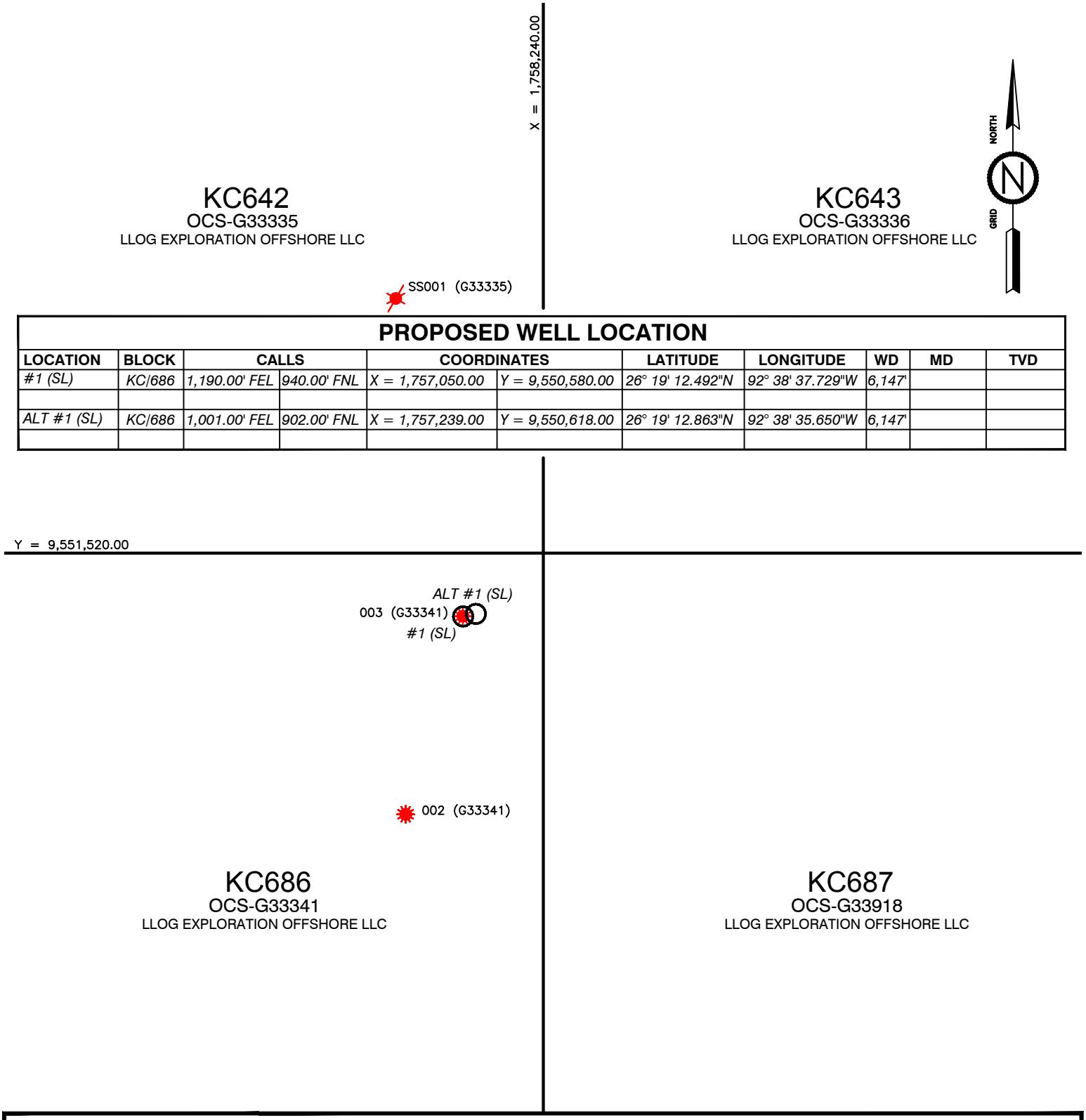
Gulf of Mexico

Location Map

0' 1000' 2000'

8/21

Geo: Cody Lewis



PROPOSED WELL LOCATION

LOCATION	BLOCK	CALLS		COORDINATES		LATITUDE	LONGITUDE	WD	MD	TVD
#1 (SL)	*KC/686*	*1,190.00' FEL*	*940.00' FNL*	*X = 1,757,050.00*	*Y = 9,550,580.00*	*26° 19' 12.492"N*	*92° 38' 37.729"W*	*6,147'*		
ALT #1 (SL)	*KC/686*	*1,001.00' FEL*	*902.00' FNL*	*X = 1,757,239.00*	*Y = 9,550,618.00*	*26° 19' 12.863"N*	*92° 38' 35.650"W*	*6,147'*		

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

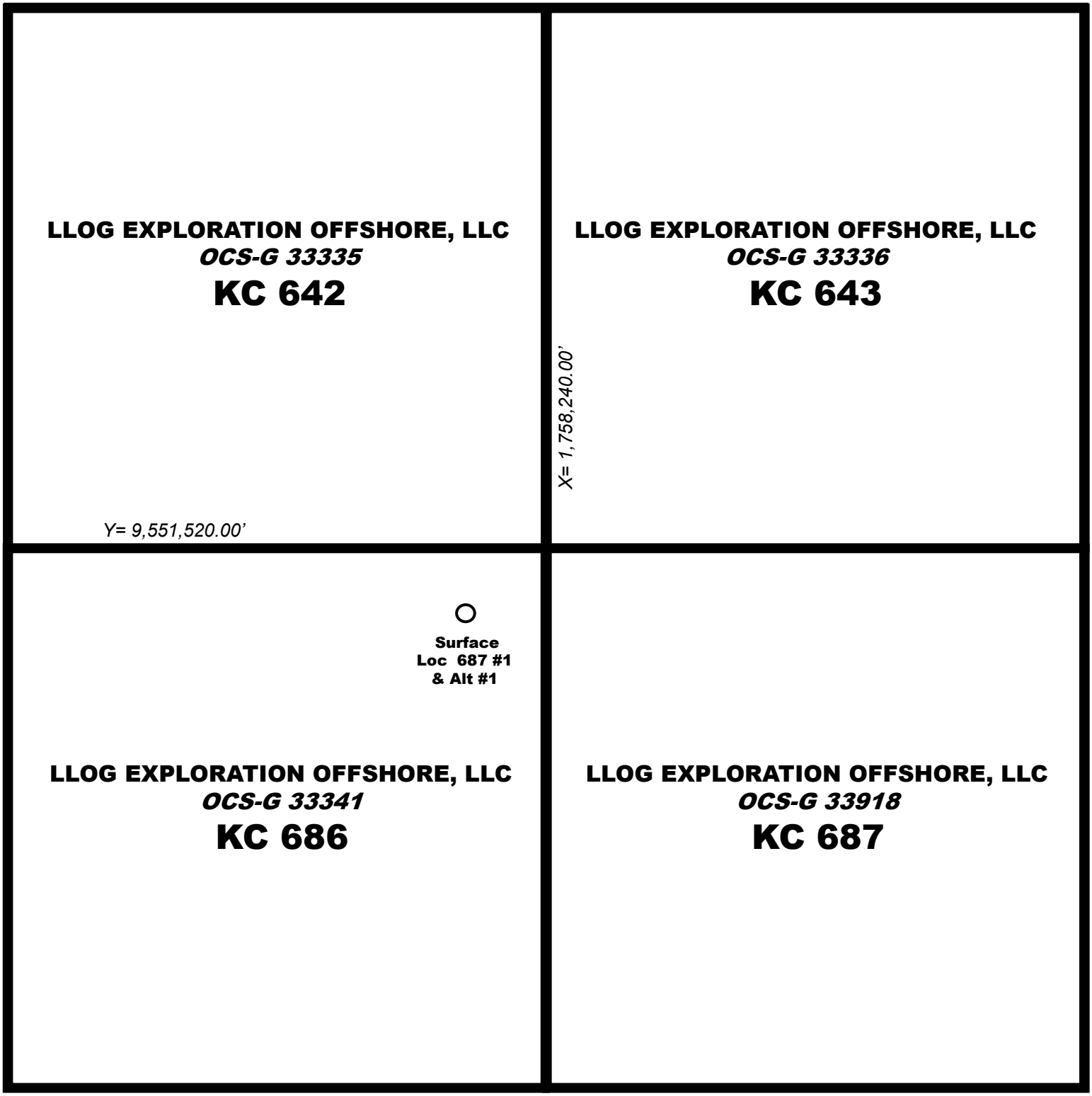
EXPLORATION PLAT

PROPOSED WELLS #1 & ALT #1
OCS-G 33336 BLOCK 643 WITH SURFACE LOCATION IN BLOCK 686
KEATHLEY CANYON AREA

GULF OF MEXICO

DRAWN BY: RJN	CHK. BY.: MEK	REV. No.:	JOB No.: 24-002	DWG No.: 24-002-EXP KC643_N0.1
DATE: 1/11/2024	REV. DATE:		SCALE: 1"=2,000'	SHEET 1 OF 1

DATUM: NAD 27	SPHEROID: CLARKE 1866	PROJECTION: U.T.M.	ZONE: 15



SURFACE LOCATION 687 #1:
X: 1,757,050.00 Y: 9,550,580.00
Lat: 26 deg, 19min, 12.492sec
Long: 92 deg, 38min, 37.729sec
1190' FEL, 940' FNL

SURFACE LOCATION ALT 687 #1:
X: 1,757,047.00 Y: 9,550,530.00
Lat: 26 deg, 19min, 11.996sec
Long: 92 deg, 38min, 37.764sec
1193' FEL, 990' FNL

Public

LLOG exploration

KC Block 642/686/687

Gulf of Mexico

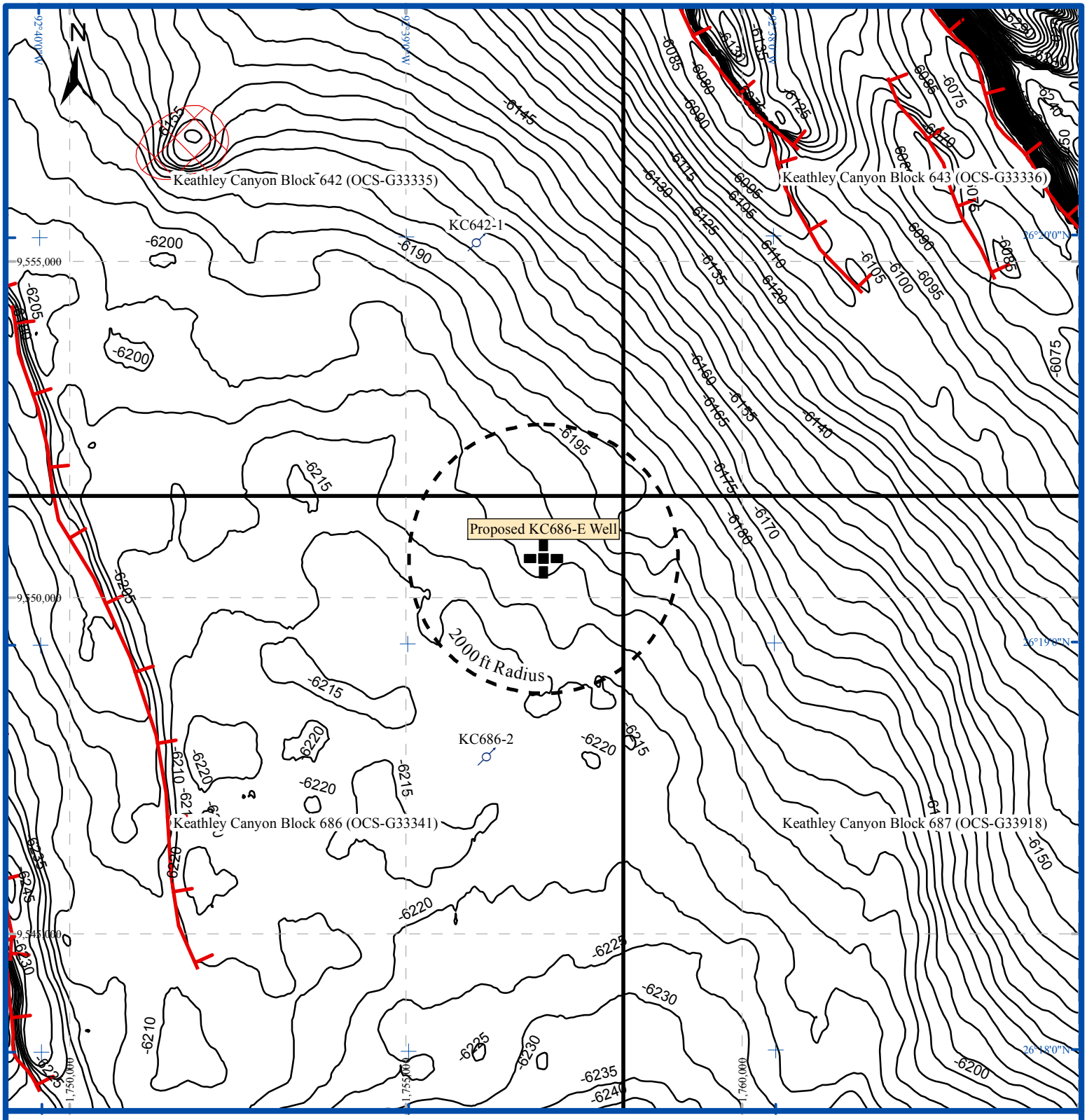
Location Map

0' 1000' 2000'

3/24
Geo: Cody Lewis

Bathymetry Map

Attachment A-3
(Public Information)



Proposed KC686-E Well Location
(1,757,050ft E / 9,550,580ft N)

Existing Well

Block boundary

-6203 Depth in feet below sea surface to seabed, contoured at 5ft intervals

Seabed fault intersection, tick denotes downthrown block

Seabed mound of unknown origin - possibly favorable for sensitive sessile benthic community development

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

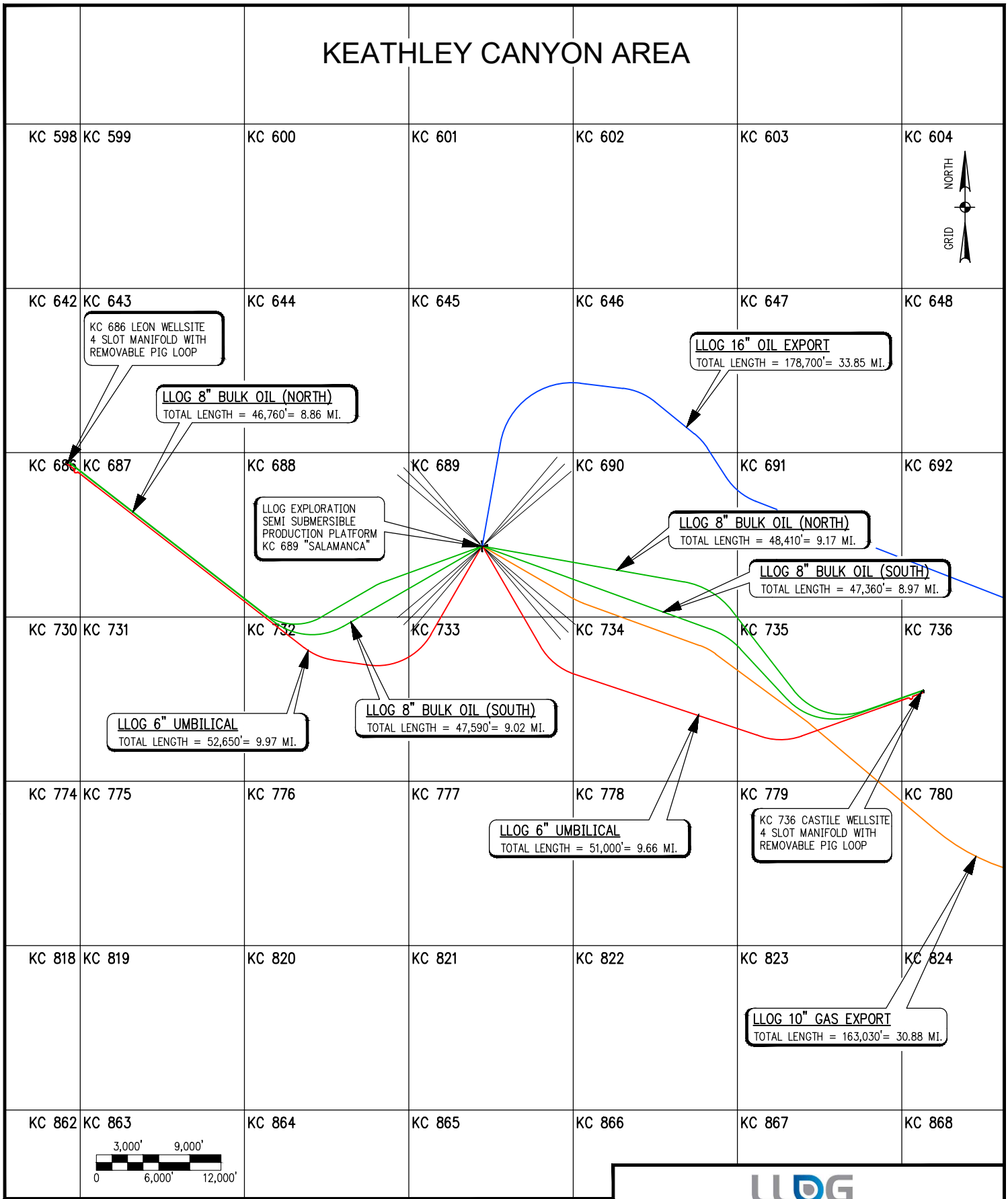
0 125 250 500 Meters

Biological, Physical & Socio-Economic Plat

Proposed Pipeline Installation

Attachment A-4
(Public Information)

KEATHLEY CANYON AREA



NO.	DATE	REVISION	BY	APPR
A		ISSUED FOR INFORMATION	JCG	MGL

PINNACLE ENGINEERING

TX REGISTERED ENGR FIRM F-567

LLOG exploration

SALAMANCA

KEATHLEY CANYON AREA

CONCEPTUAL FIELD DEVELOPMENT

DWG. NO. 205700-PIP-DG-9656-A

JGUEVARA 9/10/2021 8:30:07 AM P:\STRUCT\205700\PIPELINE\205700-PIP-DG-9656-A.dwg

Cost Recovery Payment

Attachment A-5
(Public Information)

From:	John Richard
To:	Sue Sachitana
Cc:	Kim DeSopo
Subject:	FW: Pay.gov Payment Confirmation: BOEM Development/DOCD Plan - BD
Date:	Thursday, March 28, 2024 2:30:39 PM
Importance:	High

FYI.

From: notification@pay.gov <notification@pay.gov>
Sent: Thursday, March 28, 2024 2:17 PM
To: John Richard <johnr@llog.com>
Subject: Pay.gov Payment Confirmation: BOEM Development/DOCD Plan - BD

An official email of the United States government

Pay.gov logo

Your payment has been submitted to the designated government agency through Pay.gov and the details are below. Please note that this is just a confirmation of transaction submission. To confirm that the payment processed as expected, you may refer to your bank statement on the scheduled payment date. If you have any questions or wish to cancel this payment, you will need to contact the agency you paid at your earliest convenience.

Application Name: BOEM Development/DOCD Plan - BD
Pay.gov Tracking ID: 27D4CP52
Agency Tracking ID: 76676603164

Account Holder Name: LLOG Exploration Offshore, LLC
Transaction Type: ACH Debit
Transaction Amount: $5,017.00
Payment Date: 03/29/2024

Account Type: Business Checking
Routing Number: 065403626
Account Number: **********8323

Transaction Date: 03/28/2024 03:17:26 PM EDT
Total Payments Scheduled: 1
Frequency: OneTime

Region: Gulf of Mexico
Contact: John Richard (985) 801-4300
Company Name/No: LLOG Exploration Offshore, L.L.C., 02058
Lease Number(s): 33335, 33341, 33918, 19619, 33336
Area-Block: Keathley Canyon KC, 642: Keathley Canyon KC, 686: Keathley Canyon KC, 687: Keathley Canyon KC, 689: Keathley Canyon KC, 643
Type-Wells: Supplemental Plan, 1

THIS IS AN AUTOMATED MESSAGE. PLEASE DO NOT REPLY.

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/BSEE permit applications and general permits issued by the EPA and COE)

Application/Permit	Issuing Agency	Status
Navaids	USCG	Pending
APD	BSEE	To be Filed
APM	BSEE	As Needed

B. Drilling Fluids

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

C. Production

LLOG estimates the life of reserves for the proposed development activity to be as follows:

KC642/686 - Leon

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

KC736 Castile

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

D. New Or Unusual Technology

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

E. Bonding Statement

The bond requirements for the activities and facilities proposed in this Initial Development Operations Coordination Document 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. 2008-N07 "Supplemental Bond Procedures."

F. 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 Revised Development Operations Coordination Document according to 30 CFR Part 553, and NTL No. 2008-N05 "Guidelines for Oil Spill Financial Responsibility (OSFR) for Covered Facilities."

G. 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.

H. Suspensions of Production

LLOG Exploration Offshore, L.L.C. filed a Suspension of Operations for the Keathley Canyon Block 686 Unit which was approved for the period September 29, 2020, through November 30, 2021. The Suspension of Operations was approved by BSEE on November 13, 2020. The Keathley Canyon Block 686 Unit is now held by operations.

I. Blowout Scenario

The Blowout Scenario, including Site Specific Proposed Relief Well and Intervention Planning and Relief Well Response Time Estimate (Public Information) was filed as Attachment B-1 in the Initial DOCD Plan N-10177.

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

A. Geological Description

Included as ***Attachment C-1*** is the discussion of the geological objectives, including a brief description of the hydrocarbon trapping elements.

B. Structure Contour Maps

Included as ***Attachment C-2*** are current structure maps

C. Interpreted Seismic Lines

Included as ***Attachment C-3*** are seismic lines with depth scale within 500' of the surface locations for the subject wells.

D. Geological Structure Cross-Sections

Included as ***Attachment C-4*** are interpreted geological structure cross-sections.

E. Biostratigraphic / Lithostratigraphic Column

Included as ***Attachment C-5***

F. Shallow Hazards Reports

A Shallow Hazards and Archaeological Assessment for Block 736, Keathley Canyon Area was prepared by Geoscience Earth & Marine Services of Houston, Texas dated October 16, 2019, which was submitted to BOEM by separate letter dated October 17, 2019.

A shallow hazards survey was conducted over Keathley Canyon Blocks 642 and 686. The survey report was submitted by Repsol in relation to the Joint / Initial Exploration Plan (Control No. N-9559) approved on July 27, 2011.

G. Shallow Hazards Assessments

Attached Site Clearance Letters for the proposed E (KC 687 001 and KC 643 001) at Keathley Canyon Block 686 for the E location. The Site Clearance Letter was prepared by Ocean Geo Solutions in March, 2020 and is attached as Attachment C-6.

GEOLOGIC DESCRIPTION

Attachment C-1
(Proprietary Information)

STRUCTURE MAP

Attachment C-2
(Proprietary Information)

INTERPRETED SEISMIC LINES

Attachment C-3
(Proprietary Information)

GEOLOGIC STRUCTURE CROSS-SECTIONS

Attachment C-4
(Proprietary Information)

Biostratigraphic / Lithostratigraphic Column

Attachment C-5
(Proprietary Information)

SHALLOW HAZARDS ASSESSMENTS

Attachment C-6
(Public Information)

Well Clearance Letter for
LLOG Exploration Company

Project:
Proposed KC686-E (BHL in KC687) Location
Keathley Canyon Block KC686,
Offshore Gulf of Mexico

Description:
3D Geohazard Assessment

Project Number:
2020-241

Report Status:
Final

Ocean
Geo Solutions
8399 Westview Drive, Suite 200, Houston, 77055, USA
www.oceangeosolutions.com

Public Shallow Hazards Statement – Proposed KC686-E (BHL in KC687) Well Location

March 16, 2020

US Department of the Interior
Bureau of Ocean Energy Management
1201 Elmwood Park Blvd.
New Orleans, LA 70213-2394

Reference: Shallow Hazards Analysis
Keathley Canyon Block 686
(OCS-G 33341)

Ladies/Gentlemen:

LLOG Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed KC686-E (BHL in KC687) well location in Block 686, Keathley Canyon Area (OCS-G-33341). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.557 seconds two-way time (TWT), -9,303ft MD kb (-9,221ft TVDSS, 3,018ft TVDBML).

Seabed Hazards. The proposed location exhibits a smooth seabed.

There are no indications of seabed hydrocarbon fluid seeps within 2,000ft of the proposed well location.

No seabed infrastructure occurs within a 2,000ft radius. The existing well KC686-3 occurs ~3ft to the northwest, KC686-2 is located ~3,000ft to the SSE of the proposed well, the existing KC686-1 well occurs 11,175ft to the southwest, and the existing KC642-1 is located 4,971ft to the northwest.

Sub-Seabed Hazards. Identified amplitude anomalies indicative of shallow gas occur within the 2,000ft radius in Units D but are not connected to the proposed well location. The vertical borehole will not penetrate any identified risk of gas anomalies. The well-path will penetrate a fault within Unit C and three faults in Unit D. The faults may cause minor drilling fluid circulation and wellbore stability problems and if connected to the shallow section may also experience drilling losses if pressures over hydrostatic are exerted by the drilling fluid column.

A **Slight Shallow Water Flow Risk** is assigned to a sand-rich interval in Unit B and within Unit D. Additionally, two <40ft thick sand interbeds may cause minor wellbore stability and drilling fluid circulation problems.

Proposed KC686-E Well Location (With BHL in KC687)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					**UTM Zone 15 - CM 93° West**		
Latitude	**26°**	**19'**	**12.492"**	**North**	**Easting**	**1,757,050**	**US ft E**
Longitude	**92°**	**38'**	**37.729"**	**West**	**Northing**	**9,550,580**	**US ft N**
FEL Keathley Canyon 686			**1,190ft**		**US ft**	**Inline**	**15200**
FNL Keathley Canyon 686			**940ft**		**US ft**	**Crossline**	**3589**
Water Depth: -6,285ft KB.			**Slope: <1.0° SW**				
Nearest Shoreline			188 Nautical Miles @ 30.18°				
Port of Operation			Fourchon 212 Nautical Miles @ 37.15°				
Nearest Manned Platform			A Lucius TLP in KC875		39.63 Miles @ 18.76°		

Conclusions and Recommendations. No problems are anticipated at the seabed. No existing seabed infrastructure occurs within 2,000ft of the proposed well.

No risk of gas is interpreted.

A **Slight Shallow Water Flow Risk** is assigned to a sand-rich interval in Unit B and D.

The faults may cause minor drilling fluid circulation and wellbore stability problems.

Sincerely,

LLOG Exploration Company

APPENDIX B – Sensitive Sessile Benthic Community Statement

Sensitive Sessile Benthic Communities Statement – Proposed KC686-E (BHLKC687) Well Location

LLOG Exploration Company

March 16, 2020

US Department of the Interior
Bureau of Ocean Energy Management
1201 Elmwood Park Blvd.
New Orleans, LA 70213

Reference: Sensitive Sessile Benthic Community Summary
Proposed KC686-E (BHLKC687) Well Location in Keathley Canyon KC686 (OCS-G 33341)

Ladies/Gentlemen:
LLOG Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed KC686-E (BHLKC687) well location in Block 686, Keathley Canyon Area (OCS-G-33341). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

This sensitive sessile benthic community summary letter is issued as a supplement to the Well Clearance Letter for this proposed well. A Biological, Physical and Socio-economic Map is included illustrating the areas of potential seabed impact.

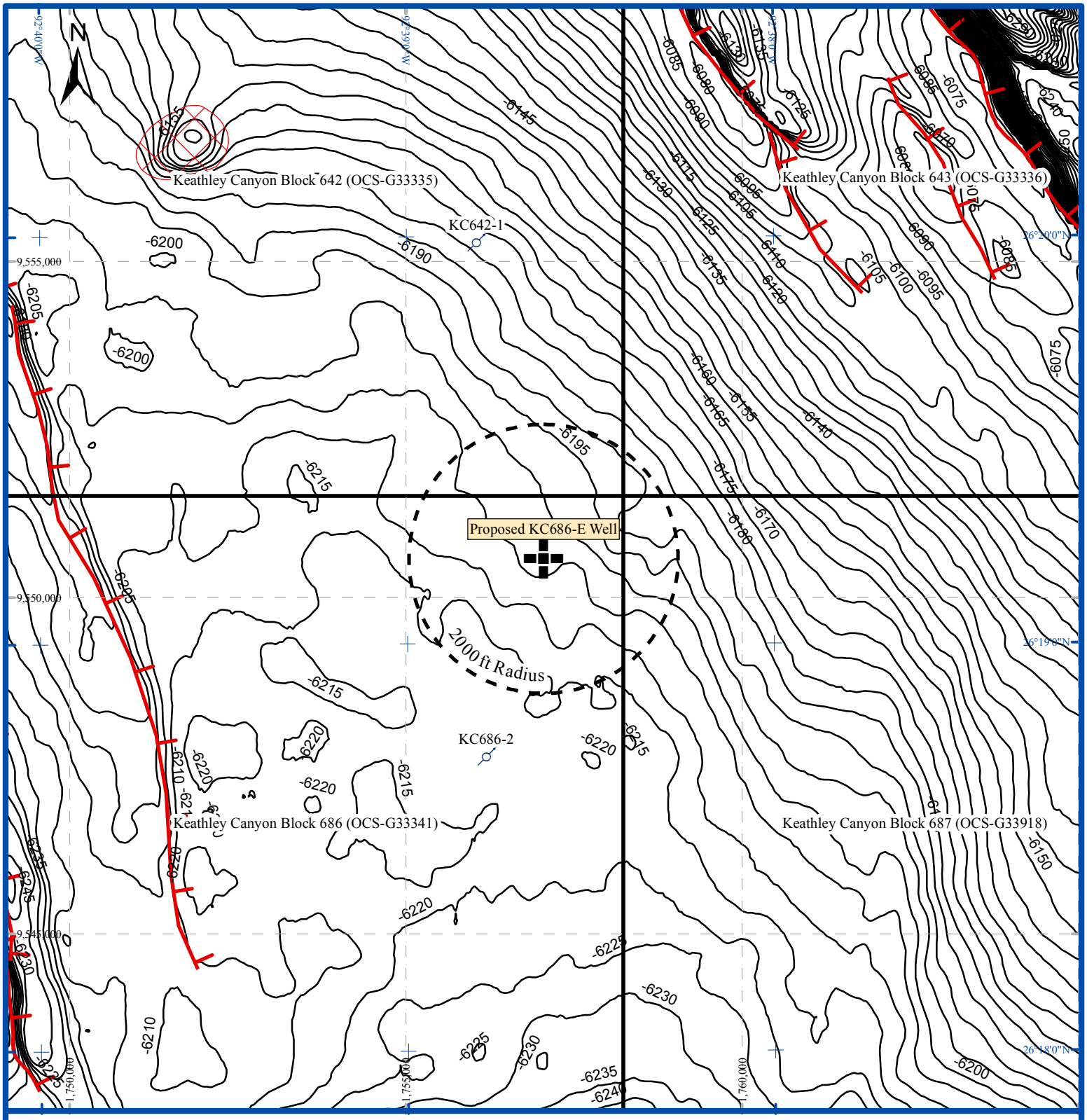
Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are *not* located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest potential sensitive sessile benthic community site is located 7,546ft to the northwest of the proposed well.

Proposed KC686-E Well Location (With BHL in KC687)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					**UTM Zone 15 - CM 93° West**		
Latitude	**26°**	**19'**	**12.492"**	**North**	**Easting**	**1,757,050**	**US ft E**
Longitude	**92°**	**38'**	**37.729"**	**West**	**Northing**	**9,550,580**	**US ft N**
FEL Keathley Canyon 686			**1,190ft**		**US ft**	**Inline**	**15200**
FNL Keathley Canyon 686			**940ft**		**US ft**	**Crossline**	**3589**
Water Depth: -6,285ft KB.			**Slope: <1.0° SW**				
Nearest Shoreline			188 Nautical Miles @ 30.18°				
Port of Operation			Fourchon 212 Nautical Miles @ 37.15°				
Nearest Manned Platform			A Lucius TLP in KC875		39.63 Miles @ 18.76°		

There are no areas with the potential to host a Sensitive Sessile Benthic Community within 2,000ft of the proposed location.

Conclusions and Recommendations: The proposed KC686-E (BHL in KC687) Well Location in KC686 will not impact any sites favorable for the development of sensitive sessile benthic communities.

Sincerely,
LLOG Exploration Company



Proposed KC686-E Well Location
(1,757,050ft E / 9,550,580ft N)

Existing Well

Block boundary

-6203 Depth in feet below sea surface to seabed, contoured at 5ft intervals

Seabed fault intersection, tick denotes downthrown block

Seabed mound of unknown origin - possibly favorable for sensitive sessile benthic community development

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Socio-Economic Plat

N

Keathley Canyon Block 642 (OCS-G33335)

Keathley Canyon Block 643 (OCS-G33336)

Keathley Canyon Block 686 (OCS-G33341)

Keathley Canyon Block 687 (OCS-G33918)

KC642-1

KC686-2

KC686-1

Proposed KC686-E Well

2,000ft Radius

9,565,000
9,560,000
9,555,000
9,550,000
9,545,000
9,540,000
9,535,000

1,740,000
1,745,000
1,750,000
1,755,000
1,760,000
1,765,000
1,770,000

26°21'0"N
26°19'0"N
26°18'0"N
26°17'0"N

LEGEND

- Proposed KC686-E Well Location (1,757,050ft E / 9,550,580ft N)
- Existing Well
- Inline
- Crossline
- Block boundaries
- Study area boundary
- -6,200 Depth in feet below sea surface to seabed, contoured at 20ft intervals
- Seabed mound of unknown origin - possibly favorable for sensitive sessile benthic community development
- Seabed fault intersection, tick denotes downthrown block

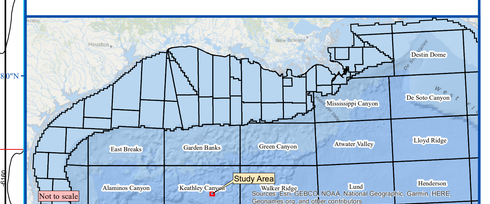
Notes

Depth converted using the Advocate and Hood polynomial
Seabed Depth (ft) = $0.1105 - 5066.9193A + 468.6693A^2 - 554.7107A^3 + 340.7019A^4 - 116.991A^5 + 20.728A^6 - 1.4658A^7$
Where A = One Way Time in seconds to seabed

Chart Scale 1" = 1,000'

0 1,000 2,000 4,000 6,000 Feet

0 250 500 1,000 1,500 Meters



GEODETIC INFORMATION

Datum Parameters		Map Projection Parameters	
Datum Name	NAD27	Projection Method	Mercator
Ellipsoid	NAD27	False Northing	0
Semi-major Axis	#	False Easting	0
Inverse Flattening	#	Latitude of Origin	0 North
		Central Meridian	30 East
		Standard Parallel	15 North
		Scale Factor	1

Ocean Geo Solutions

LLDG exploration

3D GEOHAZARD ASSESSMENT
GULF OF MEXICO
KEATHLEY CANYON
BLOCKS 642, 643, 686, and 687
PROPOSED 686-E WELL LOCATION

BIOLOGICAL, PHYSICAL & SOCIO-ECONOMIC

Prepared by: Ocean Geo Solutions Inc. 8399 Westview Drive, Houston, Texas, 77055. Suite 200 Telephone: 713.481.4630

REV	DATE	REMARKS	AUTHOR	DRAWN	CHECKED
0	February 25, 2020	Draft	LF	KB	ARH
1	March 9, 2020	2nd Draft	LF	KB	ARH
2	March 16, 2020	Final	LF	KB	ARH
SURVEY DATE	N/A	REPORT REF	2020-241	REFF NO	2020-241.01

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 development operations provided under this plan.

B. Classification

In accordance with Title 30 CFR 250.490 (c), the areas of operations have been classified by the Bureau of Ocean Energy Management as "H_2S" absent.

C. H_2S Contingency Plan

Not applicable to proposed operations.

D. Modeling Report

Not applicable to proposed operations.

APPENDIX E
MINERAL RESOURCE CONSERVATION INFORMATION
(30 CFR PART 550.246)

A. Technology and Reservoir Engineering Practices and Procedures:

Provide a brief description of the technology and reservoir engineering practices and procedures you will use to increase the ultimate recovery of oil and gas (e.g., secondary tertiary, or other enhanced recovery practices). If enhanced recovery practices are not going to be used initially, provide an explanation of the methods you considered and the reasons why you are not using them.

The Leon field development is expected to require three wells initially. Additional wells will be dependent on exploration results in untested fault blocks. Three fault blocks were identified and confirmed during the exploration and appraisal well activities. Untested downthrown fourth fault block is on the East side of the Leon Structure. The initial development consists of two producer wells. First development well is targeted for the Sector 1 Fault Block which has been tested and evaluated by the KC 642 #1BP2 discovery well. The drilling operation of the first development well, KC 642#2 is ongoing. Sector 1 has the largest recoverable resources as well as provides the highest expected initial rates of the development wells. The second development well, either KC 643 #1 or KC 687 #1 will target the untested drownthrown fault block of the structure. If the well does not find commercial hydrocarbons in the untested fault block, the KC 686 #4 well will be drilled as the 2nd producer in the field. .The KC 686 #3 well is temporarily abandoned and will be completed after first production as throughput capacity becomes available on the Salamanca host facility in KC 689.

B. Technology and Recovery Practices and Procedures. Provide a brief description of the technology and recovery practices and procedures you may use to ensure optimum recovery of oil and gas.

The Leon development and completion basis of design includes commingling the Upper and Lower Wilcox reservoirs. Commingling the Upper and Lower Wilcox sands accelerates production, significantly increases reserves and reduces the potential of uneconomic initial production rates. In general, the Upper Wilcox reservoir is subdivided into 5 reservoirs, the Upper Wilcox 1-5.

The analogs for the development wells are KC 642#1BP2, KC 686#3 and KC 686#2 BP4. These wells show significant hydrocarbon pays in both Upper and Wilcox which would be good candidate for commingle productions.

C Reservoir Development – Provide a brief description of your exploratory well results, other relevant data, proposed well spacing, completion methods, and other relevant well plan information.

Leon is a LLOG-operated field located in the southeastern part of the Keathley Canyon (KC) area, offshore Gulf of Mexico, approximately 290 miles southwest of New Orleans, LA, in water depths ranging from 6,100 to 6,300 feet. The field is located 34 miles northwest of the LLOG operated Buckskin field which produces to the Occidental operated Lucius Spar. The main development objectives at Leon are the Upper Wilcox and Lower Wilcox Formations (Eocene-Paleocene in age). The Leon Unit is comprised of the following Outer Continental Shelf Gulf (OCS-G) Blocks in KC: 686, W/2 of 687, 642, and W/2 of 643. The Leon reservoirs contain high-pressure, under-saturated crude oil (approximately 30° API), low acid, low metals, and non-naphthenic.

The Leon Field consists of a large four-way salt-cored anticline that sits below and near the outer edge of the allochthonous salt canopy. The Leon #1 discovery well (KC 642 #1BP2) was drilled by Repsol in 2014. The well required multiple bypasses after encountering a fractured and faulted marl zone near the top of the Upper Wilcox filled with active tar. The presence of tar in the objective section eliminated the ability to run multiple wireline logs and collect fluid samples. The well was

drilled to a total depth (TD) of 30,290 ft true vertical depth subsea (TVDss) after encountering hydrocarbon-bearing sands in both the Upper and Lower Wilcox formations.

Formation pressures captured on LWD indicated good vertical connectivity within the separate Upper and Lower Wilcox formations.

The Leon #2 well (KC 686 #2BP4) was drilled by Repsol in 2016 to a total depth of 31,200 ft MD (30,378 ft TVDSS) to appraise the oil bearing Upper and Lower Wilcox standstones discovered by KC 642 #1BP2.

The Leon #3 Well (KC 686 #3) was drilled by LLOG in 2019 to delineate the crest of the structure and test the reservoir continuity between the previously drilled wells.

The well found hydrocarbon sands in both the Upper and Lower Wilcox formations but the formation pressures confirmed Leon #3 is not hydraulically connected to either of the previously drilled Leon wells. To better assess the reservoir quality, validate the petrophysical analysis, and assist with completion planning, 203 ft of conventional core was acquired in the Lower Wilcox. After the coring operation, the well was drilled to a TD of 30,200 ft MD (30,108 ft TVDss) and was evaluated with an extensive wireline logging program. KC 686 #3 was temporarily abandoned and is expected to be completed later.

Following tables shows the pay summary for the three exploration and appraisal wells.

The KC 686 #3 well logged oil pay as follows:

Reservoir	*Hydrocarbon*	*Net Pay, TVT*	*Porosity*	*Water Saturation*

The KC 686#2 BP4 well logged oil pay as follows:

Reservoir	*Hydrocarbon*	*Net Pay, TVT*	*Porosity*	*Water Saturation*

The KC 642#1 BP2 well logged oil pay as follows:

Reservoir	*Hydrocarbon*	*Net Pay, TVT*	*Porosity*	*Water Saturation*

Leon development will consist of one drill center. Three wells will flow through dual flowlines to the Salamanca facility located in KC 689. The development wells will be spaced approximately 2500 ft from each other to maximize drainage in the main fault block. An extensive wireline logging suite is expected to be run assuming good hole conditions to evaluate the reservoir quality and optimize the completion intervals. Leon completion design includes stacked frac pack system with downhole commingling of the Upper and Lower Wilcox reservoirs.

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

LEON

Origination Point	***Flow Rates***	***Shut In Time***
KC 642 #2 Loc "E"		< 20 Minutes
KC 686 #4 Loc "F"		< 20 Minutes
Or		
KC 643 #1 Loc "KC 643 001"		< 20 Minutes
Or		
KC 687 #1 Loc "KC 687 001"		< 20 Minutes
KC 686 #3 Loc "C"		< 20 Minutes

APPENDIX F
BIOLOGICAL, PHYSICAL AND SOCIOECONOMIC INFORMATION (30 CFR PART 550.216 AND 550.247)

A. High-Density Deepwater Benthic Communities Information:

Keathley Canyon Blocks 686, 689, and 736 are located in water depths of 984 feet (300 meters) or greater. At such depth high-density, deepwater benthic communities may sometimes be found. However, Keathley Canyon Blocks 686, 689, and 736 are approximately 22.5 miles, 24.8, and 32.1 miles, respectfully, from a known deepwater benthic community site (Keathley Canyon Block 333), listed in NTL 2009-G40. Additionally, a dynamically positioned semisubmersible or drillship 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 dynamically positioned semisubmersible or drillship, LLOG Offshore Exploration, L. L. C.'s proposed operations in Keathley Canyon Blocks 686, 689, and 736 are not likely to impact deepwater benthic communities.

B. Topographic Features Map

Keathley Canyon Block 686 is 105.3 miles from the closest designated Topographic Features Stipulation Blocks (Geyer Bank). Keathley Canyon Blocks 689 and 736 are 106.9 miles and 112.1 miles, respectively, from the next closest designated Topographic Features Stipulation Blocks (Elvers Bank). Therefore, no adverse impacts are expected. Additionally, a dynamically positioned semisubmersible or drillship is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed.

If such proposed bottom disturbing activities are within 500 feet of a "No Activity Zone", the BOEM is required to consult with the NMFS.

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.

D. Live Bottoms (Pinnacle Trend) Map

Certain leases are located in areas characterized by the existence of live bottoms. Live bottom (Pinnacle trend features) are small, isolated, low to moderate relief carbonate reefal features or outcrops of unknown origin or hard substrates exposed by erosion that provide surface area for the growth of sessile invertebrates and attract large numbers of

fish. Known features occur in an area of topographic relief in the northeaster portion of the western Gulf of Mexico. These leases contain a Live Bottom Stipulation to ensure that impacts from nearby oil and gas activities on these live bottom areas are mitigated to the greatest extent possible.

Keathley Canyon Blocks 686, 689, and 736 are 325.8 miles, 318.9 miles, and 314 miles, respectively, from the closest live bottom (pinnacle trend) area; therefore, no adverse impacts are expected. Additionally, a dynamically positioned semisubmersible or drillship is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed

E. Live Bottom (Low Relief) Map

Certain leases are located in areas characterized by the existence of live bottoms. Live bottom (Low Relief Features) are seagrass communities; those areas that contain biological assemblages consisting of sessile invertebrates living upon and attached to naturally occurring hard or rocky formations with rough, broken, or smooth topography; and areas where a hard substrate and vertical relief may favor the accumulation of turtles, fish or other fauna. These features occur in the Eastern Planning Area of the Gulf of Mexico.

Keathley Canyon Blocks 642/686/736/689 are not located within the vicinity of a proposed live bottom (low relief) area.

F. Potentially Sensitive Biological Features

Oil and gas operations and transportation activities in the vicinity of potentially sensitive biological features may cause deleterious impacts to the sessile and pelagic communities associated with those habits. Adverse impacts to the communities could be caused by mechanical damage from drilling rigs, platform, pipelines and anchor employment.

Keathley Canyon Blocks 642/686/736/689 are 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 Keathley Canyon Blocks 642, 686, 736 and 689 are 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 Keathley Canyon Blocks 642, 686, 736 and 689 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.

I. Archaeological Report

Keathley Canyon Block 736/686/642/689 are not 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). Pursuant to the public information in the NOAA Automated Wreck and Obstruction Information System and Navigational Charts (NOAA, 2019); no shipwrecks are reported within KC 686/736/689/642.

J. Air and Water Quality Information

Not applicable. The State of Florida is not an affected State.

K. Socioeconomic Information

Not applicable. The State of Florida is not an affected State.

List of the NOAA Species Known in the Gulf of Mexico

Attachment F-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 G
WASTE AND DISCHARGE INFORMATION
(30 CFR PART 550.217 AND 550.248)

A. Projected Generated Waste

- See Attached Waste Tables

B. Projected Ocean Discharges

- See Attached Discharge Tables

C Modeling Report

Not applicable. Discharges will be performed under EPA NPDES General Permit GMG 290000.

D. NPDES Permits

Not applicable. Discharges will be performed under EPA NPDES General Permit GMG290000.

E. Cooling Water Intakes

The information at 250.217(e) and 250.248(e) regarding cooling water intakes is not required to accompany DOCD's submitted in the BOEM.

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

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	184,102 bbls/well	17,882 bbls/day/well	Discharge overboard	No
Cuttings wetted with water-based fluid	Cuttings generated while using water based drilling fluid.	10,559 bbls/well	1,026 bbls/day/well	Discharge overboard	No
Cuttings wetted with synthetic-based fluid	Cuttings generated while using synthetic based drilling fluid.	8,134 bbls/well	292 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	24,479 bbls/well	3.9 bbls/hr/well	Discharge overboard (no free oil)	No
Sanitary waste	Processed sanitary waste from living quarters	16,319 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 H
AIR EMISSIONS INFORMATION
(30 CFR PART 550.218AND 550.249)

The primary air pollutants associated with OCS development activities are:

- Carbon Monoxide
- Particulate Matter
- Sulphur Oxides
- Nitrogen Oxides
- Volatile Organic Compounds

These offshore air emissions result mainly from the drilling rig operations, helicopters, and support vessels. These emissions occur mainly from combustion or burning of fuels and natural gas and from venting or evaporation of hydrocarbons. The combustion of fuels occurs primarily on diesel powered generators, pumps or motors and from lighter fuel motors. Other air emissions can result from catastrophic events such as oil spills and blowouts.

A. Emission Worksheets and Screening Questions

The Projected Air Quality Emissions Report (Form MMS-139) addresses the related support vessels and construction barge information.

B. Emissions Reduction Measures

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

C. Verification of Non-default Emissions Factors

LLOG has elected to use the default emission factors as provided in ***Attachment H-1.***

D. Non-Exempt Activities

The proposed activities are within the exemption amount.

E. Modeling Report

Not applicable. The State of Florida is not an affected State for the proposed activities in this plan.

Air Quality Emissions Report

Attachment H-1
(Public Information)

Attachment H-1

Air Emissions Information
(§§ 550.218 and 550.249)

Screening Questions for DOCD's	Yes	No
Is any calculated Complex Total (CT) Emission amount (tons) associated with your proposed development and production activities more than 90% of the amounts calculated using the following formulas: CT = 3400D2/3 for CO, and CT = 33.3D for the other air pollutants (where D = distance to shore in miles)?		X
Do your emission calculations include any emission reduction measures or modified emission factors?		X
Does or will the facility complex associated with your proposed development and production activities process production from eight or more wells?		X
Do you expect to encounter H2S at concentrations greater than 20 parts per million (ppm)?		X
Do you propose to flare or vent natural gas in excess of the criteria set forth under 30 CFR 250.1105(a)(2) and (3)?		X
Do you propose to burn produced hydrocarbon liquids?		X
Are your proposed development and production activities located within 25 miles (40 kilometers) from shore?		X
Are your proposed development and production activities located within 124 miles (200 kilometers) of the Breton Wilderness Area?		X

AIR EMISSIONS CALCULATIONS

COMPANY	LLOG Exploration Offshore, L. L. C.
AREA	Keathley Canyon
BLOCK	689
LEASE	G19619
FACILITY	A
WELL	KC 736 #1, KC 736 #2, KC 642 #2, KC 686 #3, KC 686 #4, KC 643 #1, KC 687 #1
COMPANY CONTACT	Kim DeSopo
TELEPHONE NO.	985-801-4300
REMARKS	Calcuated with BOEM default drillship horsepower. Calculated STORAGE TANK emissions based on VOC vent gas emissions routed to vapor recovery unit (VRU) with estimated maximum downtime of 5%. Calculated GLYCOL DEHYDRATOR emissions based on VOC vent gas emissions routed to vapor recovery unit (VRU) with estimated maximum downtime of 5%. Default drillship HP used.

LEASE TERM PIPELINE CONSTRUCTION INFORMATION:

YEAR	NUMBER OF PIPELINES	TOTAL NUMBER OF CONSTRUCTION DAYS
2023	0	0
2024	10	150
2025	15	162
2026-2034	15	150

Yes	No	Air Quality Screening Questions
	X	Is any calculated Complex Total (CT) Emission amount (tons) associated with your proposed development and production activities more than 90% of the amounts calculated using the following formulas: CT = $3400D^{2/3}$ for CO, and CT = 33.3D for the other air pollutants (where D = distance to shore in miles)?
X		Do your emission calculations include any emission reduction measures or modified emission factors?
X		Does or will the facility complex associated with your proposed development and production activities process production from eight or more wells?
	X	Do you expect to encounter H2S at concentrations greater than 20 parts per million (ppm)?
	X	Do you propose to flare or vent natural gas in excess of the criteria set forth under 250.1105(a)(2) and (3)?
	X	Do you propose to burn produced hydrocarbon liquids?
	X	Are your proposed development and production activities located within 25 miles from shore?
	X	Are our proposed development and production activities located within 200 kilometers of the Breton Wilderness Area?

Air emission calculations prepared by Brian E. Boyer, BTGap, LLC. (337.356.9856; brianeboyer@gmail.com)

AIR EMISSIONS CALCULATIONS

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
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	
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
Combustion Flare (no smoke)	lbs/MMscf	0.00	0.00	0.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	
Combustion Flare (light smoke)	lbs/MMscf	2.10	2.10	2.10	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_02-05-18.pdf
Combustion Flare (medium smoke)	lbs/MMscf	10.50	10.50	10.50	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	
Combustion Flare (heavy smoke)	lbs/MMscf	21.00	21.00	21.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	
Liquid Flaring	lbs/bbl	0.42	0.0966	0.0651	5.964	0.84	0.01428	5.14E-05	0.21	0.0336	AP42 1.3-1 through 1.3-3 and 1.3-5	5/10	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s03.pdf
Storage Tank	tons/yr/tank						4.300				2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017	https://www.boem.gov/environment/environmental-studies/2014-gulfwide-emission-inventory
Fugitives	lbs/hr/component						0.0005				API Study	12/93	https://www.apiwebstore.org/publications/item.cgi?9879d38a-8bc0-4abe-bb5c-9b623870125d
Glycol Dehydrator	tons/yr/dehydrator						19.240				2011 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2014	https://www.boem.gov/environment/environmental-studies/2011-gulfwide-emission-inventory
Cold Vent	tons/yr/vent						44.747				2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017	https://www.boem.gov/environment/environmental-studies/2014-gulfwide-emission-inventory
Waste Incinerator	lb/ton		15.0	15.0	2.5	2.0	N/A	N/A	20.0	N/A	AP 42 2.1-12	10/96	https://www3.epa.gov/ttnchie1/ap42/ch02/final/c02s01.pdf
On-Ice – Loader	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Other Construction Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Other Survey Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	https://www.epa.gov/moves/nonroad2008a-installation-and-updates
On-Ice – Tractor	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Truck (for gravel island)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
On-Ice – Truck (for surveys)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	
Man Camp - Operation (max people/day)	tons/person/day		0.0004	0.0004	0.0004	0.006	0.001	N/A	0.001	N/A	BOEM 2014-1001	2014	https://www.boem.gov/sites/default/files/uploadedFiles/BOEM/BOEM_Newsroom/Library/Publications/2014-1001.pdf
Vessels - Ice Management Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data
Vessels - Hovercraft Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	

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

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

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

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

AIR EMISSIONS CALCULATIONS

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL		CONTACT	PHONE	REMARKS
LLOG Exploration Offshore, L. L. C.	Keathley Canyon		689	G19619	A	KC 736 #1, KC 736 #2, KC 642 #2, KC 686 #3, KC 686 #4, KC 643 #1, KC 687 #1		Kim DeSopo	985-801-4300	Calcuated with BOEM default drillship horsepower. Calculated STORAGE TANK emissions based on VOC vent gas emissions routed to vapor recovery unit (VRU) with estimated maximum downtime of 5%. Calculated GLYCOL DEHYDRATOR emissions based on VOC

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	Drillship	61800	3179.3628	76304.71	24	365	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	190.96	115.21	111.76	2.78	4575.29	131.55	0.01	717.62	1.34
PIPELINE	VESSELS - Pipeline Laying Vessel - Diesel		12000	617.352	14816.45	24	60	8.47	5.11	4.95	0.12	202.83	5.83	0.00	31.81	0.06	6.10	3.68	3.57	0.09	146.04	4.20	0.00	22.91	0.04
INSTALLATION	VESSELS - Support - Diesel	ROV Vessel	8000	411.568	9877.63	24	125	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	8.47	5.11	4.95	0.12	202.83	5.83	0.00	31.81	0.06
	VESSELS - Pipeline Laying Vessel - Diesel		12000	617.352	14816.45	24	45	8.47	5.11	4.95	0.12	202.83	5.83	0.00	31.81	0.06	4.57	2.76	2.68	0.07	109.53	3.15	0.00	17.18	0.03
	VESSELS - ROV Vessel - Diesel	ROV Vessel	8000	411.568	9877.63	24	10	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	0.68	0.41	0.40	0.01	16.23	0.47	0.00	2.55	0.00
	VESSELS - Pipeline Laying Vessel - Diesel		12000	617.352	14816.45	24	45	8.47	5.11	4.95	0.12	202.83	5.83	0.00	31.81	0.06	4.57	2.76	2.68	0.07	109.53	3.15	0.00	17.18	0.03
	VESSELS - ROV Vessel - Diesel	ROV Vessel	8000	411.568	9877.63	24	10	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	0.68	0.41	0.40	0.01	16.23	0.47	0.00	2.55	0.00
FACILITY	Structure Towing Tug		16500	848.859	20372.62	24	15	11.64	7.02	6.81	0.17	278.89	8.02	0.00	43.74	0.08	2.10	1.26	1.23	0.03	50.20	1.44	0.00	7.87	0.01
INSTALLATION	Structure Towing Tug		14500	745.967	17903.21	24	15	10.23	6.17	5.99	0.15	245.09	7.05	0.00	38.44	0.07	1.84	1.11	1.08	0.03	44.12	1.27	0.00	6.92	0.01
	Structure Towing Tug		14500	745.967	17903.21	24	15	10.23	6.17	5.99	0.15	245.09	7.05	0.00	38.44	0.07	1.84	1.11	1.08	0.03	44.12	1.27	0.00	6.92	0.01
	Structure Support Vessel	Support//ROV Vessel	15200	781.9792	18767.50	24	30	10.72	6.47	6.28	0.16	256.92	7.39	0.00	40.30	0.07	3.86	2.33	2.26	0.06	92.49	2.66	0.00	14.51	0.03
	Structure Support Vessel	Support//ROV Vessel	10300	529.8938	12717.45	24	30	7.27	4.38	4.25	0.11	174.10	5.01	0.00	27.31	0.05	2.62	1.58	1.53	0.04	62.68	1.80	0.00	9.83	0.02
	Structure Support Vessel	Mooring /ROV Vessel	10300	529.8938	12717.45	24	30	7.27	4.38	4.25	0.11	174.10	5.01	0.00	27.31	0.05	2.62	1.58	1.53	0.04	62.68	1.80	0.00	9.83	0.02
PRODUCTION	RECIP.<600hp Diesel	Pedestal Crane 1	525	27.00915	648.22	0	0	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.<600hp Diesel	Pedestal Crane 2	525	27.00915	648.22	0	0	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.<600hp Diesel	Storm Generator	148	7.614008	182.74	0	0	0.33	0.33	0.33	0.01	4.60	0.34	--	0.99	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel	Firewater Pump 1	834	42.905964	1029.74	0	0	0.59	0.33	0.33	0.01	20.04	0.53	--	4.60	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel	Firewater Pump 2	834	42.905964	1029.74	0	0	0.59	0.33	0.33	0.01	20.04	0.53	--	4.60	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel	Auxiliary Generator	2442	125.63113	3015.15	0	0	1.72	0.98	0.96	0.03	58.68	1.56	--	13.46	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel	Emergency Generator	1333	68.577518	1645.86	0	0	0.94	0.53	0.52	0.02	32.03	0.85	--	7.35	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	Natural Gas Turbine - Taurus70	CZZ-2500	10970	104476.19	2507428.57	0	0	--	0.21	0.21	0.06	35.10	0.23	--	9.00	--	--	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	Natural Gas Turbine - Solar Mars 100	ZAN-9000	18774	178800	4291200.00	0	0	--	0.36	0.36	0.11	60.08	0.39	--	15.39	--	--	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	Natural Gas Turbine - Solar Mars 100	ZAN-9100	18774	178800	4291200.00	0	0	--	0.36	0.36	0.11	60.08	0.39	--	15.39	--	--	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	Natural Gas Turbine - Solar Mars 100	ZAN-9200	18774	178800	4291200.00	0	0	--	0.36	0.36	0.11	60.08	0.39	--	15.39	--	--	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	MISC.		BPD	SCF/HR	COUNT																				
	STORAGE TANK				0	0	0.0	--	--	--	--	--	#DIV/0!	--	--	--	--	--	--	--	--	0.00	--	--	--
	COMBUSTION FLARE - no smoke	LP Flare		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	--
	COMBUSTION FLARE - no smoke	HP Flare		0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	FUGITIVES				0	0	0	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	GLYCOL DEHYDRATOR	MAF-3110			0	0	0.0	--	--	--	--	--	#DIV/0!	--	--	--	--	--	--	--	--	0.00	--	--	--
DRILLING	Liquid Flaring							0.00	0.00	0.00	0.00	0.00	0.00	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			162500		24	28	0.00	0.00	0.00	0.09	11.60	5.84	--	52.89	--	0.00	0.00	0.00	0.03	3.90	1.96	--	17.77	--
2024	Facility Total Emissions							149.76	92.55	89.91	2.70	3,827.91	#DIV/0!	0.01	684.52	1.00	230.89	139.30	135.12	3.39	######	161.02	0.02	885.45	1.61
EXEMPTION CALCULATION	DISTANCE FROM LAND IN MILES																######			######	######	######		########	
	215.0																								
DRILLING	VESSELS- Crew Diesel	Crew Boat	7644	393.25322	9438.08	8	37	5.39	3.25	3.16	0.08	129.20	3.71	0.00	20.27	0.04	0.80	0.48	0.47	0.01	19.12	0.55	0.00	3.00	0.01
	VESSELS - Supply Diesel	Supply Boat	7400	380.7004	9136.81	8	37	5.22	3.15	3.06	0.08	125.08	3.60	0.00	19.62	0.04	0.77	0.47	0.45	0.01	18.51	0.53	0.00	2.90	0.01
	VESSELS - Supply Diesel	Supply Boat	7400	380.7004	9136.81	8	37	5.22	3.15	3.06	0.08	125.08	3.60	0.00	19.62	0.04	0.77	0.47	0.45	0.01	18.51	0.53	0.00	2.90	0.01
PIPELINE	VESSELS - Support Diesel, Laying		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 - Support Diesel, Burying		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
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	Fast Rescue Boat	90	4.63014	111.12	0	0	0.06	0.04	0.04	0.00	1.52	0.04	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel	North Survival Craft	50	2.5723	61.74	0	0	0.04	0.02	0.02	0.00	0.85	0.02	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel	South Survival Craft	50	2.5723	61.74	0	0	0.04	0.02	0.02	0.00	0.85	0.02	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel	West Survival Craft	50	2.5723	61.74	0	0	0.04	0.02	0.02	0.00	0.85	0.02	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel	Crew Boat	7644	393.25322	9438.08	0	0	5.39	3.25	3.16	0.08	129.20	3.71	0.00	20.27	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel	Supply Boat	7400	380.7004	9136.81	0	0	5.22	3.15	3.06	0.08	125.08	3.60	0.00	19.62	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel	Supply Boat	7400	380.7004	9136.81	0	0	5.22	3.15	3.06	0.08	125.08	3.60	0.00	19.62	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2024	Non-Facility Total Emissions							31.84	19.21	18.63	0.46	762.79	21.93	0.00	119.64	0.22	2.34	1.41	1.37	0.03	56.15	1.61	0.00	8.81	0.02

AIR EMISSIONS CALCULATIONS

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL		CONTACT	PHONE	REMARKS
LLOG Exploration Offshore, L. L. C.	Keathley Canyon		689	G19619	A	KC 736 #1, KC 736 #2, KC 642 #2, KC 686 #3, KC 686 #4, KC 643 #1, KC 687 #1		Kim DeSopo	985-801-4300	Calcuated with BOEM default drillship horsepower. Calculated STORAGE TANK emissions based on VOC vent gas emissions routed to vapor recovery unit (VRU) with estimated maximum downtime of 5%. Calculated GLYCOL DEHYDRATOR emissions based on VOC

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	Drillship	61800	3179.3628	76304.71	24	355	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	185.73	112.06	108.69	2.70	4449.94	127.94	0.01	697.96	1.30
PIPELINE INSTALLATION	VESSELS - Pipeline Laying Vessel - Diesel		12000	617.352	14816.45	24	72	8.47	5.11	4.95	0.12	202.83	5.83	0.00	31.81	0.06	7.31	4.41	4.28	0.11	175.25	5.04	0.00	27.49	0.05
	VESSELS - Support - Diesel	ROV Vessel	8000	411.568	9877.63	24	112	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	7.59	4.58	4.44	0.11	181.74	5.23	0.00	28.51	0.05
	VESSELS - Pipeline Laying Vessel - Diesel		12000	617.352	14816.45	24	57	8.47	5.11	4.95	0.12	202.83	5.83	0.00	31.81	0.06	5.79	3.49	3.39	0.08	138.74	3.99	0.00	21.76	0.04
	VESSELS - ROV Vessel - Diesel	ROV Vessel	8000	411.568	9877.63	24	22	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	1.49	0.90	0.87	0.02	35.70	1.03	0.00	5.60	0.01
	VESSELS - Pipeline Laying Vessel - Diesel		12000	617.352	14816.45	24	57	8.47	5.11	4.95	0.12	202.83	5.83	0.00	31.81	0.06	5.79	3.49	3.39	0.08	138.74	3.99	0.00	21.76	0.04
	VESSELS - ROV Vessel - Diesel	ROV Vessel	8000	411.568	9877.63	24	22	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	1.49	0.90	0.87	0.02	35.70	1.03	0.00	5.60	0.01
FACILITY INSTALLATION	Structure Towing Tug		16500	848.859	20372.62	24	15	11.64	7.02	6.81	0.17	278.89	8.02	0.00	43.74	0.08	2.10	1.26	1.23	0.03	50.20	1.44	0.00	7.87	0.01
	Structure Towing Tug		14500	745.967	17903.21	24	15	10.23	6.17	5.99	0.15	245.09	7.05	0.00	38.44	0.07	1.84	1.11	1.08	0.03	44.12	1.27	0.00	6.92	0.01
	Structure Towing Tug		14500	745.967	17903.21	24	15	10.23	6.17	5.99	0.15	245.09	7.05	0.00	38.44	0.07	1.84	1.11	1.08	0.03	44.12	1.27	0.00	6.92	0.01
	Structure Support Vessel	Support//ROV Vessel	15200	781.9792	18767.50	24	30	10.72	6.47	6.28	0.16	256.92	7.39	0.00	40.30	0.07	3.86	2.33	2.26	0.06	92.49	2.66	0.00	14.51	0.03
	Structure Support Vessel	Support//ROV Vessel	10300	529.8938	12717.45	24	30	7.27	4.38	4.25	0.11	174.10	5.01	0.00	27.31	0.05	2.62	1.58	1.53	0.04	62.68	1.80	0.00	9.83	0.02
	Structure Support Vessel	Mooring /ROV Vessel	10300	529.8938	12717.45	24	10	7.27	4.38	4.25	0.11	174.10	5.01	0.00	27.31	0.05	0.87	0.53	0.51	0.01	20.89	0.60	0.00	3.28	0.01
PRODUCTION	RECIP.<600hp Diesel	Pedestal Crane 1	525	27.00915	648.22	8	184	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	0.85	0.85	0.85	0.02	12.01	0.89	--	2.58	--
	RECIP.<600hp Diesel	Pedestal Crane 2	525	27.00915	648.22	8	184	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	0.85	0.85	0.85	0.02	12.01	0.89	--	2.58	--
	RECIP.<600hp Diesel	Storm Generator	148	7.614008	182.74	1	83	0.33	0.33	0.33	0.01	4.60	0.34	--	0.99	--	0.01	0.01	0.01	0.00	0.19	0.01	--	0.04	--
	RECIP.>600hp Diesel	Firewater Pump 1	834	42.905964	1029.74	1	184	0.59	0.33	0.33	0.01	20.04	0.53	--	4.60	--	0.05	0.03	0.03	0.00	1.84	0.05	--	0.42	--
	RECIP.>600hp Diesel	Firewater Pump 2	834	42.905964	1029.74	1	184	0.59	0.33	0.33	0.01	20.04	0.53	--	4.60	--	0.05	0.03	0.03	0.00	1.84	0.05	--	0.42	--
	RECIP.>600hp Diesel	Auxiliary Generator	2442	125.63113	3015.15	1	23	1.72	0.98	0.96	0.03	58.68	1.56	--	13.46	--	0.02	0.01	0.01	0.00	0.69	0.02	--	0.16	--
	RECIP.>600hp Diesel	Emergency Generator	1333	68.577518	1645.86	1	83	0.94	0.53	0.52	0.02	32.03	0.85	--	7.35	--	0.04	0.02	0.02	0.00	1.32	0.04	--	0.30	--
	Natural Gas Turbine - Taurus70	CZZ-2500	10970	104476.19	2507428.57	24	184	--	0.21	0.21	0.06	35.10	0.23	--	9.00	--	--	0.46	0.46	0.14	77.51	0.51	--	19.86	--
	Natural Gas Turbine - Solar Mars 100	ZAN-9000	18774	178800	4291200.00	24	184	--	0.36	0.36	0.11	60.08	0.39	--	15.39	--	--	0.79	0.79	0.23	132.65	0.87	--	33.99	--
	Natural Gas Turbine - Solar Mars 100	ZAN-9100	18774	178800	4291200.00	24	184	--	0.36	0.36	0.11	60.08	0.39	--	15.39	--	--	0.79	0.79	0.23	132.65	0.87	--	33.99	--
	Natural Gas Turbine - Solar Mars 100	ZAN-9200	18774	178800	4291200.00	24	184	--	0.36	0.36	0.11	60.08	0.39	--	15.39	--	--	0.79	0.79	0.23	132.65	0.87	--	33.99	--
	MISC.		BPD	SCF/HR	COUNT																				
	STORAGE TANK				2	1.5	150	--	--	--	--	--	76.32	--	--	--	--	--	--	--	--	8.60	--	--	--
	COMBUSTION FLARE - no smoke	LP Flare		1875		24	184	0.00	0.00	0.00	0.00	0.13	0.07	--	0.61	--	0.00	0.00	0.00	0.00	0.30	0.15	--	1.35	--
	COMBUSTION FLARE - no smoke	HP Flare		1875		24	184	0.00	0.00	0.00	0.00	0.13	0.07	--	0.61	--	0.00	0.00	0.00	0.00	0.30	0.15	--	1.35	--
	FUGITIVES				11350	24	184	--	--	--	--	--	5.68	--	--	--	--	--	--	--	--	12.53	--	--	--
	GLYCOL DEHYDRATOR	MAF-3110			1	1.5	150	--	--	--	--	--	170.77	--	--	--	--	--	--	--	--	19.24	--	--	--
DRILLING	Liquid Flaring							0.00	0.00	0.00	0.00	0.00	0.00	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			162500		24	28	0.00	0.00	0.00	0.09	11.60	5.84	--	52.89	--	0.00	0.00	0.00	0.03	3.90	1.96	--	17.77	--
2025	**Facility Total Emissions**							**149.76**	**92.55**	**89.91**	**2.70**	**3,828.18**	**365.08**	**0.01**	**685.74**	**1.00**	**230.20**	**142.38**	**138.25**	**4.25**	**######**	**204.97**	**0.02**	**1,006.82**	**1.60**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																######			######	######	######		########	
	215.0																								
DRILLING	VESSELS - Support Diesel	Crew Boat	7644	393.25322	9438.08	8	24	5.39	3.25	3.16	0.08	129.20	3.71	0.00	20.27	0.04	0.52	0.31	0.30	0.01	12.40	0.36	0.00	1.95	0.00
	VESSELS - Support Diesel	Supply Boat	7400	380.7004	9136.81	8	24	5.22	3.15	3.06	0.08	125.08	3.60	0.00	19.62	0.04	0.50	0.30	0.29	0.01	12.01	0.35	0.00	1.88	0.00
	VESSELS - Support Diesel	Supply Boat	7400	380.7004	9136.81	8	24	5.22	3.15	3.06	0.08	125.08	3.60	0.00	19.62	0.04	0.50	0.30	0.29	0.01	12.01	0.35	0.00	1.88	0.00
PIPELINE INSTALLATION	VESSELS - Support Diesel, Laying		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 - Support Diesel, Burying		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
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	Fast Rescue Boat	90	4.63014	111.12	1	164	0.06	0.04	0.04	0.00	1.52	0.04	0.00	0.24	0.00	0.01	0.00	0.00	0.00	0.12	0.00	0.00	0.02	0.00
	VESSELS - Support Diesel	North Survival Craft	50	2.5723	61.74	1	365	0.04	0.02	0.02	0.00	0.85	0.02	0.00	0.13	0.00	0.01	0.00	0.00	0.00	0.15	0.00	0.00	0.02	0.00
	VESSELS - Support Diesel	South Survival Craft	50	2.5723	61.74	1	365	0.04	0.02	0.02	0.00	0.85	0.02	0.00	0.13	0.00	0.01	0.00	0.00	0.00	0.15	0.00	0.00	0.02	0.00
	VESSELS - Support Diesel	West Survival Craft	50	2.5723	61.74	1	365	0.04	0.02	0.02	0.00	0.85	0.02	0.00	0.13	0.00	0.01	0.00	0.00	0.00	0.15	0.00	0.00	0.02	0.00
	VESSELS - Support Diesel	Crew Boat	7644	393.25322	9438.08	8	24	5.39	3.25	3.16	0.08	129.20	3.71	0.00	20.27	0.04	0.52	0.31	0.30	0.01	12.40	0.36	0.00	1.95	0.00
	VESSELS - Support Diesel	Supply Boat	7400	380.7004	9136.81	8	24	5.22	3.15	3.06	0.08	125.08	3.60	0.00	19.62	0.04	0.50	0.30	0.29	0.01	12.01	0.35	0.00	1.88	0.00
	VESSELS - Support Diesel	Supply Boat	7400	380.7004	9136.81	8	24	5.22	3.15	3.06	0.08	125.08	3.60	0.00	19.62	0.04	0.50	0.30	0.29	0.01	12.01	0.35	0.00	1.88	0.00
2025	**Non-Facility Total Emissions**							**31.84**	**19.21**	**18.63**	**0.46**	**762.79**	**21.93**	**0.00**	**119.64**	**0.22**	**3.06**	**1.85**	**1.79**	**0.04**	**73.43**	**2.11**	**0.00**	**11.52**	**0.02**

AIR EMISSIONS CALCULATIONS

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL		CONTACT	PHONE	REMARKS
LLOG Exploration Offshore, L. L. C.	Keathley Canyon		689	G19619	A	KC 736 #1, KC 736 #2, KC 642 #2, KC 686 #3, KC 686 #4, KC 643 #1, KC 687 #1		Kim DeSopo	985-801-4300	Calcuated with BOEM default drillship horsepower. Calculated STORAGE TANK emissions based on VOC vent gas emissions routed to vapor recovery unit (VRU) with estimated maximum downtime of 5%. Calculated GLYCOL DEHYDRATOR emissions based on VOC

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	Drillship	61800	3179.3628	76304.71	24	345	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	180.50	108.90	105.63	2.63	4324.59	124.34	0.01	678.30	1.26
PIPELINE INSTALLATION	VESSELS - Pipeline Laying Vessel - Diesel		12000	617.352	14816.45	24	60	8.47	5.11	4.95	0.12	202.83	5.83	0.00	31.81	0.06	6.10	3.68	3.57	0.09	146.04	4.20	0.00	22.91	0.04
	VESSELS - Support - Diesel	ROV Vessel	8000	411.568	9877.63	24	100	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	6.77	4.09	3.96	0.10	162.27	4.67	0.00	25.45	0.05
	VESSELS - Pipeline Laying Vessel - Diesel		12000	617.352	14816.45	24	45	8.47	5.11	4.95	0.12	202.83	5.83	0.00	31.81	0.06	4.57	2.76	2.68	0.07	109.53	3.15	0.00	17.18	0.03
	VESSELS - ROV Vessel - Diesel	ROV Vessel	8000	411.568	9877.63	24	10	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	0.68	0.41	0.40	0.01	16.23	0.47	0.00	2.55	0.00
	VESSELS - Pipeline Laying Vessel - Diesel		12000	617.352	14816.45	24	45	8.47	5.11	4.95	0.12	202.83	5.83	0.00	31.81	0.06	4.57	2.76	2.68	0.07	109.53	3.15	0.00	17.18	0.03
	VESSELS - ROV Vessel - Diesel	ROV Vessel	8000	411.568	9877.63	24	10	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	0.68	0.41	0.40	0.01	16.23	0.47	0.00	2.55	0.00
FACILITY INSTALLATION	Structure Towing Tug		16500	848.859	20372.62	0	0	11.64	7.02	6.81	0.17	278.89	8.02	0.00	43.74	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Structure Towing Tug		14500	745.967	17903.21	0	0	10.23	6.17	5.99	0.15	245.09	7.05	0.00	38.44	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Structure Towing Tug		14500	745.967	17903.21	0	0	10.23	6.17	5.99	0.15	245.09	7.05	0.00	38.44	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Structure Support Vessel	Support//ROV Vessel	15200	781.9792	18767.50	0	0	10.72	6.47	6.28	0.16	256.92	7.39	0.00	40.30	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Structure Support Vessel	Support//ROV Vessel	10300	529.8938	12717.45	0	0	7.27	4.38	4.25	0.11	174.10	5.01	0.00	27.31	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Structure Support Vessel	Mooring /ROV Vessel	10300	529.8938	12717.45	0	0	7.27	4.38	4.25	0.11	174.10	5.01	0.00	27.31	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	RECIP.<600hp Diesel	Pedestal Crane 1	525	27.00915	648.22	4	365	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	0.84	0.84	0.84	0.02	11.91	0.88	--	2.56	--
	RECIP.<600hp Diesel	Pedestal Crane 2	525	27.00915	648.22	4	365	1.16	1.16	1.16	0.03	16.32	1.20	--	3.51	--	0.84	0.84	0.84	0.02	11.91	0.88	--	2.56	--
	RECIP.<600hp Diesel	Storm Generator	148	7.614008	182.74	1	164	0.33	0.33	0.33	0.01	4.60	0.34	--	0.99	--	0.03	0.03	0.03	0.00	0.38	0.03	--	0.08	--
	RECIP.>600hp Diesel	Firewater Pump 1	834	42.905964	1029.74	1	365	0.59	0.33	0.33	0.01	20.04	0.53	--	4.60	--	0.11	0.06	0.06	0.00	3.66	0.10	--	0.84	--
	RECIP.>600hp Diesel	Firewater Pump 2	834	42.905964	1029.74	1	365	0.59	0.33	0.33	0.01	20.04	0.53	--	4.60	--	0.11	0.06	0.06	0.00	3.66	0.10	--	0.84	--
	RECIP.>600hp Diesel	Auxiliary Generator	2442	125.63113	3015.15	1	52	1.72	0.98	0.96	0.03	58.68	1.56	--	13.46	--	0.04	0.03	0.02	0.00	1.53	0.04	--	0.35	--
	RECIP.>600hp Diesel	Emergency Generator	1333	68.577518	1645.86	1	164	0.94	0.53	0.52	0.02	32.03	0.85	--	7.35	--	0.08	0.04	0.04	0.00	2.63	0.07	--	0.60	--
	Natural Gas Turbine - Taurus70	CZZ-2500	10970	104476.19	2507428.57	24	365	--	0.21	0.21	0.06	35.10	0.23	--	9.00	--	--	0.91	0.91	0.27	153.76	1.01	--	39.40	--
	Natural Gas Turbine - Solar Mars 100	ZAN-9000	18774	178800	4291200.00	24	365	--	0.36	0.36	0.11	60.08	0.39	--	15.39	--	--	1.56	1.56	0.47	263.14	1.73	--	67.43	--
	Natural Gas Turbine - Solar Mars 100	ZAN-9100	18774	178800	4291200.00	24	365	--	0.36	0.36	0.11	60.08	0.39	--	15.39	--	--	1.56	1.56	0.47	263.14	1.73	--	67.43	--
	Natural Gas Turbine - Solar Mars 100	ZAN-9200	18774	178800	4291200.00	24	365	--	0.36	0.36	0.11	60.08	0.39	--	15.39	--	--	1.56	1.56	0.47	263.14	1.73	--	67.43	--
	MISC.		BPD	SCF/HR	COUNT																				
	STORAGE TANK				2	1.5	298	--	--	--	--	--	38.47	--	--	--	--	--	--	--	--	8.60	--	--	--
	COMBUSTION FLARE - no smoke	LP Flare		1875		24	365	0.00	0.00	0.00	0.00	0.13	0.07	--	0.61	--	0.00	0.00	0.00	0.00	0.59	0.30	--	2.67	--
	COMBUSTION FLARE - no smoke	HP Flare		1875		24	365	0.00	0.00	0.00	0.00	0.13	0.07	--	0.61	--	0.00	0.00	0.00	0.00	0.59	0.30	--	2.67	--
	FUGITIVES				11350	24	365	--	--	--	--	--	5.68	--	--	--	--	--	--	--	--	24.86	--	--	--
	GLYCOL DEHYDRATOR	MAF-3110			1	1.5	298	--	--	--	--	--	86.09	--	--	--	--	--	--	--	--	19.24	--	--	--
DRILLING	Liquid Flaring							0.00	0.00	0.00	0.00	0.00	0.00	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			162500		24	28	0.00	0.00	0.00	0.09	11.60	5.84	--	52.89	--	0.00	0.00	0.00	0.03	3.90	1.96	--	17.77	--
2026-2034	**Facility Total Emissions**							**149.76**	**92.55**	**89.91**	**2.70**	**3,828.18**	**242.55**	**0.01**	**685.74**	**1.00**	**205.92**	**130.50**	**126.81**	**4.73**	**######**	**203.96**	**0.01**	**1,038.74**	**1.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																######			######	######	######		########	
	215.0																								
DRILLING	VESSELS - Support Diesel	Crew Boat	7644	393.25322	9438.08	8	24	5.39	3.25	3.16	0.08	129.20	3.71	0.00	20.27	0.04	0.52	0.31	0.30	0.01	12.40	0.36	0.00	1.95	0.00
	VESSELS - Support Diesel	Supply Boat	7400	380.7004	9136.81	8	24	5.22	3.15	3.06	0.08	125.08	3.60	0.00	19.62	0.04	0.50	0.30	0.29	0.01	12.01	0.35	0.00	1.88	0.00
	VESSELS - Support Diesel	Supply Boat	7400	380.7004	9136.81	8	24	5.22	3.15	3.06	0.08	125.08	3.60	0.00	19.62	0.04	0.50	0.30	0.29	0.01	12.01	0.35	0.00	1.88	0.00
PIPELINE INSTALLATION	VESSELS - Support Diesel, Laying		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 - Support Diesel, Burying		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
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	Fast Rescue Boat	90	4.63014	111.12	1	365	0.06	0.04	0.04	0.00	1.52	0.04	0.00	0.24	0.00	0.01	0.01	0.01	0.00	0.28	0.01	0.00	0.04	0.00
	VESSELS - Support Diesel	North Survival Craft	50	2.5723	61.74	1	365	0.04	0.02	0.02	0.00	0.85	0.02	0.00	0.13	0.00	0.01	0.00	0.00	0.00	0.15	0.00	0.00	0.02	0.00
	VESSELS - Support Diesel	South Survival Craft	50	2.5723	61.74	1	365	0.04	0.02	0.02	0.00	0.85	0.02	0.00	0.13	0.00	0.01	0.00	0.00	0.00	0.15	0.00	0.00	0.02	0.00
	VESSELS - Support Diesel	West Survival Craft	50	2.5723	61.74	1	365	0.04	0.02	0.02	0.00	0.85	0.02	0.00	0.13	0.00	0.01	0.00	0.00	0.00	0.15	0.00	0.00	0.02	0.00
	VESSELS - Support Diesel	Crew Boat	7644	393.25322	9438.08	8	52	5.39	3.25	3.16	0.08	129.20	3.71	0.00	20.27	0.04	1.12	0.68	0.66	0.02	26.87	0.77	0.00	4.22	0.01
	VESSELS - Support Diesel	Supply Boat	7400	380.7004	9136.81	8	52	5.22	3.15	3.06	0.08	125.08	3.60	0.00	19.62	0.04	1.09	0.66	0.64	0.02	26.02	0.75	0.00	4.08	0.01
	VESSELS - Support Diesel	Supply Boat	7400	380.7004	9136.81	8	52	5.22	3.15	3.06	0.08	125.08	3.60	0.00	19.62	0.04	1.09	0.66	0.64	0.02	26.02	0.75	0.00	4.08	0.01
2026-2034	**Non-Facility Total Emissions**							**31.84**	**19.21**	**18.63**	**0.46**	**762.79**	**21.93**	**0.00**	**119.64**	**0.22**	**4.84**	**2.92**	**2.84**	**0.07**	**116.07**	**3.34**	**0.00**	**18.20**	**0.03**

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL
LLOG Exploration Offshore, L. L. C.	689	G19619	G19619	A	KC 736 #1, KC 736 #2, KC 642 #2, KC 686 #3, KC 686 #4, KC 6

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2024	230.89	139.30	135.12	3.39	5535.85	161.02	0.02	885.45	1.61
2025	230.20	142.38	138.25	4.25	5980.15	204.97	0.02	1006.82	1.60
2026	205.92	130.50	126.81	4.73	5868.31	203.96	0.01	1038.74	1.43
2027	205.92	130.50	126.81	4.73	5868.31	203.96	0.01	1038.74	1.43
2028	205.92	130.50	126.81	4.73	5868.31	203.96	0.01	1038.74	1.43
2029	205.92	130.50	126.81	4.73	5868.31	203.96	0.01	1038.74	1.43
2030	205.92	130.50	126.81	4.73	5868.31	203.96	0.01	1038.74	1.43
2031	205.92	130.50	126.81	4.73	5868.31	203.96	0.01	1038.74	1.43
2032	205.92	130.50	126.81	4.73	5868.31	203.96	0.01	1038.74	1.43
2033	205.92	130.50	126.81	4.73	5868.31	203.96	0.01	1038.74	1.43
2034	205.92	130.50	126.81	4.73	5868.31	203.96	0.01	1038.74	1.43
Allowable	7159.50			7159.50	7159.50	7159.50		122021.93	

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

A. Oil Spill Response Planning

All the proposed activities in this Revised Development Operations Coordination Document will be covered by the Oil Spill Response Plan filed by LLOG (No. 02058 in accordance with 30 CFR 254, our biennial update was found to be "in-compliance" on September 8, 2022. Our OSRP revision was approved on November 27, 2023.

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

B. Spill Response Sites

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

Primary Response Equipment Location	Pre-Planned Staging Location(s)
Houma, LA	Venice,, 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*	*DOCD*
Type of Activity	Exploratory MODU	Drilling
Facility Surface Location	Mississippi Canyon 386/387	Keathley Canyon 736
Facility Description	Well No. 001 (Rev "B" Location)	Well No. 001 (Loc F)
Distance to Nearest Shoreline (Miles)	58 miles	215 Miles
Volume: Storage Tanks (total) Facility Piping (total) Lease Term Pipeline Uncontrolled Blowout (day) Barging **Potential 24 Hour Volume (bbls)**	396,602 bbls	**135,476 bbls/day**
Type of Liquid Hydrocarbon	Crude	Crude Oil
API Gravity	25º	31.7°

Category	*Regional OSRP*	*DOCD*
Type of Activity	Development Production >10 miles from shore	Development
Facility Surface Location	Keathley Canyon 689	Keathley Canyon 689
Facility Description	Platform A	Platform A
Distance to Nearest Shoreline (Miles)	224 Miles	224 Miles
Volume: Storage Tanks (total) Facility Piping (total) Lease Term Pipeline Uncontrolled Blowout (day) Barging **Potential 24 Hour Volume (bbls)**	 2097 bbls 327 bbls 15 bbls 45,260 bbls **47,699 bbls**	 2097 bbls 327 bbls 6 bbls 45,260 bbls **47,699 bbls**
Type of Liquid Hydrocarbon	Crude Oil	Crude Oil
API Gravity	31.7°	31.7°

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 biennial update was found to be "in-compliance" on September 8, 2022. Our OSRP revision was approved on November 27, 2023.

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 July 21, 2020 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. does not plan to use any new or unusual technology in the event of a 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 135,476 barrels of crude oil with an API gravity of 32.1°.

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 2% probability of impact to the shorelines of Matagorda County, TX, Galveston County, TX, and/or Cameron Parish, LA within 30 days. Cameron Parish includes the east side of Sabine Lake, Sabine National Wildlife Refuge, Calcasieu Lake, Lacassine National Wildlife Refuge (inland) and Grand Lake. Cameron Parish also includes the area along the coastline from Sabine Pass to Big Constance Lake in Rockefeller Wildlife Refuge. This region is composed of open public beaches, marshlands and swamps. It serves as a habitat for numerous birds, finfish and other animals, including several rare, threatened and endangered species. Galveston County includes the Gulf Beach from the west end of Galveston Island at Texas Highway 3005 to the east coast of High Island at the Jefferson County line. Habitats include marshes at the west end of Seawall Boulevard and on the east end of the island and open beaches and avian feeding areas all along the coastline, including a National Audubon Society Sanctuary. The waters of Galveston Bay are classified as an EPA National Estuary. Matagorda County stretches from Matagorda Bay, across the Colorado River and up to the border of San Bernard Wildlife Refuge (immediately west of the San Bernard River). The county includes Matagorda Peninsula on the Gulf coast and Matagorda Bay. This area is primarily open beach. However, marshland exists along the east side of Matagorda Bay. Several bird rookeries are present around the peninsula. Seagrass is present off of Matagorda Peninsula on the bay side.

Response

LLOG 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 13% or approximately 17,612 barrels of crude oil would be evaporated/dispersed within 24 hours, with approximately 117,864 barrels remaining.

Natural Weathering Data: KC 736, Well Location F (Well #3)	**Barrels of Oil**
WCD Volume	135,476
Less 13% natural evaporation/dispersion	17,612
Remaining volume	117,864

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'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 spill response equipment, with a total derated skimming capacity of 206,084 barrels. Temporary storage associated with skimming equipment equals 4,498 barrels. If additional storage is needed, various storage barges with a total capacity 218,000+ bbls 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 Galveston County, Texas, Matagorda County, Texas, and/or Cameron Parish, Louisiana would depend upon existing environmental conditions. Shoreline protection would include the use of CGA's near shore and shallow water skimmers with a totaled derated skimming capacity of 50,131 barrels. Temporary storage associated with skimming equipment equals 968 barrels. If additional storage is needed, various storage barges with a total capacity of 60,000 barrels 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. 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. LLOG's contract Incident Management Team has access to the applicable ACP(s) and GRP(s).

Based on the anticipated worst case discharge scenario, LLOG 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 60 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 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 spill management team (SMT) 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'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 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

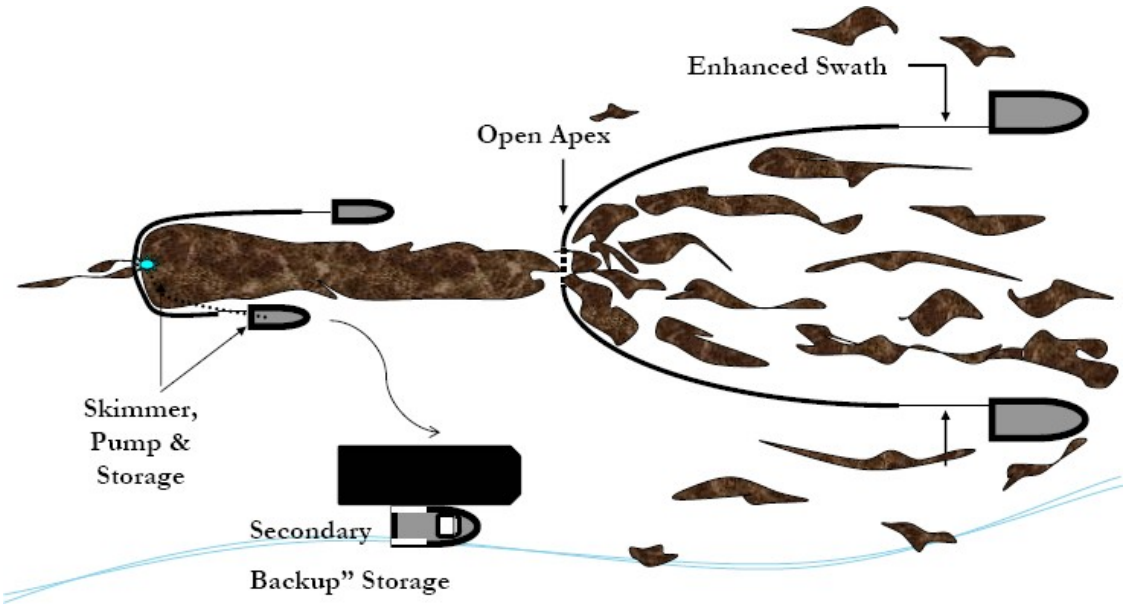
Mechanical Recovery – Deployed on large vessels of opportunity (VOO) the Koseq Rigid Sweeping Arms are high volume surge capacity deployed to increase recovery capacity at the source of a large oil spill in the offshore and outer nearshore environment of the Gulf of Mexico. They are highly mobile and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

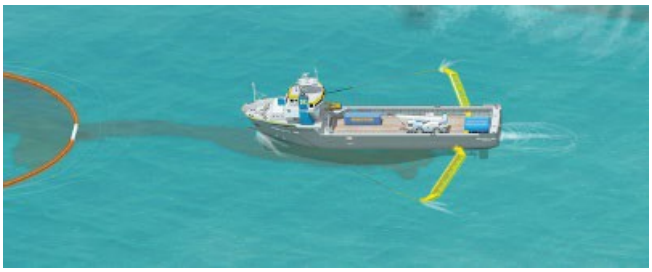
Command and Control – The large OSVs in many cases have state of the art communication and electronic systems, as well as the accommodations to support the function of directing all skimming operations offshore and reporting back to the command post.

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'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

Prevailing winds, waves and currents along the Texas coast are from the southeast and northeast quadrants. Ten to 20 foot waves may occur during hurricanes. The combined effect of the winds, surface currents, and waves refracting shoreward produce the prevailing westerly longshore currents.

Tides are semi-diurnal and diurnal, and range in height from less than 1 foot to 2.5 feet. The direction, force, and duration of the wind has a considerable effect on the tides and currents. Fifteen foot tides may be expected during severe hurricanes and very low tides may accompany strong northerlies of long duration.

Surface water temperature averages slightly less than 90° F and ranges between 80 and 100° F during the late summer. During the winter the average is slightly less than 60° F and the range is between 35 and 80° F.

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'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	LaunchArea	Land Segment and/or Resource	Conditional Probability (%)
KC 736,	G36077	W29	Kenedy, TX	1
Well Location F (Well #3)			Kleberg, TX	1
			Aransas, TX	1
215 miles from shore			Calhoun, TX	1
			Matagorda, TX	**2**
			Brazoria, TX	1
			Galveston, TX	**2**
			Jefferson, TX	1
			Cameron, LA	**2**
			Vermilion, LA	1

WCD Scenario– <u>BASED ON WELL BLOWOUT DURING DRILLING OPERATIONS</u> (215 miles from shore)
117,864 bbls of crude oil (Volume considering natural weathering)
API Gravity 32.1°

FIGURE 2 – Equipment Response Time to KC 736, Well Location F (Well#3)

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	1.3	5.3
DC 3	1200	2	Houma	2	2	1.7	5.7
DC 3	1200	2	Houma	2	2	1.7	5.7
Aero Commander	NA	2	Houma	2	2	1.3	5.3

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	27	2	47
95' FRV	22885	249	NA	6	Galveston	2	0	2	13.5	1	18.5
95' FRV	22885	249	NA	6	Vermilion	2	0	3	11	1	17
95' FRV	22885	249	NA	6	Leeville	2	0	2	12	1	17
95' FRV	22885	249	NA	6	Venice	2	0	3	12.5	1	18.5
Boom Barge (CGA-300) 42" Auto Boom (25000')	NA	NA	1 Tug 50 Crew	4 (Barge) 2 (Per Crew)	Leeville	8	0	4	34	2	48
Enterprise Marine Services LLC (Available through contract with CGA)											
RO Barge	NA	100000+	1 Tug	6	Venice	24	0	4	31	1	60
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 2603	NA	25000	1 Tug	6	Amelia	14	0	6	27	1	48
CTCo 2608	NA	23000	1 Tug	6	Amelia	14	0	6	27	1	48
CTCo 2609	NA	23000	1 Tug	6	Amelia	14	0	6	27	1	48
CTCo 5001	NA	47000	1 Tug	6	Amelia	14	0	6	27	1	48

Staging Area: Fourchon

Offshore Equipment With 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											
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Vermilion	2	6	5.5	20	1	34.5
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Galveston	2	6	12	20	1	41
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Aransas Pass	2	6	16.5	20	1	45.5
FRU (3) + 100 bbl Tank (6)	12753	600	3 Utility	18	Leeville	2	6	2	20	1	31
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Venice	2	6	5	20	1	34
Hydro-Fire Boom	NA	NA	8 Utility	40	Harvey	0	24	3	20	6	53

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											
46' FRV	15257	65	NA	4	Leeville	2	0	2	8	1	13
46' FRV	15257	65	NA	4	Vermilion	2	0	2	2.5	1	7.5
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 2604	NA	20000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 2605	NA	20000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 2606	NA	20000	1 Tug	6	Amelia	26	0	6	15	1	48

Staging Area: Cameron

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	5	2	1	12
SWS Egmopol	1810	100	NA	3	Leeville	2	2	7	2	1	14
SWS Marco	3588	20	NA	3	Vermilion	2	2	2	2	1	9
SWS Marco	3588	34	NA	3	Leeville	2	2	7	2	1	14
SWS Marco	3588	34	NA	3	Venice	2	2	9.5	2	1	16.5
Foilex Skim Package (TDS 150)	1131	50	1 Utility	3	Vermilion	4	12	2	2	2	22
Foilex Skim Package (TDS 150)	1131	50	1 Utility	3	Galveston	4	12	5	2	2	25
Foilex Skim Package (TDS 150)	1131	50	1 Utility	3	Harvey	4	12	7	2	2	27
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Vermilion	2	2	2	2	1	9
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Harvey	2	2	7	2	1	14
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Vermilion	2	2	2	2	1	9
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Harvey	2	2	7	2	1	14

Staging Area: Cameron

Shoreline Protection Boom	VOO	Persons Req.	Storage/Warehouse Location	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
AMPOL (available through MSA)									
34,050’ 18” Boom	13 Crew	26	New Iberia, LA	2	2	3.5	2	12	21.5
12,850’ 18” Boom	7 Crew	14	Chalmette, LA	2	2	7.5	2	6	19.5
900’ 18” Boom	1 Crew	2	Morgan City, LA	2	2	5	2	2	13
3,200’ 18” Boom	2 Crew	4	Venice, LA	2	2	9	2	2	17
12,750’ 18” Boom	7 Crew	14	Port Arthur, TX	2	2	1.5	2	6	13.5
OMI Environmental (available through MSA)									
14,000’ 18” Boom	6 Crew	12	Belle Chasse, LA	1	1	8	2	3	15
2,000’ 18” Boom	1 Crew	2	Galliano, LA	1	1	7	2	3	14
1,800’ 18” Boom	1 Crew	2	Gonzalez, LA	1	1	8	2	3	15
11,800’ 18” Boom	5 Crew	10	Harvey, LA	1	1	7	2	3	14
2,000’ 18” Boom	2 Crew	4	Houma, LA	1	1	7	2	3	14
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	4	2	3	11
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	9	2	3	16
19,000’ 18” Boom	6 Crew	12	Deer Park, TX	1	1	4	2	3	11
11,000’ 18” Boom	5 Crew	10	La Marque, TX	1	1	4	2	3	11
20,000’ 18” Boom	6 Crew	12	Port Arthur, TX	1	1	2	2	3	9

Wildlife Response	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
Wildlife Support Trailer	NA	NA	NA	2	Harvey	2	2	7	1	2	14
Bird Scare Guns (24)	NA	NA	NA	2	Harvey	2	2	7	1	2	14
Bird Scare Guns (12)	NA	NA	NA	2	Galveston	2	2	5	1	2	12
Bird Scare Guns (12)	NA	NA	NA	2	Aransas Pass	2	2	9.5	1	2	16.5
Bird Scare Guns (48)	NA	NA	NA	2	Vermilion	2	2	2	1	2	9
Bird Scare Guns (24)	NA	NA	NA	2	Leeville	2	2	7	1	2	14

Response Asset	Total
Offshore EDRC	206,084
Offshore Recovered Oil Capacity	224,796+
Nearshore / Shallow Water EDRC	50,131
Nearshore / Shallow Water Recovered Oil Capacity	60,968

APPENDIX J
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.

Keathley Canyon Blocks 686 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 drilling, completion and production of wells in Keathley Canyon Blocks 686.

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

C. Flower Garden Banks National Marine Sanctuary

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

APPENDIX K
LEASE STIPULATION INFORMATION
(30 CFR PART 550.222 AND 550.253)

A. Lease Stipulations

Minerals Management Service (BOEM) invoked Stipulation No. 8 – Protected Species

Lease Stipulation No. 8 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."

B. Special Conditions

- **Subsea Completions**

  LLOG will be completing the subject wells as subsea completions, therefore, LLOG will follow the regulations in Title 30 CFR Parts 550.286 through 550.299, which mandates the submittal and approval of separate regulatory filings entitled as a "Deepwater Operations Plan" and a Conservation Information Document" respectively.

- **Ocean Current Monitoring**

  The proposed operations under this Plan are in water depths greater than 400 meters (1,312'); therefore, LLOG will follow the guidelines of the applicable NTL 2009-G02 "Ocean Current Monitoring", by continuously monitoring and gathering ocean current data using Acoustic Doppler Current Profile (ADCP) while the MODU is on location.

APPENDIX L
ENVIRONMENTAL MITIGATION MEASURES INFORMATION (30 CFR PART 550.223 AND 550.254)

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" 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 drilling and completion of one well. The estimated time to conduct these operations through the moonpool involves approximately 150 drilling days and 150 completion days for the well.

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 (193 days) 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 150 completion days includes 2 days to run the BOP and riser and 2 days to retrieve the equipment.

APPENDIX M
RELATED FACILITIES AND OPERATIONS INFORMATION
(30FR PART 550.256)

A. Related OCS Facilities and Operations –

The subject subsea wells will be connected via proposed manifolds and ROW pipeline systems with associated appurtenances & ancillary components (umbilicals, well jumpers, flowline jumpers, subsea pumps, etc.) to LLOG's proposed semi-submersible floating platform "A" Keathley Canyon Block 689. This will be a manned platform and will process produced hydrocarbons from the incoming subsea wells from the drill site designated as Leon on the northern half of Keathley Canyon Block 686.

An approximate 80' long x 6.625" Lease Term Well Jumper at KC 643 Well SS001

An approximate 80' long x 6.625" Lease Term Well Jumper at KC 687 Well SS001

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

LEON

Origination Point	***Flow Rates***	***Shut In Time***
KC 642 #2 Loc "E"	8,743 MCFD 17,000 BOPD	< 20 Minutes
KC 686 #4 Loc "F"	8,743 MCFD 17,000 BOPD	< 20 Minutes
Or		
KC 643 #1 Loc "KC 643 001"	8,743 MCFD 17,000 BOPD	< 20 Minutes
Or		
KC 687 #1 Loc "KC 687 001"	8,743 MCFD 17,000 BOPD	< 20 Minutes
KC 686 #3 Loc "C"	5,657 MCFD 11,000 BOPD	< 20 Minutes

B. Transportation System

LLOG does not anticipate installation of any new/or modified onshore facilities to accommodate the production of Keathley Canyon Block 689.

C. Produced Liquid Hydrocarbon Transportation Vessels

Not applicable. All production will flow through pipelines. No transportation vessels will be utilized.

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

A. General

DP Semisubmersible Rig and Drillship:

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

DURING INSTALLTION:

Type	Maximum Fuel Tank Storage Capacity	Maximum No. in Area at Any Time	Trip Frequency or Duration
Tug Boats	5,100 bbls	3	15 days
Support Vessel	4,250 bbls	0	0 days
ROV Vessel	8,805 bbls	2	197 days
DP Pipelay Vessel	10,000 bbls	2	170 days
MSV	15,000 bbls	0	0 days

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	1500 bbls	1/weekly	From the shorebase to KC 689 Platform A

A. Drilling Fluids Transportation

Drilling fluid transportation information is not required to be submitted with this plan.

B. Solid and Liquid Wastes Transportation

See Tables 1 and 2 – Wastes you will Transport and/or Dispose of Onshore, located in Appendix G of this plan.

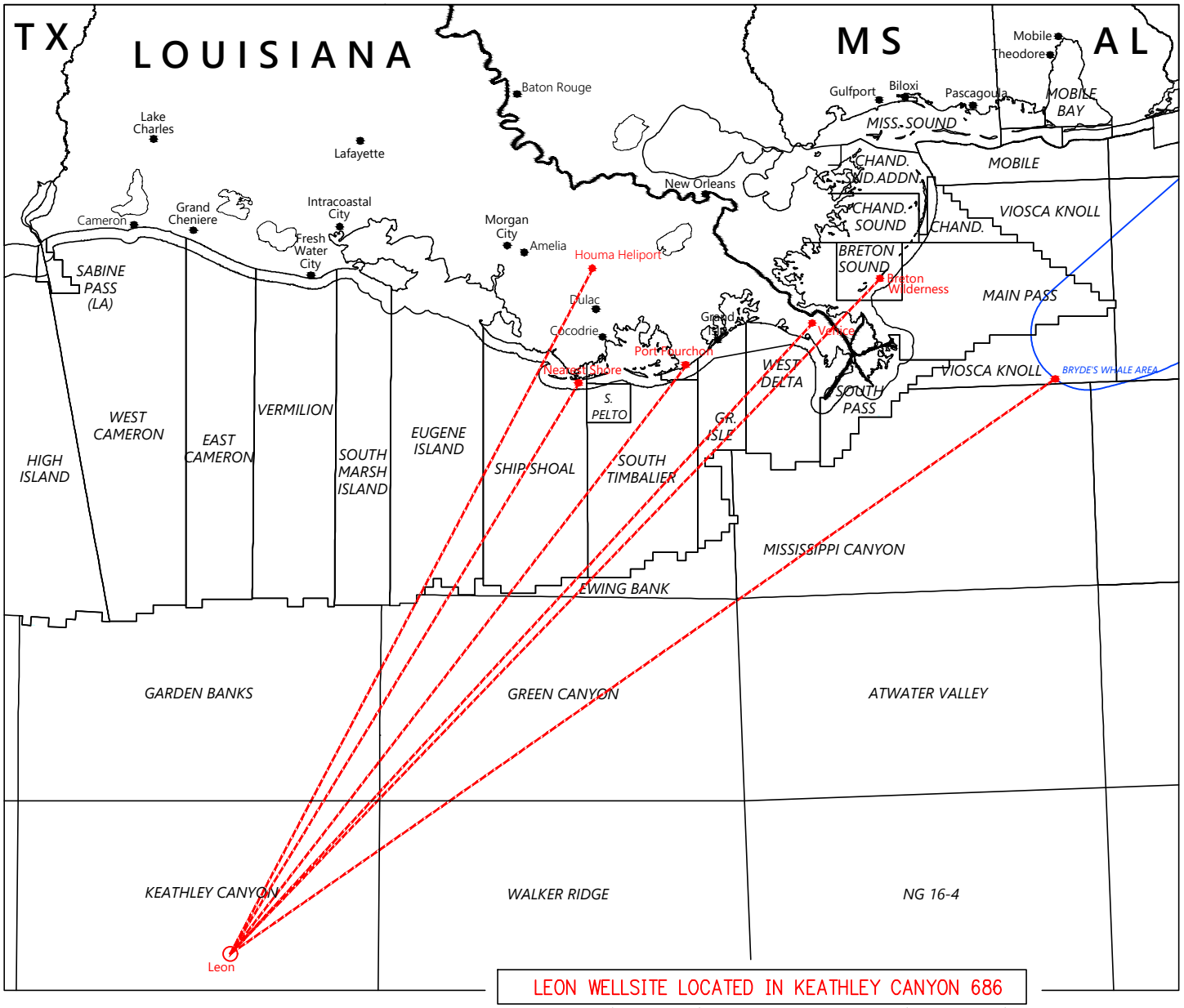
C. Vicinity Map

Vicinity Plats showing the locations of KC 642/686/736/689/643 relative to the nearest shoreline, heliport and onshore base are included as ***Attachment N-1.***

Vicinity Maps

Attachment N-1
(Public Information)

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



LEON WELLSITE LOCATED IN KEATHLEY CANYON 686

~215 STATUTE (187 NAUTICAL) MILES TO TERREBONNE PARISH (NEAREST SHORE)
COORDINATES TO NEAREST POINT ON SHORELINE X=2,292,944' Y=10,550,063'
~243 STATUTE (211 NAUTICAL) MILES TO PORT FOURCHON, LA
~267 STATUTE (232 NAUTICAL) MILES TO HOUMA HELIPORT, HOUMA, LA
~286 STATUTE (249 NAUTICAL) MILES TO VENICE, LA
~337 STATUTE (292 NAUTICAL) MILES TO BRETON WILDERNESS
~333 STATUTE (289 NAUTICAL) MILES TO BRYDE'S WHALE AREA

VICINITY MAP

0 100
SCALE IN MILES

LLOG EXPLORATION OFFSHORE, L.L.C.

LLOG exploration

LEON WELLSITE LOCATED IN
KEATHLEY CANYON 686 AREA
GULF OF MEXICO

DATUM: NAD 27	PROJECTION: U.T.M.
SPHEROID: CLARKE 1866	ZONE: 15

PINNACLE ENGINEERING

DRAWN BY: J. GUEVARA	DATE: 9/15/21	SCALE: N.T.S.	REV DATE: 9/15/21
DRAWING NUMBER: 205700-PIP-DG-9657-A			

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

A. General

The proposed operations in Keathley Canyon Blocks 642/686/736/689/643 will be located approximately 215 miles from the nearest shoreline and 243 miles from the onshore support base.

Name	Location	Existing/New/Modified
LLOG c/o GIS Yard	Fourchon, LA	Existing
PHI US LLC - 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 Tables 1 and 2 – Appendix G – of this plan - Wastes You Will Transport and/or Dispose of Onshore.

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

Under direction of the Coastal Zone Management Act (CZMA), the States of Alabama, Florida, Louisiana, Mississippi and Texas developed Coastal Zone Management Programs (CZMP) to allow for the supervision of significant land and water use activities that take place within or that could significantly impact their respective coastal zones.

A. Consistency Certification

Certificates of Coastal Zone Management Consistency for the State of Louisiana are not required for supplemental plans.

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

LLOG Offshore Exploration, L. L. C.

Initial Development Operations Coordination Document Keathley Canyon Block 686 OCS-G 33341 Lease

(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)			X(7)			
Prehistoric archaeological sites			(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 Keathley Canyon Block 686

Proposed operations consist of the drilling and completion of two wells in Keathley Canyon Block 686 (KC 643 001 & KC 687 001).

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

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: Keathley Canyon Block 686 is 105.3 miles from the closest designated Topographic Features Stipulation Blocks (Geyer Bank). Therefore, no adverse impacts are expected. Additionally, a dynamically positioned semisubmersible or drillship is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed.

Effluents: Keathley Canyon Block 686 is 105.3 miles from the closest designated Topographic Features Stipulation Blocks (Geyer 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 Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**).

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 Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**), 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: Keathley Canyon Block 686 is 325.8 miles from the closest live bottom (pinnacle trend) area; therefore, no adverse impacts are expected. Additionally, a dynamically positioned semisubmersible or drillship 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, Keathley Canyon Block 686 is 325.8 miles from the closest live bottom (pinnacle trend) area; therefore, no adverse impacts are expected.

Effluents: Keathley Canyon Block 686 is 325.8 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 Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**).

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: Keathley Canyon Block 686 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 dynamically positioned semisubmersible or drillship 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, Keathley Canyon Block 686 is not located in an area characterized by the existence of live bottoms; therefore, no adverse impacts are expected.

Effluents: Keathley Canyon Blocks 686 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 Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**).

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.

Keathley Canyon Block 686 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, Keathley Canyon Block 686 is approximately 22.5 miles from a known deepwater benthic community site (Keathley Canyon Block 333), listed in NTL 2009-G40. Additionally, a dynamically positioned semisubmersible or drillship 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 dynamically position semisubmersible or drillship, LLOG Offshore Exploration, L. L. C. 's proposed operations in

Keathley Canyon Block 686is 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 Keathley Canyon Block 686 includes 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 dynamically positioned semisubmersible or drillship 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 Offshore Exploration, L. L. C.'s Regional Oil Spill Response Plan, which discusses potential response actions in more detail (refer to information submitted in **Section 9**).

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 Keathley Canyon Block 686 includes 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 dynamically positioned semisubmersible or drillship 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**).

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 Keathley Canyon Block 686 includes 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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. LLOG Offshore Exploration, L. L. C.'s contractor or company representative will provide a dedicated crew member to monitor and continually survey the moon pool area during the operations for marine mammals. If any marine mammal is detected in the moon pool, LLOG Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C.'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 Offshore Exploration, L. L. C.'s OSRP (refer to information submitted in accordance with **Section 9**).

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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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. LLOG Offshore Exploration, L. L. C.'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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C.'s Regional Oil Spill Response Plan (refer to information submitted in accordance with **Section 9**).

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.

The projected air emissions identified in **Section 8** are not expected to affect the OCS air quality primarily due to distance to the shore or to any Prevention of Significant Deterioration Class I air quality area such as the Breton Wilderness Area. Keathley Canyon Block 686 is beyond the 200-kilometer (124 mile) buffer for the Breton Wilderness Area and are 215 miles from the coastline. Therefore, no special mitigation, monitoring, or reporting requirements apply with respect to air emissions.

Accidents and blowouts can release hydrocarbons or chemicals, which could cause the emission of air pollutants. However, these releases should not impact onshore air quality because of the prevailing atmospheric conditions, emission height, emission rates, and the distance of Keathley Canyon Block 686 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 Offshore Exploration, L. L. C. 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 Keathley Canyon Block 686 includes physical disturbances to the seafloor. Should LLOG Offshore Exploration, L. L. C. 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.

Physical disturbances to the seafloor: Although the operations proposed will be conducted by utilizing a dynamically positioned semisubmersible or drillship, which would cause only an insignificant amount of seafloor to be disturbed, Keathley Canyon Block 686 is located within the area designated by BOEM as high probability for occurrence of shipwrecks. Due to this designation, LLOG Offshore Exploration, L. L. C. will report to BOEM the discovery of any evidence of a shipwreck and make every reasonable effort to preserve and protect that cultural resource.

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

11. Prehistoric Archaeological Sites

In accordance with BOEM NTL 2005-G07, LLOG Offshore Exploration, L. L. C. 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 Keathley Canyon Block 686 includes disturbances to the seafloor and accidents. Keathley Canyon Block 686 is located outside the Archaeological Prehistoric high probabilty line,

therefore, no adverse impacts are expected. Should LLOG Offshore Exploration, L. L. C. 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.

Physical disturbances to the seafloor: A dynamically positioned semisubmersible, or drillship 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 dynamically positioned semisubmersible or drillship, LLOG Offshore Exploration, L. L. C.'s proposed operations in Keathley Canyon Block 686 is not likely to cause impacts to prehistoric archaeological sites.

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 Offshore Exploration, L. L. C.'s Regional Oil Spill Response Plan (refer to information submitted in accordance with **Section 9**).

There are no other IPFs (including emissions, effluents, wastes sent to shore for treatment or disposal, and accidents) 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 Keathley Canyon Block 686 includes 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 dynamically positioned semisubmersible or drillship 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 Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**).

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 Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**).

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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 **Section 4** 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 (214 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 Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**).

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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 (214 miles) and the response capabilities that would be implemented, no impacts are expected. The operations proposed in this plan will be covered by LLOG Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**).

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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 (214 miles) and the response capabilities that would be implemented, no impacts are expected. The operations proposed in this plan will be covered by LLOG Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**).

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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 (214 miles) and the response capabilities that would be implemented, no impacts are expected. The operations proposed in this plan will be covered by LLOG Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**).

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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 (292.8 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 Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9).**

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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 321.9 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 Offshore Exploration, L. L. C. 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 (292.4 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 Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9)**.

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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 Keathley Canyon Block 686 includes 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**).

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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 Keathley Canyon Block 686 includes 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 Offshore Exploration, L. L. C. 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 (105.3 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 Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**).

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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 Offshore Exploration, L. L. C. 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 351.7 miles from Keathley Canyon Block 686; 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 (105.3 miles) and other critical coral habitats, no adverse impacts are expected. The operations proposed in this plan will be covered by LLOG Offshore Exploration, L. L. C.'s Regional OSRP (refer to information submitted in **Section 9**).

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 Keathley Canyon Block 686 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 their location in the Gulf, Keathley Canyon Block 686 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. Platform / Structure Installation
   Operator will not conduct platform / structure installation operations during Tropical Storm or Hurricane threat.

3. Pipeline Installation
   Operator will not conduct pipeline 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, the following were utilized in preparing this EIA:

- Hazard Surveys

Appendix R
Administrative Information
(30FR Part 550.228 and 550.262)

Exempted Information Description (Public Information Copies Only)

Excluded from the Public Information copies are the following:

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

Bibliography

The following documents were utilized in preparing this Plan:

Document	Author	Dated
KC642/686 – Shallow Hazards Assessment	Ocean Geo Solutions	2019
Keathley Canyon Blocks 642-647,686-691, 731-736, 779-780	Echo Offshore	2021
KC 686 – Shallow Hazards	Ocean Geo Solutions	2020
Environmental Impact Analysis	JConnor	2021
NTL 2010-N06	BOEM	June 18, 2010
NTL 2008- G04	MMS	May 1, 2008
Regional Oil Spill Plan	JCC//LLOG	2022
Initial DOCD Plan (N-10177) Approved 12-30-2022	LLOG	2022