UNITED STATES GOVERNMENT April 14, 2026
MEMORANDUM

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

Subject: Public Information copy of plan

Control #	-	S-08219
Type	-	Supplemental Exploration Plan
Lease(s)	-	OCS-G16987 Block - 425 Walker Ridge Area
Operator	-	Murphy Exploration & Production Company - USA
Description	-	Drill, complete, & abandon S well
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.

Tehirah Barkum
Plan Coordinator

Site Type/Name	Botm Lse/Area/Blk	Surface Location	Surf Lse/Area/Blk
WELL/S	G16987/WR/425	23 FSL, 7320 FEL	G16987/WR/425

Supplemental Exploration Plan
List of Amendments

WALKER RIDGE BLOCKS 425 & 469
LEASES OCS-G 16987 & 16997
Plan Control No.: S-8219
Version: 1

Regulatory Purpose: This Amendment Log is provided to identify, document, and summarize all revisions made to the Supplemental Exploration Plan (EP) permit for the Bureau of Ocean Energy Management (BOEM) review and regulatory transparency.

Note: All changes documented herein are tracked to ensure transparency, traceability, and regulatory compliance.

Date of Change	Submittal Type	Section / Reference	Page No	Description of Revision/Amendment
04/07/26	Amendment	Section O / Environmental Impact Analysis	94	Revise description of drilling rig from DP semi-submersible to drill ship.
04/07/26	Amendment	Section O / Environmental Impact Analysis	93	Revise description of drilling rig from DP semi-submersible to drill ship.
04/07/26	Amendment	Section O / Environmental Impact Analysis	83	Revise description of drilling rig from DP semi-submersible to drill ship.
04/07/26	Amendment	Section O / Environmental Impact Analysis	80	Revise description of drilling rig from DP semi-submersible to drill ship.
04/07/26	Amendment	Section O / Environmental Impact Analysis	79	Revise description of drilling rig from DP semi-submersible to drill ship.
04/07/26	Amendment	Section O / Environmental Impact Analysis	78	Revise description of drilling rig from DP semi-submersible to drill ship.
04/07/26	Amendment	Section O / Environmental Impact Analysis	77	Revise description of drilling rig from DP semi-submersible to drill ship.
04/07/26	Amendment	Section O / Environmental Impact Analysis	75	Revise description of drilling rig from DP semi-submersible to drill ship.
03/10/26	BOEM Received	EP Received by BOEM	-	N/A

MURPHY
EXPLORATION & PRODUCTION CO.

March 02, 2026

United States Department of Interior
Gulf of America OCS Region
Bureau of Ocean Energy Management
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394

Attn: Michelle Uli Picou
Chief, Plans Section

Subject: Murphy Exploration & Production - USA
Supplemental Exploration Plan
Lease OCS-G 16987 and 16997, Walker Ridge Blocks 425 / 469

In accordance with 30 CFR 550.200 Subpart B and NTL 2009-G07, Murphy Exploration & Production Company - USA (Murphy) hereby submits for your review and approval a Supplemental Exploration Plan for the drilling and completion/abandonment of Well Location "S" in Lease OCS-G 16987 and 16997, Walker Ridge Blocks 425 / 469, respectively. Murphy is adding the Well Location "S" by updating the previously approved Supplemental Exploration Plan, Control No. S-8193, which was approved on August 27, 2025, and included Locations "P", "Q", and "R".

Enclosed you will find one Proprietary Copy and one Public Copy of the Supplemental Exploration Plan with sections pertinent to the changes for Lease OCS-G 16987 and 16997, Walker Ridge Blocks 425 / 469.

If you should have any questions or concerns, please contact Brenda Montavo by phone at (281) 798-0481 or by e-mail at brenda_montalvo@murphyoilcorp.com .

Sincerely,

Brenda Montalvo
Supervisor, Environmental & Regulatory

9805 Katy Freeway, Suite G-200, Houston, Texas 77024
281.675.9000

SUPLEMENTAL
EXPLORATION PLAN

WALKER RIDGE BLOCKS 425 & 469
LEASE OCS-G 16987 & 16997

PUBLIC INFORMATION COPY

Submitted by:

MURPHY
EXPLORATION & PRODUCTION CO.

TABLE OF CONTENTS

EXPLORATION PLAN CONTENTS……..1

(a) Project Description, objectives, and schedule
(b) Location
(c) Drilling unit description
(d) Service Fee

SECTION A GENERAL INFORMATION……..A-1

(a) Applications and permits
(b) Drilling fluids
(c) Chemical products
(d) New or unusual technology
(e) Bonds, oil spill financial responsibility, and well control statements
(f) Suspensions of operations
(g) Blowout scenario
(h) Contact information

SECTION B GEOLOGICAL, GEOPHYSICAL……..B-1

(a) Geological description
(b) Structure contour maps
(c) Two-dimensional (2D) or three-dimensional (3D) seismic lines
(d) Geological cross-sections
(e) Shallow hazards report
(f) Shallow hazards assessment
(g) High-resolution seismic lines
(h) Stratigraphic column
(i) Time-versus-depth chart
(j) Geochemical information
(k) Future G&G activities

SECTION C H_2S IINFORMATION…….C-1

(a) Concentration
(b) Classification
(c) H_2S Contingency Plan
(d) Modeling Report

SECTION D BIOLOGICAL, PHYSICAL, AND SOCIOECONOMIC……..….D-1

(a) Biological environment reports
(b) Physical environment reports
(c) Socioeconomic study reports

SECTION E SOLID AND LIQUID WASTES AND DISCHARGES……..……E-1

(a) Projected wastes
(b) Projected ocean discharges
(c) National Pollutant Discharge Elimination System (NPDES) permit
(d) Modeling Report
(e) Projected cooling water intake

SECTION F AIR EMISSIONS……F-1

(a) Projected emissions

SECTION G OIL AND HAZARDOUS SUBSTANCE SPILLS……G-1

(a) Oil spill response planning
(b) Modeling Report

SECTION H ALASKA PLANNING……..……..H-1

(a) Oil spill response planning
(b) Modeling Report

SECTION I ENVIRONMENTAL MONITORING…….…..……..…I-1

(a) Monitoring systems
(b) Incidental takes
(c) Flower Garden Banks National Marine Sanctuary (FGBNMS)

SECTION J LEASE STIPULATIONS……...J-1

(a) Lease stipulations

SECTION K MITIGATION MEASURES……...K-1

(a) Measures taken to minimize or mitigate environmental impacts
(b) Incidental takes

SECTION L SUPPORT VESSELS & AIRCRAFT…….……L-1

(a) Oil spill response planning
(b) Modeling Report

SECTION M ONSHORE SUPPORT FACILITIES……..…..……...L-1

(a) General
(b) Air emissions
(c) Unusual solid and liquid wastes
(d) Waste disposal

SECTION N COASTAL ZONE MANAGEMENT…….…….....M-1

SECTION O ENVIRONMENTAL IMPACT ANALYSIS…… N-1

SECTION P ADMINISTRATIVE INFORMATION……...O-1

PLAN CONTENTS

(a) Description, Objectives, and Schedule

This proposed Suplemental Exploration Plan is for the drilling and completion of Well Location "S" in Leases OCS-G 16987 & 16997, Walker Ridge Blocks 425 & 469, respectively. An OCS Plan Information Form – "Form BOEM-0137" is included under this section with further activity description.

Murphy is adding the Well Location "S" by updating the previously approved Supplemental Exploration Plan, Control No. S-8193, which was approved on August 27, 2025, and approved Locations "P", "Q", and "R".

Murphy acquired leases OCS-G 16987 & 16997 on February 15, 2019. Murphy Exploration & Production Company - USA is operator of all of Walker Ridge Blocks 425 & 469. Leases OCS-G 16987 & 16997 are under Unit Agreement No. 754306013 and is currently held by unit production.

Murphy drilling activities being proposed under this plan are scheduled to commence on or before March 15, 2026.

(b) Location

A Well Location Map showing the proposed surface and bottom-hole locations of the new well location "S" is included in this plan along with a Bathymetry Map showing the water depths across the lease block. The vessel type planned for the drilling of this well is a drillship, therefore no anchors are associated with this project.

(c) Drilling unit

Murphy will use a drillship with subsea BOP's and will comply with all of the regulations of the ABS, IMO and USCG. All drilling operations will be conducted under the provisions of 30 CFR, Part 250, Subpart D, and other applicable regulations and notice to lessees, including those regarding the avoidance of potential drilling hazards and safety and pollution prevention control. Such measures as inflow detection and well control, monitoring for loss of circulation and seepage loss, and casing design will be our primary safety measures.

Pollution prevention measures may include installation of curbs, gutters, drip pans, and drains on drilling deck areas, as needed to collect all contaminants and debris. All discharges will be in accordance with applicable EPA NPDES permits.

Storage Tanks and/or Production Vessels with 25 bbls or more

Type of Storage Tank	Type of Facility	Tank Capacity (bbls)	Number of Tanks	Total Capacity (bbls)	Fluid Gravity (API)
Fuel Oil	Drillship	11,993	2	23,986	32.4
Fuel Oil	Drillship	6,438	2	12,876	32.4
DO Service Tank	Drillship	476	2	952	33
Lube Oil	Drillship	328	1	328	35
Lube Oil	Drillship	275	3	825	35
Base Oil	Drillship	3,140	1	3,140	33

Additional measures which may be initiated by Murphy and/or its contractors beyond those required by Title 30 CFR Part 250 may include all of the following, Preliminary MODU inspection by a contractor to

ensure facility meets current regulatory requirements; obtaining historical performance history of MODU; obtaining historical performance history of drilling contractor; safety and environmental briefings with offshore employee and contractor personnel through facility orientation and briefings on current operations; review of BSEE/USCG Incident Reporting System and Sub-Regional Oil Spill Response Plan to ensure personnel are aware of the notifications and reporting requirements; review of Region IV EPA NPDES General Permit with applicable personnel to ensure awareness of permit effluent limitations and reporting requirements; pre-spud meetings with operations, regulatory, environmental and safety personnel and key vendors and contractors.

(d) Service fee:
In accordance with 550.125, a Pay.gov receipt in the amount of $4,823.00 is enclosed to cover the cost and processing fee for the proposed operations being conducted under this plan.

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

OMB Control Number: 1010-0151
OMB Approval Expires: 06/30/2021

OCS PLAN INFORMATION FORM

GENERAL INFORMATION

Type of OCS Plan:	X	Supplemental Exploration Plan (EP)		Development Operations Coordination Document (DOCD)			
Company Name: Murphy Exploration & Production Company - USA				BOEM Operator Number: 02647			
Address: 9805 Katy Freeway, Suite G-200				Contact Person: Brenda Montalvo			
Houston, Texas 77024				Phone Number: (281) 798-0481			
				Email Address: brenda_montalvo@murphyoilcorp.com			
If a service fee is required under 30 CFR 550.125(a) provide the:				Amount paid	$4,823.00	Tracking ID	2804FMTM

Project and Worst-Case Discharge (WCD) Information

Lease: G16987 & 16997	Area: WR		Block(s): 425/469	Project Name (If Applicable): Chinook			
Objective(s):	☒Oil	☐Gas	☐Sulphur	☐Salt	Onshore Support Base(s): Fourchon, LA		
Platform/Well Name: S		Total Volume of WCD: 68,000		API Gravity: 30			
Distance to Closest Land (Miles): 173			Volume from uncontrolled blowout: 7.2				

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-8193			
Do you propose to use new or unusual technology to conduct your activities?		Yes	X	No
Do you propose to use a vessel with anchors to install or modify a structure?		Yes	X	No
Do you propose any facility that will serve as a host facility for deepwater subsea development?		Yes	X	No

Description of Proposed Activities Scheduled (Mark all that apply)

Proposed Activity	Start Date	End Date	No. of Days
Drill/Complete/Abandon Location S	March 15, 2026	August 06, 2026	144

Description of Drilling Rig

	Jackup	X	Drillship		Caisson		Tension leg platform
	Gorilla Jackup		Platform rig		Fixed platform		Compliant tower
	Semisubmersible		Submersible		Spar		Guyed Tower
	DP Semisubmersible		Other (Attach Description)		Floating Production System		Other (Attach Description)

Drilling Rig Name (If Known):

Description of Structure

Description of Lease Term Pipelines

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

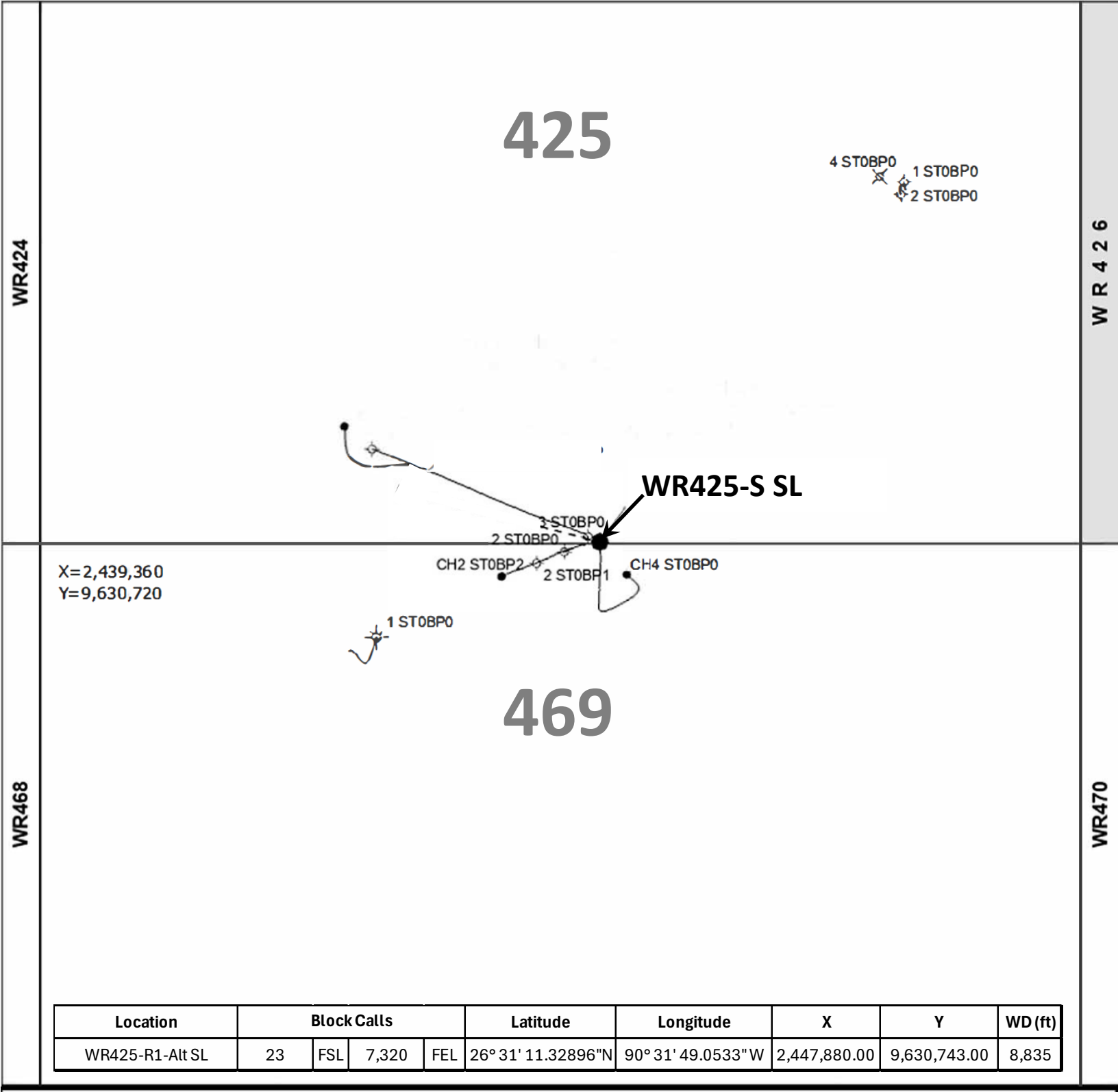
U.S. Department of the Interior
Bureau of Ocean Energy Management

OMB Control Number: 1010-0151
OMB Approval Expires: 06/30/2021

OCS PLAN INFORMATION FORM

Proposed Well/Structure Location											
Well or Structure Name/Number (If renaming well or structure, reference previous name): **S**					Previously reviewed under an approved EP or DOCD?		YES	X	NO		
Is this an existing well or structure?		YES	X	NO	If this is an existing well or structure, list the Complex ID or API No.						
Do you plan to use a subsea BOP or surface BOP on a floating facility to conduct your proposed activities?						X	YES		NO		
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 68,000		For structures, volume of all storage and pipelines (Bbls): 0		API Gravity of fluid:		30				
	Surface Location		**Bottom-Hole Location (For Wells)**		**Completion (For multiple completions, enter separate lines)**						
Lease No.	**OCS-G 16987**										
Area Name	**Walker Ridge**										
Block No.	**425**										
Blockline Departures (in feet)	23’ FSL										
	7,320’ FEL										
Lambert X-Y Coordinates	X: 2,447,880.00										
	Y: 9,630,743.00										
Latitude/ Longitude	26° 31’ 11.32896”										
	90° 31’ 49.0533”										
Water Depth (Feet): 8,835											
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 or Seafloor**



Location	Block Calls				Latitude	Longitude	X	Y	WD (ft)
WR425-R1-Alt SL	23	FSL	7,320	FEL	26° 31' 11.32896"N	90° 31' 49.0533" W	2,447,880.00	9,630,743.00	8,835

2,000 1,000 0 2,000 4,000 US Feet

Scale: 1" = 2,000'

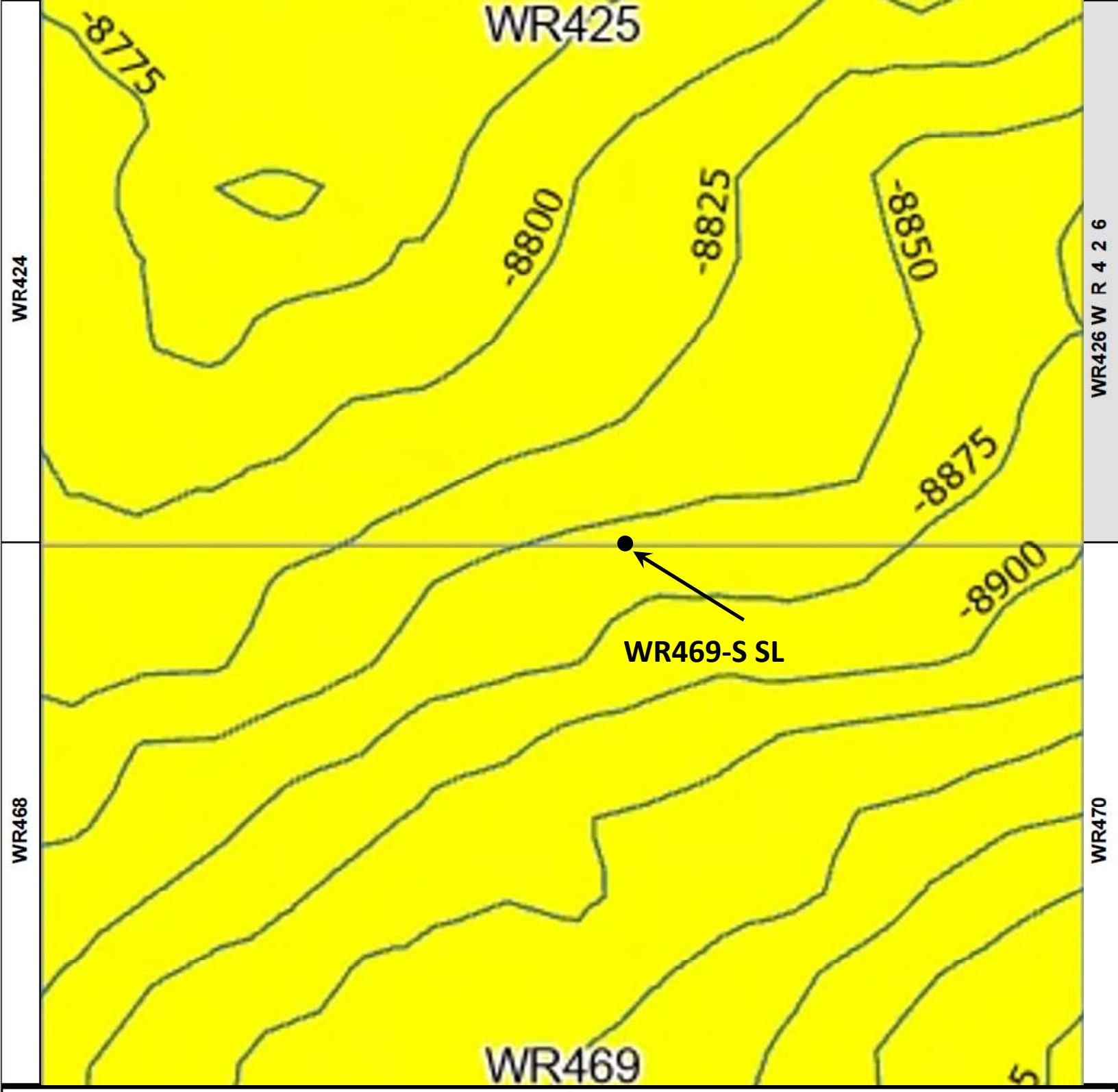
NAD 1927 UTM Zone 15N

MURPHY

Walker Ridge
Block 425 OCS-G16987

Chinook
WR425-S
Locator Map

Public



MURPHY

Walker Ridge
Block 425 OCS-G16987
Block 469 OCS-G16997

Chinook
WR425-S
Bathymetry Map

Public

Outlook

[EXTERNAL] Pay.gov Payment Confirmation: BOEM Exploration Plan - BF

From notification@pay.gov <notification@pay.gov>
Date Mon 3/2/2026 2:17 PM
To Kelli Pratt <Kelli_Pratt@murphyoilcorp.com>

An official email of the United States government

Your payment has been submitted to Pay.gov and the details are below. If you have any questions regarding this payment, please contact Bert Readinger at (703) 787-1863 or bseefinanceaccountsreceivable@bsee.gov.

Application Name: BOEM Exploration Plan - BF
Pay.gov Tracking ID: 2804FMTM
Agency Tracking ID: 77314132789
Transaction Type: Sale
Transaction Date: 03/02/2026 03:13:13 PM EST
Account Holder Name: Kelli Pratt
Transaction Amount: $4,823.00
Card Type: MasterCard
Card Number: **********1951

Region: Gulf of America
Contact: Kelli Pratt (832) 316-8430
Company Name/No: Murphy Exploration and Production - USA, 02647
Lease Number(s): 16987, 16997
Area-Block: Walker Ridge WR,425: Walker Ridge WR,469
Surface Locations: 1

THIS IS AN AUTOMATED MESSAGE. PLEASE DO NOT REPLY.

Pay.gov is a program of the U.S. Department of the Treasury, Bureau of the Fiscal Service

SECTION A
GENERAL INFORMATION

(a) Applications and permits
No additional applications or permits from other agencies are required at this time to be submitted and approved other than an Application for Permit to Drill (APD) to the BSEE New Orleans District.

(b) Drilling fluids
Drilling fluids to be used for this well are described in Table 1 under Section E "Solid and Liquid Wastes and Discharges" of this plan.

(c) Chemical products
Please see Table 1 "Generated Wastes which will be Treated, Disposed of Downhole or Discharged to the GOM" and Table 2 "Wastes you will transport and/or dispose of onshore".

(d) New or unusual technology
Murphy does not propose to use any new or unusual technology as described under 30 CFR 550.200 to carry out the proposed exploration activities.

(e) Bonds, oil spill financial responsibility, and well control statements
The bond requirements for the activities and facilities proposed in this Supplemental EP are satisfied by an *areawide development* bond, furnished and maintained according to 30 CFR 556.900, Subpart I; and if determined by the Regional Director, provide additional under 30 CFR 556.901(d).

Murphy (Operator No. 02647) is of sound financial strength and reliability and has demonstrated oil spill financial responsibility (OSFR) according to 30 CFR 553 for the activities planned in this Supplemental EP. In accordance with 30 CFR 553.29(a), Murphy is insured for *$150,000,000*. This financial reliability ensures that Murphy has the capability to deal with emergency situations such as blowout control, including relief well drilling and kill operations, if such an unlikely event should occur.

Murphy has the financial capability to drill a relief well and conduct other emergency well control operations.

(f) Suspension of operations
Murphy does not anticipate filing a suspension of operations for the activities being proposed under this plan. Leases OCS-G 16987 and OCS-G 16997 are held under Unit Contract No. 754306013.

(g) Blowout scenario
The scenario that presents the potential worst-case discharge rate for the proposed wellbore is expected to occur when the drill string has been pulled from the hole after having drilled the 10-5/8" open hole section through the objective sands. It is assumed the well has experienced a kick and attempts at initiating shut-in procedures have failed, thus rendering the BOPs ineffective. This situation presents an unrestricted flow of hydrocarbons to surface with an initial flow rate of 68,000 BOPD within the first 24-hour period.

In the event of a worst-case discharge situation, there will be some gradual depletion in the reservoir and the well will gradually decline in production. However, to come up with a more conservative estimate, the reported worst-case discharge is based on the WCD rate multiplied by the estimated relief well days.

Estimated Flow Rate of the Potential Blowout

Category	
Type of Activity	Drilling
Facility Location	WR 425 (Surface Location)
Facility Designation	MODU
Distance to Nearest Shoreline	173 miles
Uncontrolled Blowout	68,000 lbs/day
Type of Fluid	Crude

Maximum Duration of Potential Blowout

Category	
Duration of flow (days)	107 days
Total Volume of Spill (bbls)	7,276,000

Potential of Wellbore to Bridge Over During a Blowout:
There is potential for the wellbore to bridge over during the WCD blowout. However, there is little internal data to definitively support such an assumption. If any water zones are exposed, this will accelerate wellbore collapse and bridging.

Discussion of Likelihood for Surface Intervention to Stop Blowout:
The well will be drilled as a subsea well in approximately 8,835 feet of water with the wellhead and BOP equipment located at the mudline. Surface intervention would be the preferred method of intervention pending an uncontrolled blowout; however, the technique used would be contingent upon the condition of the rig, marine riser system and BOP equipment. Surface intervention is a quicker solution than drilling a relief well, but actual methodology of controlling the blowout would have to be determined pending an analysis of the site-specific conditions at the location.

A team of specialists would be mobilized immediately to assess the situation and determine a corrective course of action to control the blowout. Well control specialists would perform either a fly-by via helicopter and/or surface vessel to assess conditions at the site. An ROV spread capable of manipulating the rig's BOP hot-stab functions would be mobilized to location and, if appropriate, an attempt would be made to shut in the well by closing the blind shear rams. These actions would take place within 24-48 hours of the incident. Initial assessment activities are projected to take 3-5 days. During this period, the well control team would analyze the blowout situation, devise an intervention strategy and mobilize additional service company specialists, supplies and equipment. A field support base in Fourchon, LA and secondary command center near the coast would be arranged and would have communication established simultaneously during this assessment period.

Discussion of the Likelihood of Subsea Intervention to Stop the Blowout:
Subsea interference would be the likely method of intervention pending an uncontrolled blowout, however; the technique used would be contingent upon the condition of the rig, marine riser system and BOP equipment. An ROV may be used to shift the blind/shear rams in the BOP stack to the closed position, thereby allowing the damaged riser system to be removed and a capping mechanism to be put in place, if applicable. Murphy has a contract in place with HWCG, LLC (HWCG). In the event of a blowout, a capping stack may be mobilized to the location. If discharge is occurring at a rate that prevents the well from being shut in, hydrocarbon collection at the source would occur during relief well drilling operations.

Discussion of Drilling a Relief Well:
Murphy Exploration & Production Company - USA (Company No. 02647) has the financial capability to drill a relief well and conduct other emergency well control operations. Should a relief well be necessary,

there are rigs rated and equipped to drill in water depths of 8,835 feet or greater currently working in the Gulf of America. Travel time to the location would be dependent upon current operations of the rig and the distance to the well location. The time required to drill the relief well will be dependent on many factors, chief among them is the required depth of the relief well. The deepest anticipated depth of the relief well would be in the situation where it was required to intersect the blown-out well at its final target depth. The probable directional nature of the relief well could nominally increase its measured depth compared to the blown-out well. In order to intersect the blown out well, numerous ranging runs will be required which will add approximately three weeks to the drilling programs. The steps and time required to accomplish the dynamic kill are also dependent on the particular circumstances of the blown-out well.

Example Relief Well Timetable	
Activity	**Duration (days)**
Assess the situation and chose the optimum rig	2
Secure the rig's current well	10
Travel time	3
Drill relief well	60
Intersect the blowout well	20
Dynamically kill the well	12
TOTAL ANTICIPATED DAYS 107	

It is assumed that a rig is not immediately available to mobilize to location to commence drilling a relief well. The estimated mobilization time of a rig to the wellsite location incorporates the suspension of activities by another operator before the rig can be released for relief well operations. Murphy will support relief well drilling operations using in-house resources supplemented with diversified engineering consulting firms who would provide drilling operations, engineering, logistical and materials management; QA/QC and wellsite supervision support. In addition, Murphy will select a well control specialty company and prepare a conceptual "Relief Well Plan" specific to the well. The plan will address the calculated blowout rate, selection of surface location, directional planning intercept strategy and dynamic kill design. Casing design, directional drilling, trajectory planning and magnetic ranging techniques, as well as multiphase simulation of the blowout will be considering factors in planning the relief well.

Rig Package Constraints:

- The rig chosen to drill the relief well must be capable of operating in water depths of 8,000 to 9,000 feet of water.
- The rig chosen to drill the relief well must have a BOP package acceptable and certified. under current BOEM/BSEE regulations.
- The rig chosen should have managed pressure drilling (MPD) capability.
- There are no facilities within the surrounding area of well locations; therefore, a relief well will be unable to be drilled from a nearby platform.
- Due to proximity to shore (~174 miles) a relief well cannot be drilled from an onshore location.

Potential Rigs Capable of Drilling a Relief Well:

Contractor	Rig	MPD Capable	Current Operator
Diamond Ocean	Blackhawk	Yes	Anadarko Petroleum Corporation
Diamond Ocean	BlackLion	Yes	BP Exploration & Production Inc.
Diamond Ocean	West Vela	Yes	Talos QN Exploration LLC
Seadrill	West Neptune	Yes	LLOG Exploration Offshore LLC
Stena	Evolution	Yes	Shell Offshore Inc.

Transocean	Deepwater Asgard	Yes	Hess Corporation
Transocean	Deepwater Atlas	Yes	BOE Exploration & Production LLC
Transocean	Deepwater Invictus	Yes	BP Exploration & Production Inc.
Transocean	Deepwater Thalassa	Yes	Shell Offshore Inc.
Transocean	Deepwater Titan	Yes	Chevron USA Inc.

There are currently 10 individual rigs currently working in the Gulf of America that could be capable of drilling a relief well at this location.

(h) Contact information

Name	Title	Phone Number	Email
Brenda Montalvo	Supervisor, Environmental and Regulatory	(713) 798-0481	Brenda_montalvo@murphyoilcorp.com

SECTION B
GEOLOGICAL AND GEOPHYSICAL

(a) Geological description
Proprietary Information.

(b) Structure contour map(s)
Proprietary Information.

(c) Two dimensional (2-D) or three-dimensional (3-D) seismic lines
Proprietary Information.

(d) Geological cross-sections
Proprietary Information.

(e) Shallow hazards report
A shallow hazards report for the Chinook Prospect which includes Blocks 425 (G16987), 426 (G16988), 469 (G16997), and 470 (G16998), Walker Ridge Area, Gulf of America, was prepared by Fugro Geoservices, Inc. in 1999, (Report No. 2499-2045) and the geohazard report "Seafloor and Geologic Assessment, Cascade and Chinook Development Areas, Blocks 160-162, 203-208, 247-252, 293-295, 337-338, 381-382, 425-426, and 469-470, Walker Ridge Area Gulf of America" prepared by GEMS in 2007 (Report No. 1106-1257b).

(f) Shallow hazards assessment
A shallow hazards assessment/site clearance has been prepared for the proposed surface location, evaluating seafloor and subsurface geological and manmade features and conditions that may adversely affect drilling operations and is included as ***Attachments B-1.***

(g) High resolution seismic lines
Proprietary Information.

(h) Stratigraphic column
Proprietary Information.

(i) Time-versus depth chart
Proprietary Information.

(j) Geochemical information.
Proprietary Information.

(k) Future G&G activities
Proprietary Information.

A Geosyntec Company

15810 Park Ten Place, Suite 100
Houston, Texas 77084
832.603.4352
www.geosyntec.com

May 13, 2025 Project No.: GHZ1095

Murphy Exploration & Production Company
9805 Katy Freeway
Houston, Texas 77024

Attention: Mr. Tom Wichman

Site Clearance Letter,
Proposed Wellsite WR425-R,
Block 425 /469 (OCS-G-16987 and -16997),
Walker Ridge Area,
Gulf of Mexico

Murphy Exploration & Production Company (Murphy) contracted Geoscience Earth & Marine Services (GEMS), a Geosyntec Company, to provide an assessment of the seafloor and shallow geologic conditions to determine the favorability of drilling operations for the Proposed Wellsite WR425-R (OCS-G-16987), whose surface location is in Block 469 (OCS-G-16997), Walker Ridge Area (WR), Gulf of Mexico. This letter addresses specific seafloor and subsurface conditions around the proposed location to 6,000 ft below the mudline (bml).

Seafloor conditions appear favorable within the vicinity of the proposed surface location. There are no potential sites for deepwater benthic communities within 2,000 ft. The proposed well is in close proximity to existing oil field infrastructure. In addition, four sonar contacts, all over 1,400 ft from the proposed site, are not considered archaeologically significant. Based on seismic characteristics and regional information, there is a Negligible to Low potential for encountering overpressured sands and a Negligible to Low potential for shallow gas within the Limit of Investigation. This letter provides details specific to the well location, including available data, Notice to Lessees (NTL) requirements, man-made features, and wellsite conditions.

Proposed Well Location

The surface location for the Proposed Wellsite WR425-R lies along the northern border of WR 469. Murphy provided the following coordinates:

Table 1. Proposed Location Coordinates for Proposed Wellsite WR425-R

Proposed Wellsite WR425-R			
Spheroid & Datum: Clarke 1866, NAD27 Projection: UTM Zone 15 North (ft)		Line Reference	Block Calls WR 469 (ft)
X: 2,447,902 ft	Latitude: 26º 31’ 10.8694” N	Inline 4307	7,298 ft FEL
Y: 9,630,697 ft	Longitude: 90º 31’ 48.8209” W	Crossline 8304	23 ft FNL

Murphy plans to drill this well using a dynamically positioned drilling vessel. Our assessment addresses the seafloor conditions within a 2,000-ft radius around the proposed wellsite location.

Available Data

The following discussion is based on findings provided within the main body of the geohazard report “Shallow Hazards Report, Chinook Prospect, Blocks 425, 426, 469, and 470, OCS-G-16987, G-16988, G-16997, and G-16998, Walker Ridge Area, Gulf of Mexico” prepared by Fugro Geoservices, Inc., in 1999, (Report No. 2499-2045) and the geohazard report “Seafloor and Geologic Assessment, Cascade and Chinook Development Areas, Blocks 160-162, 203-208, 247-252, 293-295, 337-338, 381-382, 425-426, & 469-470, Walker Ridge Area, Gulf of Mexico” prepared by

GEMS in 2007 (Report No. 1106-1257b). The text, maps, and figures included in the geohazard reports mentioned above provide details on the regional geology of the area of interest.

Murphy provided an additional, higher frequency, exploration 3-D seismic depth dataset to GEMS under the seismic name "ShallowHazard_GT_Kirchhoff_Full_Enh_SBAL_FullSt_sofmh_attriib_9_15" for an extended geohazard analysis of the area around proposed wellsites in 2020 (GEMS, 2021). The 3-D seismic volume covers portions of Federal Lease Blocks WR 381, 425, 426, 469, and 470. Additional 3-D data from this survey were provided by Murphy in 2024 to cover proposed wellsites in WR 469 (Figure WR 425-R-1). Horizons identified in the previous investigations were mapped in the new Study Area as well has feature identifications and amplitude extractions. The interpretations from this seismic volume supplement Fugro's 1999 shallow hazards analysis.

Additionally, a high-resolution survey using an autonomous underwater vehicle (AUV) was conducted over the Cascade-Chinook Development area from December 2006 to January 2007 by C & C Technologies, Inc. (C & C) that included all or portions of WR Blocks 160-163, 204-207, 248-251, 293-295, 338-339, 382-383, 426-427, and 470-471. C & C's C-Surveyor II Hugin 3000 AUV collected 472 line miles of data in the survey area. The AUV survey data included 2-16 kHz chirp subbottom profiler (SBP), 120-kHz side-scan sonar (SSS), and a 3-meter (10-foot) bin multibeam bathymetry (MBE). The AUV data, along with geotechnical samples acquired in 2006 and 2007, were used to identify the seafloor and shallow subsurface geologic and geotechnical conditions within the Cascade and Chinook areas (GEMS, 2007). The AUV datasets over the Chinook Development area were also used to complete the archaeological assessment. GEMS submitted the archaeological assessment to Petrobras in June 2014 under Project No. 0314-2368.

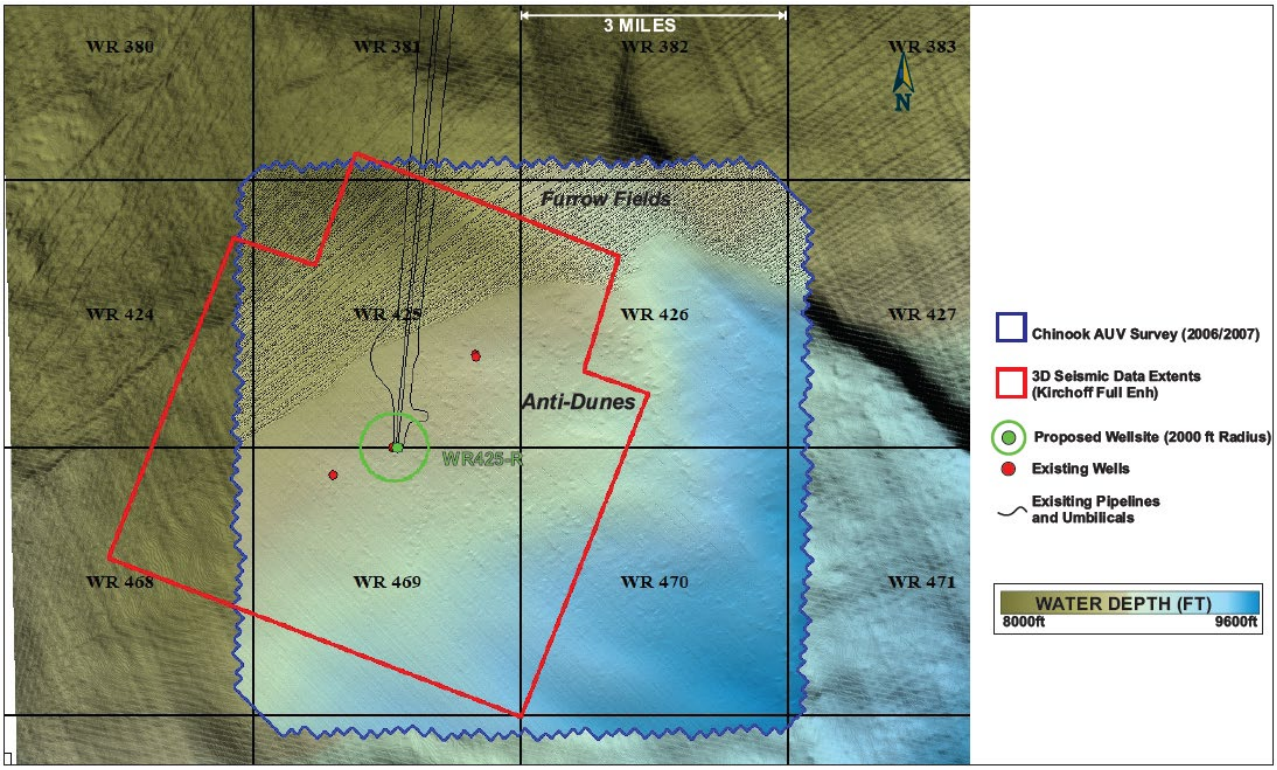


Figure WR 425-R-1. Seafloor Rendering of the Walker Ridge Survey Area Showing the Location of the Proposed Wellsite WR425-R, Whose Surface Location is in Walker Ridge Area Block 469.

NTL Requirements

The following report complies with the Bureau of Ocean Energy Management (BOEM) guidelines including: NTL 2008-G04, NTL 2009-G40, and NTL 2022-G01 (MMS, 2008, 2010, BOEM, 2022) with respect to benthic community and shallow hazard assessments. WR 425 and 469 are not located within a Military Warning Area (BOEM, 2014) or an Ordnance Dumpsite Area.

Mitigation guidelines historically required an archaeological assessment of all surveyed blocks prior to any bottom disturbing activities. An archeological assessment of the area of potential effect around the proposed surface location may be required as per NTL 2020-G05 (BOEM, 2020). GEMS (2014) prepared an archaeological assessment in the area to comply with the Archaeological Resource Surveys and Reports requirements. The assessment covered WR 425-426 and WR 469-470 using AUV data collected in 2006 and 2007 and used initially for development planning for the Cascade and Chinook fields (GEMS, 2007).

As specified in NTL 2022-G01 (BOEM, 2022), GEMS extracted the power spectrum diagram from the 3-D seismic dataset provided at the proposed wellsite (Figure WR425-R-2). The extraction was generated within a 2,000-ft radius of the intersection of the inline and crossline at the proposed wellsite. The extraction interval consisted of the seafloor to ~2,500 ft below the mudline. We converted the amplitude vs. frequency spectrum, generated by the IHS Kingdom software, to power vs. frequency by squaring the amplitude values as described by J. A. Coffeen, 1978. The frequency bandwidth at 50% power ranges from 8 Hz to 131 Hz.

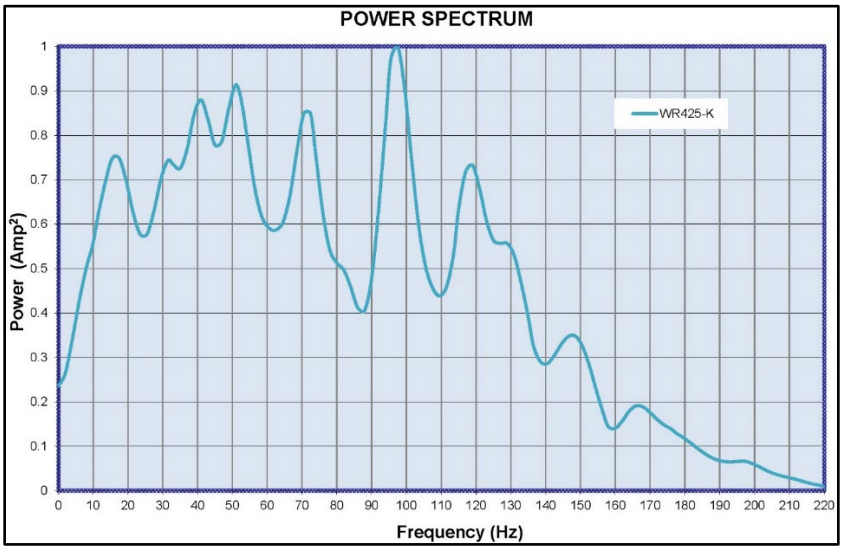


Figure WR425-R-2. Power Spectrum Curve, Proposed Wellsite WR425-R in Walker Ridge Block 469

Man-Made Features

The proposed wellsite WR425-R is an addition to the existing Chinook oilfield infrastructure (Map WR425-R-1). The proposed wellsite is within a few hundred feet of an existing PLET, manifold and the sites of several production wells, pipelines, and umbilicals.

Archaeological Assessment

An archaeological assessment was completed over portions of WR 425-426 and WR 469 and 470 using AUV data collected in 2006-2007 (GEMS,2014). The archaeological assessment defined a total of 214 unidentified side-scan sonar contacts. The unidentified contacts are generally small objects interpreted to represent modern debris from shipping, storms, fishing, geologic and exploration activities. There are four unidentified sonar contacts within 2,000 ft of the proposed WR425-R wellsite (Table 2 and Maps WR425-R-2, -4, and -5).

Table 2. Side-Scan Sonar Contacts within 2,000 ft of Proposed Wellsite WR425-R in Walker Ridge Block 469

Contact No.	Area/Block	Length (ft)	Width(ft)	Height (ft)	Description	NAD 27 (UTM 15 N)		Offset from WR425-R
						X (ft)	Y (ft)	
98	WR 425	14.1	2	0	Linear	2,448,401	9,632400	1,775 ft /NNE
101	WR 425	19.4	3	0	Linear	2,448,367	9,632,058	1,439 ft /NNE
103	WR 425	10.7	1	0	Linear	2,447,154	9,631,953	1,462 ft /NNW
105	WR 425	10.2	2.5	0	Linear	2,447,130	9,631,873	1,407 ft /NNW

No potential submerged cultural resources were found in the area of potential effect (APE) for the proposed wellsite (GEMS, 2014). BOEM's database lists no known archaeological sites within the well's APE. Should any potentially historic materials such as textiles, wood, ceramics, or other items be uncovered during operations in the area, all operations must cease and BOEM be notified within 48 hours.

Wellsite Conditions

The Proposed Wellsite WR425-R is located on the upper continental rise about nine miles southeast of the Sigsbee Escarpment. The proposed location is clear of any major constraining geologic seafloor conditions as defined by the AUV and 3-D seismic data sets (Maps WR425-R-2 and K-5). The seafloor in the area has been the subject of intense bottom currents as evidenced by furrows and anti-dune bed forms. The shallow stratigraphy to the Limit of Investigation (LOI) will primarily consist of interbedded hemipelagic clays, mass-transport complexes, and turbidites

composed of predominately clays and silts. Sand layers are possible within the turbidites and channel overbank/levee deposits.

Water Depth and Seafloor Conditions. The water depth at the proposed surface location is about -8,835 ft and slopes to the south-southeast at about 1.2° (Map WR425-R-1). The seafloor is slightly irregular at the proposed wellsite (Map WR425-R-2). Strong bottom currents have differentially eroded the seafloor and shallow sediments resulting in scattered areas comprised of randomly distributed bed forms called "anti-dunes". Existing box and piston core data in the area recovered very soft clay with high moisture contents and very low shear strengths to approximately 17 ft bml (GEMS, 2007).

The seafloor at the proposed wellsite appears feasible given the observed geologic and geotechnical conditions. The topography of the anti-dunes, and seafloor currents that cause them, should be considered for development planning purposes.

Deepwater Benthic Communities. Federal Lease Blocks WR 425 and 469 and the adjacent blocks are not designated as having high-density deepwater benthic communities (MMS, 2010). No features or areas were interpreted within 2,000 ft of the proposed location that are capable of supporting high-density chemosynthetic or other deepwater benthic communities (Maps WR425-R-2, K-3, and K-4).

The Side-Scan Sonar Mosaic and Seafloor Amplitude Rendering (Maps WR425-R-3 and K-4) show normal or ambient returns along the seabed with no indication of any hard-bottom conditions within 2,000 ft of the proposed well.

Stratigraphy. The stratigraphy at the proposed well location is depicted on Illustrations WR425-R-1 through WR 425-R-3. The Tophole Prognosis Chart (Illustration WR425-R-3) shows the inline, annotated with calculated depths to the various horizons and predicted lithology of the sequences, along with their potential for shallow gas and SWF. Similar stratigraphy and drilling conditions observed at the existing Chinook production wells are likely to exist at the proposed wellsite.

he high resolution subbottom profiler (SBP) data collected with an AUV define, in detail, the upper approximate 200 ft of section beneath the mudline at the proposed wellsite (Illustration WR425-R-1). The uppermost ~7 ft of sediment at the proposed wellsite is a drape consisting of high-water content clays followed by primarily layered, normally consolidated hemipelagic clays and silts to approximately 200 ft bml (GEMS, 2007). A relatively thin (7 ft) clay-rich, mass-transport deposit occurs at a depth of 45 ft to 52 ft bml.

The top of the regionally mapped Triplet is identified in the SBP data at approximately 30 ft bml. The Triplet sediments were deposited around 19,000 yrs ka, around the time of the Last Glacial Maximum when rivers delivered a large volume of sediment to the continental slope, and it represents the transition of late Pleistocene (low-stand) and current Holocene (high-stand) sediments (Stanley, 2018). The shallow sediments at the proposed well location should provide an adequate foundation for bottom-founded structures.

The stratigraphy from 200 ft bml to the LOI (6,000 ft bml) consists primarily of turbidites and mass-transport deposits (Illustrations WR 425-R-2 and WR 425-R-3). Channel fill, levee, and overbank deposits occur within Units 4 and 6 (WR425-R-3). Thin sand layers may be encountered within the interlayered channel and overbank sequences within Unit 4 (Horizon 20 to Horizon 30) and Unit 6 (Horizon 40 to the LOI).

Faults. A vertical wellbore at the Proposed Wellsite WR425-R is not expected to intersect any seafloor or buried faults to the LOI (Illustrations WR425-R-1 through WR425-R-3).

Gas Hydrates, Shallow Gas, and Shallow Water Flow. Significant shallow gas and SWF are not likely to be encountered within the shallow sediments from the seafloor to the LOI (Illustration WR425-R-3). The potential for gas hydrates, SWF, and shallow gas is considered Negligible to Low.

Gas Hydrates. There is a Negligible risk of hydrocarbon macro seepage and shallow gas hydrates in the vicinity of the proposed well location.

Shallow Gas. The proposed well path will not penetrate any interpreted high-amplitude events from the seafloor to the LOI (Map WR425-R-5 and Illustration WR425-R-3). In general, moderate-amplitude reflectors within some of

the turbidite and channelized intervals may indicate coarse-grained sediments, and minor amounts of biogenic gas may be encountered but significant pressures are not indicated based on the seismic data.

Unit 1 (Seafloor to Horizon 05: 0 to 202 ft bml), Unit 2 (Horizon 05 to Horizon 10: 202ft to 1,542 ft bml) and Unit 3 (Horizon 10 to Horizon 20: 1,542 to 1,912 ft bml) are, in general, clay-rich turbidites and mass-transport deposits. These units have a Negligible potential for encountering shallow gas at the proposed wellsite.

Unit 4 (Horizon 20 to Horizon 30: 1,912 ft bml to 2,653 ft bml) consists of interbedded channel and overbank deposits. Thin sand layers and pockets may occur within channel fill and overbank intervals. Unit 4, at the proposed wellsite has a Low potential for shallow gas.

Unit 5 (Horizon 30 to Horizon 40: 2,653 ft bml to 3,000 ft bml) consists mainly of clay-rich turbidites. However, the upper ~100 ft of Unit 5, in places, shows chaotic reflections indicative of small channels and mass-transport deposits with varying amplitudes. Small amplitude events within Unit 5 occur about 550 ft to the southeast of the proposed wellsite at about 2,750 ft bml (Map WR425-R-5). Unit 5, at the proposed wellsite has a Low potential for shallow gas.

Unit 6 (Horizon 40 to the LOI: 3,000 ft bml to 6,000 ft bml) consists of intervals of low-amplitude, stratified, clay-rich turbidites intercalated with mass-transport deposits at the top and mid to lower portion of the unit. Discontinuous reflections of varying amplitudes occur in the middle and at the base of Unit 6 (Illustration WR425-I-2 and I-3). The discontinuous reflections consist of channel deposits, mass-transport deposits and some turbidites. Sediments will be a mixture of sand, silt, and clay. Small amplitude events occur approximately 575 ft northwest of the proposed site in Unit 6 at about 4,825 ft bml. The amplitude events occur within interlayered turbidite and mass-transport deposits and may indicate minor amounts of biogenic gas within potential sand layers. Unit 6 has a Low potential for shallow gas at the proposed wellsite.

Shallow Water Flow. There is a Negligible to Low potential for SWF at the proposed wellsite. The highest potential for sand accumulations is within the channelized intervals. Any sand layers encountered within the channel, overbank, and mass-transport deposits are expected to be discontinuous and will not likely produce sustained flows. Additionally, the nearby production wells penetrated similar stratigraphy observed at the proposed wellsite, and SWFs were not reported (BOEM, 2024c).

Unit 1 (Seafloor to Horizon 05: 0 to 202 ft bml), Unit 2 (Horizon 05 to Horizon 10: 202 ft to 1,542 ft bml) and Unit 3 (Horizon 10 to Horizon 20: 1,542 to 1,912 ft bml) are, in general, clay-rich turbidites and mass-transport deposits. These units have a Negligible potential for encountering SWF at the proposed wellsite.

Unit 4 (Horizon 20 to Horizon 30: 1,912 ft bml to 2,653 ft bml) consists of interbedded channel and overbank deposits. Thin sand layers and pockets may occur within channel fill and overbank intervals. Unit 4, at the proposed wellsite has a Low potential for SWF.

Unit 5 (Horizon 30 to Horizon 40: 2,653 ft bml to 3,000 ft bml) consists mainly of clay-rich turbidites. However, the upper ~100 ft of Unit 5, in places, shows chaotic reflections indicative of small channels and mass-transport deposits with varying amplitudes. Unit 5, at the proposed wellsite has a Low to Negligible potential for SWF.

Unit 6 (Horizon 40 to the LOI: 3,000 ft bml to 6,000 ft bml) consists of intervals of low-amplitude, stratified, clay-rich turbidites intercalated with mass-transport deposits at the top and mid to lower portion of the unit. Discontinuous reflections of varying amplitudes occur in the middle and at the base of Unit 6 (Illustration WR425-R-2 and K-3). The discontinuous reflections consist of channel deposits, mass-transport deposits and some turbidites. Sediments will be a mixture of sand, silt, and clay. The low amplitude stratified intervals within Unit 6 have a Negligible to Low potential for SWF. The channel deposits in the middle and at the base of Unit 6 have a Low potential for SWF.

Results

The Proposed Wellsite WR425-R in WR Block 425 appears suitable for exploration drilling operations. Strong bottom currents have differentially eroded the seafloor and shallow sediments surrounding the proposed wellsite, resulting in scattered areas of randomly distributed anti-dunes along the seafloor. The topography of the anti-dunes, and seafloor currents that cause them, should be considered for development planning purposes.

Within 2,000 ft of the proposed location, there are no potential sites for high-density deepwater benthic communities identified.

Existing production wells occur within a few hundred feet of the proposed location. A manifold, pipelines, and umbilicals are associated with these wells. Caution is recommended when working in the vicinity of the existing infrastructure.

Four unidentified sonar contacts occur within 2,000 ft of the proposed wellsite. All contacts are over 1,400 ft from the proposed location, and none are considered potential submerged cultural resources (GEMS, 2014). These contacts likely represent modern debris and is not recommended for archaeological avoidance or investigation; however, a 100 ft geohazard avoidance of all sonar contacts is recommended to avoid damage to equipment and infrastructure. Should any potentially historical materials such as textiles, wood, ceramics, or other items be uncovered during operations in the area, all operations must cease, and the BOEM must be notified within 48 hours.

The subsurface interpretation concluded a Negligible to Low potential for SWF and shallow gas to the LOI (6,000 ft bml). Thin sand seams may be encountered within mass-transport deposits and channel and overbank deposits within Units 4 and 6; however, significant overpressures are not expected. Moderate amplitude reflectors within Units 4, 5, and 6 may indicate coarse-grained sediments, and minor amounts of biogenic gas may be encountered.

Closing

We appreciate the opportunity to be of service to Murphy Exploration & Production Company and look forward to working with Murphy on future projects.

Sincerely,

GEOSCIENCE EARTH & MARINE SERVICES
A Geosyntec Company

Thomas W. Neurauter, PhD, P.G.
Senior Consultant

Daniel Lanier
Senior Principal

Erin Williams Janes
Principal

Attachments (5 Maps and 3 Illustrations)

Distribution:
Mr. Tom Wichman, Murphy Exploration & Production Company, Houston, TX (digital copy)

REFERENCES

Bureau of Ocean Energy Management (BOEM), 2014, Notice to lessees and operators of federal oil, gas, and sulphur leases in the outer continental shelf (OCS), Gulf of Mexico OCS region, Military warning and water test areas: U. S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico Region (GOMR), NTL 2014-G04. Effective Date June 1, 2014.

Bureau of Ocean Energy Management (BOEM), 2020, Notice to lessees and operators of federal oil, gas, and sulphur leases and pipeline right-of-way holders in the outer continental shelf, Gulf of Mexico OCS region, Archaeological resource surveys and reports: U. S. Department of the Interior, Minerals Management Service, Gulf of Mexico, NTL 2005-G07. NTL re-issued by BOEM in 2020.

Bureau of Ocean Energy Management (BOEM) 2022, Notice to lessees and operators of federal oil, gas, and sulphur leases in the outer continental shelf, Gulf of Mexico region, Shallow Hazards Program, NTL 2022-G01. Effective Date October 1, 2022.

Bureau of Ocean Energy Management (BOEM), 2024a, ASCII data files, published on the BOEM Gulf of Mexico Region Homepage, https://www.data.boem.gov/Main/Default.aspx, accessed January 2024.

Bureau of Ocean Energy Management (BOEM), 2024b, Seismic water bottom anomalies map gallery, published on the BOEM Gulf of Mexico Region web page, http://www.boem.gov/Oil-and-Gas-Energy-Program/Mapping-and-Data/Map-Gallery/Seismic-Water-Bottom-Anomalies-Map-Gallery.aspx, accessed January 2024.

Bureau of Ocean Energy Management (BOEM), 2024c, Safety performance review – shallow waterflows can pose significant hazards to deepwater drilling, published on the BOEM Gulf of Mexico Region Homepage, http://www.boem.gov/Oil-and-Gas-Energy-Program/Resource-Evaluation/Geological-and-Geophysical-Reviews/Reviews-Gulf-of-Mexico.aspx, accessed January 2024.

Coffeen, J. A., 1978, Seismic Exploration Fundamentals: Tulsa, the Petroleum Publishing Co., p. 125.

Fugro Geoservices, Inc., 1999, Shallow Hazard Report, Chinook Prospect, Blocks 425, 426, 469, and 470, OCS G 16987, G-16988, G-16997, and G-16998, Walker Ridge Area, Gulf of Mexico, Fugro Report No. 2499-2045. Submitted to Petrobras.

Geoscience Earth & Marine Services (GEMS), 2007, Seafloor and geologic assessment, Cascade and Chinook development areas, Blocks 160-162, 203-208, 247-252, 293-295, 337-338, 381-382, 425-426, & 469-470, Walker Ridge Area, Gulf of Mexico: GEMS Report No. 1106-1257b. Submitted to Petrobras.

Geoscience Earth & Marine Services (GEMS), 2014, Archaeological assessment, Blocks 425-426, & 469-470, Walker Ridge Area, Gulf of Mexico, Project No. 0314-2368. Submitted to Petrobras.

Geoscience Earth & Marine Services (GEMS), 2021, Site Clearance Letter Proposed Wellsite WR 425-O, Block 425 Walker Ridge Area, Gulf of Mexico, Project No. 0621-3044. Submitted to Murphy Exploration & Production Company.

Minerals Management Service (MMS), 2005, Notice to lessees and operators of federal oil, gas, and sulphur leases and pipeline right-of-way holders in the outer continental shelf, Gulf of Mexico OCS region, Archaeological resource surveys and reports: U. S. Department of the Interior, Minerals Management Service, Gulf of Mexico, NTL 2005-G07.

Minerals Management Service (MMS), 2008, Notice to lessees and operators of federal oil, gas, and sulphur leases and pipeline right-of-way holders in the outer continental shelf, Gulf of Mexico OCS region, information requirements for exploration plans and development operations coordination documents: U. S. Department of the Interior, Minerals Management Service, Gulf of Mexico, NTL 2008-G04. NTL re-issued by BOEM in 2020

Minerals Management Service (MMS), 2010, Notice to lessees and operators of federal oil and gas leases in the outer continental shelf, Gulf of Mexico OCS region, deepwater benthic communities: U. S. Department of the Interior, Minerals Management Service, Gulf of Mexico, NTL 2009-G40. Effective Date January 27, 2010.

Stanley, Laura Lee, 2018, The Distribution of the Triplet Reflector in the Northwestern Gulf of Mexico as Observed on High-Resolution Subbottom Profiles. Master's thesis, Texas A&M University.

SECTION C
HYDROGEN SULFIDE

(a) Concentration

Murphy does not anticipate encountering any H2S during the proposed operations being conducted under this Supplemental EP.

(b) Classification

In accordance with 30 CFR 250.490(c) Walke Ridge Blocks 425 and 469 have been classified as an area where the "absence" of H2S has been confirmed.

(c) H2S contingency plan

H2S is neither recorded in the project area, nor anticipated based on subsurface modeling (temperature, sulfate availability). Based on this, there is likely no need for contingencies beyond the use of H2S inhibitors in the mud system and the presence of standard emergency equipment on board the rig. It is not anticipated additional H2S contingency plans will be required.

(d) Modeling report

No H2S documented in the offset wells in and around the project area, nor in nearby producing fields. Expected temperatures are too low for two of four main sources of H2S (thermal cracking, thermochemical sulfate reduction), vertical migrations distance prevents a third (direct change), and inadequate sulfate is present for the fourth (bacterial sulfate reduction). Therefore, no further model reports are needed.

SECTION D
BIOLOGICAL, PHYSICAL, AND SOCIOECONOMIC

(a) Biological environment reports

WR 425 and 469 (Proposed Well Location "S") and the adjacent blocks are not designated as having high-density deepwater benthic communities (MMS, 2010). No features or areas were interpreted within 2,000 ft of the proposed location that are capable of supporting high-density chemosynthetic or other deepwater benthic communities.

(b) Physical environment reports

Proposed Well Location "S"

Existing production wells occur within a few hundred feet of the proposed location. A manifold, pipelines, and umbilical's are associated with these wells. Caution is recommended when working in the vicinity of the existing infrastructure.

Four unidentified sonar contacts occur within 2,000 ft of the proposed wellsite. All contacts are over 1,400 ft from the proposed location, and none are considered potential submerged cultural resources (GEMS, 2014). These contacts likely represent modern debris and is not recommended for archaeological avoidance or investigation; however, a 100 ft geohazard avoidance of all sonar contacts is recommended to avoid damage to equipment and infrastructure.

All activities proposed under this Supplemental EP will be conducted outside all Topographic Feature Protective Zones; therefore, shunting of drill cuttings and drilling fluids is not required per NTL 2009-G39, "Biologically Sensitive Underwater Features and Areas."

Walker Ridge Blocks 425 and 469 are not located within 61 meters (200 feet) of any pinnacle trend feature or potentially sensitive biological features; therefore, a separate bathymetry map or biologically sensitive area map is not required per NTL2009-G39, "Biologically Sensitive Underwater Features and Areas."

(c) Socioeconomic study reports

Murphy will utilize an existing shorebase in Fourchon, Louisiana which is fully staffed and operational and does not expect to employ persons. Murphy also does not expect to purchase major supplies, services, energy, water or other resources for the proposed operations.

SECTION E
WASTES AND DISCHARGES

(a) Projected waste and (b) Projected Ocean discharges

A table providing the name, brief description, projected quantity, and composition of solid and liquid wastes (such as spent drilling fluids, drill cuttings, trash, sanitary and domestic wastes, and chemical product wastes) likely to be generated by the proposed exploration activities is enclosed as Table 1. "Generated Wastes which will be treated, disposed of downhole or discharge to the GOA" for Projected generated wastes and Projected Ocean discharges.

(c) National Pollutant Discharge Elimination System (NPDES) permit

All discharges will be in accordance with Murphy's Region 6 EPA NPDES permit No. GMG29062K.

(d) Modeling report

Murphy did not conduct any modeling of discharges for the projected solid or liquid wastes; therefore, one is not included in this Supplemental EP.

(e) Projected cooling water intake

The proposed exploration activities will not conduct cooling water intake; therefore, this section does not apply.

TABLE 1

GENERATED WASTES WHICH WILL BE TREATED, DISPOSED OF DOWNHOLE OR DISCHARGED TO THE GOM

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

Projected generated waste			Projected ocean discharges		Projected Downhole Disposal
Type of Waste	**Composition**	**Projected Amount**	**Discharge Rate**	**Discharge Method**	**Yes or No**
Will drilling occur? If yes, you should list muds and cuttings					
Water-based drilling fluid	Sodium Chloride brine, barite, sodium chloride powder, xanthan gum	8,000 bbls/well	2000 bbls/well/day	At seabed after being circulated through the well	N/A
Cuttings wetted with water-based fluid	clay, sand	280 bbls/well	140 bbls/well/day	At seabed after being circulated out of the well	N/A
Cuttings wetted with synthetic-based fluid	claystone, sandstone internal olefin based fluid	1050 bbls/well	130 bbls/well/day	Discharged overboard after being treated to meet regulations	N/A
Will humans be there? If yes, expect conventional waste					
Domestic waste (kitchen water, shower water)	grey water	22466 bbls/well	239 bbls/well/day	Remove floating solids and discharge	No
Sanitary water (toilet water)	treated sanitary waste	13010 bbls/well	138.4 bbls/well/day	Chlorinate and discharge	No
Is there a deck? If yes, there will be Deck Drainage					
Deck Drainage	Deck drainage resulting from rainfall	0-4000 bbls/well	15 bbls/hr (max separator discharge)	Treat for oil and gas then discharge	No
Will you conduct well treatment, completion, or workover?					
Well treatment fluids	Gelled Seawater	600 bbls/well	8 bbls/min/well	discharge used fluids overboard	No
Well completion fluids	N/A	N/A	N/A	N/A	
Workover fluids	N/A	N/A	N/A	N/A	N/A
fill in those associated with your					
Desalinization unit discharge	Uncontaminated spent saltwater used for portable water generation unit	128,464 m bbls/well	1835 bbls/day	Discharge overboard	No
Blowout prevent fluid	Completion brine (CaBr2)	12-17 bbls	N/A	Contained	No
Ballast water	Saltwater used for ballast control	6686 bbls/well	6686 bbls/day - 1 day	Discharge overboard	No
Bilge water	Fresh water and salt water overflow/leakage accumulated from machinery operations	977 bbls/well	13.9 bbls/day	Discharge overboard	No
Excess cement at seafloor	N/A	N/A	N/A	N/A	N/A
Fire water	Saltwater	13714 bbls/well	195 bbls/day	Discharge overboard	No
Cooling water	Saltwater	40.7 mm bbls/well	581,510 bbls/day	Discharge overboard	No
Will you produce hydrocarbons? If yes fill in for producted water.					
Produced water	N/A	N/A	N/A	N/A	N/A
Will you be covered by an individual or general NPDES permit?					
NPDES ID: GMG29062K					

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

SECTION F
AIR EMISSIONS

(a) Projected emissions

There are no existing facilities or activities co-located with Murphy's proposed activities; therefore, the Complex Total Emissions are the same as the Plan Emissions and are included within this plan.

Screen Questions for EP's	Yes	No
Is the calculated Complex Total (CT) Emission amount (tons) associated with your proposed exploration activities more than 90% of the amounts calculated using the following formula's: CT = $3400D^{2/3}$ for CO, and CT = 33.3D for the other air pollutants (where D = distance to shore in miles)?		X
Do your emission calculations include any emission reduction measures or modified emission factors?		X
Are you proposed exploration activities located east of 87.5° W longitude?		X
Do you expect to encounter H2S at concentrations greater than 20 parts per million (ppm)?		X
Do you propose to flare or vent natural gas for more than 48 continuous hours from any proposed well?		X
Do you propose to burn produced hydrocarbon liquids?		X

Enclosed in this section are the emissions worksheets prepared in accordance with 30 CFR 550.218.

This information was calculated by:

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

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AREA	Walker Ridge
BLOCK	425
LEASE	OCS-G16987
FACILITY	NA
WELL	S
COMPANY CONTACT	Brenda Montalvo
TELEPHONE NO.	281-798-0481
REMARKS	Drilling and Complete Well Location S

AIR EMISSIONS COMPUTATION FACTORS

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

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

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

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

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

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

AIR EMISSIONS CALCULATIONS - 2ND YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Murphy Exploration & Production Company - USA	Walker Ridge		425	OCS-G16987	NA	S					Brenda Montalvo		281-798-0481		Drilling and Complete Well Location S										
OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR									ESTIMATED TONS								
	Diesel Engines		HP	GAL/HR	GAL/D																				
	Nat. Gas Engines		HP	SCF/HR	SCF/D																				
	Burners		MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
DRILLING	VESSELS- Drilling - Propulsion Engine - Diesel		61800	3179.3628	76304.71	24	150	43.60	26.30	25.51	0.63	1044.59	30.03	0.00	163.84	0.30	78.48	47.35	45.93	1.14	1880.26	54.06	0.01	294.91	0.55
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW			HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
#REF!	**Facility Total Emissions**							**43.60**	**26.30**	**25.51**	**0.63**	**1,044.59**	**30.03**	**0.00**	**163.84**	**0.30**	**78.48**	**47.35**	**45.93**	**1.14**	**1,880.26**	**54.06**	**0.01**	**294.91**	**0.55**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**5,760.90**			**5,760.90**	**5,760.90**	**5,760.90**		**105,562.50**	
	173.0																								
DRILLING	VESSELS- Crew Diesel (2 x week)		7200	370.4112	8889.87	24	43	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	2.62	1.58	1.53	0.04	62.80	1.81	0.00	9.85	0.02
	VESSELS - Supply Diesel (4 x week)		7200	370.4112	8889.87	24	86	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	5.24	3.16	3.07	0.08	125.59	3.61	0.00	19.70	0.04
	VESSELS - Tugs Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
#REF!	**Non-Facility Total Emissions**							**10.16**	**6.13**	**5.95**	**0.15**	**243.40**	**7.00**	**0.00**	**38.18**	**0.07**	**7.86**	**4.74**	**4.60**	**0.11**	**188.39**	**5.42**	**0.00**	**29.55**	**0.05**

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	
Murphy Exploration & Production Company - USA	Walker Ridge	425	OCS-G16987	NA	Drilling of Well Locations S.	

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2026	78.48	47.35	45.93	1.14	1880.26	54.06	0.01	294.91	0.55
Allowable	5760.90			5760.90	5760.90	5760.90		105562.50	

SECTION G
OIL AND HAZARDOUS SUBSTANCE SPILLS

(a) Oil Spill Response Planning

(2)(i) All proposed activities in this Supplemental EP will be covered under Murphy's approved Regional OSRP filed by Murphy Exploration & Production Company – USA, BOEM/BSEE Operator Number 02647, in accordance with 30 CFR 254, approved on November 6, 2023, with most recent modification submitted on January 31, 2025. Murphy's Regional OSRP was found in compliance on March 7, 2025.

(a)(2)(ii) SPILL RESPONSE SITES

Primary Response Equipment Location	Preplanned Staging Location(s)
Houma, LA	Houma, LA
Leeville, LA	Port Fourchon, LA
Venice, LA	Venice, LA

(a)(2)(iii) OSRO INFORMATION

Clean Gulf Associates (CGA) is the primary equipment provider and Marine Spill Response Corporation (MSRC) is a secondary equipment provider for Murphy in the Gulf of American Region. CGA maintains a dedicated fleet of vessels and other equipment permanently located at designated ports. CGA and MSRC have the capability to plan the mobilization and rapid deployment of spill response resources on a 24 hour, 7 days a week basis. The Incident Commander (IC) may use other service companies if additional equipment, materials, and personnel are needed. Refer to **Appendix F of our OSRP** for a listing of potential support services.

(a)(2)(iv) WORST-CASE SCENARIO COMPARISON

Category	Regional OSRP WCD	EP WCD
Type of Activity	>10 Miles Seaward of the Coastline	>10 Miles Seaward of the Coastline
Facility Location (Area/Block)	MC 600	WR 469
Facility Designation	A	S
Distance to Nearest Shoreline (miles)	53	173
Volume Storage tanks (total) Uncontrolled blowout Total Volume	335,032	68,000
Type of Oil(s) (crude, condensate, diesel)	Crude	Crude
API Gravity	30°	30°

Since Murphy has the capability to respond to the worst-case spill scenario included in our Regional OSRP approved on April 19, 2024, with most recent acknowledgement received on March 7, 2025; the worst-case scenario determined for this Supplemental EP does not replace the worst-case scenario in our Regional OSRP, therefore Murphy hereby certifies that we have the capability to respond, to the maximum extent

practicable, to a worst-case spill scenario included in our Regional OSRP resulting from the activities proposed in our Supplemental EP.

(b) 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 68,000 barrels of crude oil with an API gravity of 30°.

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 America 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 Galveston County, Texas, Cameron Parish, Louisiana and/or Plaquemines Parish, Louisiana within 30 days. 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. 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. Plaquemines Parish includes Barataria Bay, the Mississippi River Delta, Breton Sound and the affiliated islands and bays. This region is an extremely sensitive habitat and serves as a migratory, breeding, feeding and nursery habitat for numerous species of wildlife. Beaches in this area vary in grain particle size and can be classified as fine sand, shell or perched shell beaches. Sandy and muddy tidal flats are also abundant.

Response

Murphy 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.

Natural Weathering Data: WR 469, Well Location "S"	**Barrels of Oil**
WCD Volume	68,000
Less 15% natural evaporation/dispersion	10,200
Remaining volume	57,800

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. Please note that **Figure 2** is a list of contractually available equipment, which may be called out in the event of an exercise or spill. However, operations and specific equipment are situationally dependent and may change according to product specifications, weather, and environmental conditions, etc.

Murphy'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, 4 sorties (4,800 gallons) from the DC-3 aircraft 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 194,993 barrels. Temporary storage associated with skimming equipment equals 28,996 barrels. If additional storage is needed, various storage barges with a total capacity 166,882 bbl. may be mobilized and centrally located to provide temporary storage and minimize off-loading time. Additionally, CGA works with the member company's Incident Management Team (IMT), specifically the marine logistics group within the logistics section, to identify and procure Offshore Supply Vessels (PSV/OSV) capable of providing temporary offshore storage to the initial mechanical recovery assets within 12-24 hours, ensuring that devices for the storage of recovered oil are sufficient to allow containment and recovery operations to continue without interruption. If needed, CGA can leverage an internal CGA membership vessel sharing agreement to help locate available Petroleum Industry Dedicated Vessels (PIDV). All OSVs can provide between 20% - 100% of their deadweight in recovered oil storage (4k – 30k bbls) based on the vessel's Certificate of Inspection (COI). **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, Cameron Parish or Plaquemines 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 total derated skimming capacity of 89,511 barrels. Temporary storage associated with skimming equipment equals 1,266 barrels. If additional storage is needed, various storage barges with a total capacity of 117,482 bbl. may be mobilized and centrally located to provide temporary storage and minimize off-loading time. Onshore response may include the deployment of shoreline boom on beach areas, or protection and sorbent boom on vegetated areas. A Master Service Agreement with AMPOL and Letter of Intent from E3 OMI will ensure access to 222,150 feet of 18" shoreline protection boom. **Figure 2** outlines individual times needed for procurement, load out, travel time to the site and deployment. Strategies would be based upon surveillance and real time trajectories that depict areas of potential impact given actual sea and weather conditions. Applicable Area Contingency Plans (ACPs), Geographic Response Plans (GRPs), and Unified Command (UC) will be consulted to ensure that environmental and special economic resources are correctly identified and prioritized to ensure optimal protection. Shoreline protection strategies depict the protection response modes applicable for oil spill clean-up operations. The UC should take into consideration all appropriate items detailed in Tactics discussion of this Appendix. The UC and their personnel have the option to modify the deployment and operation of equipment to allow for a more effective response to site-specific circumstances. Murphy's contract Incident Management Team has access to the applicable ACP(s) and GRP(s).

Based on the anticipated worst case discharge scenario, Murphy 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 78 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

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

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

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

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

- Information will be confirmed
- An assessment will be made and initial objectives set
- OSRO's 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 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 offshore skimming systems
General

- Deployed to the highest concentration of oil
- Assets deployed at a 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 with known debris (seaweed, and other floating materials)

CGA 95' Fast Response Vessels (FRV's)

- 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-shore as safely possible

CGA FRU's

- To the area of the thickest oil
- Use as far offshore 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 offshore as allowed
- VOOs with a minimum of 2,000 bbl. of storage capacity
- VOOs with minimum 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 tugboat 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 Murphy'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 > 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 Guidebook 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 aircraft 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): Murphy 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 are 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/Crew boat (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.

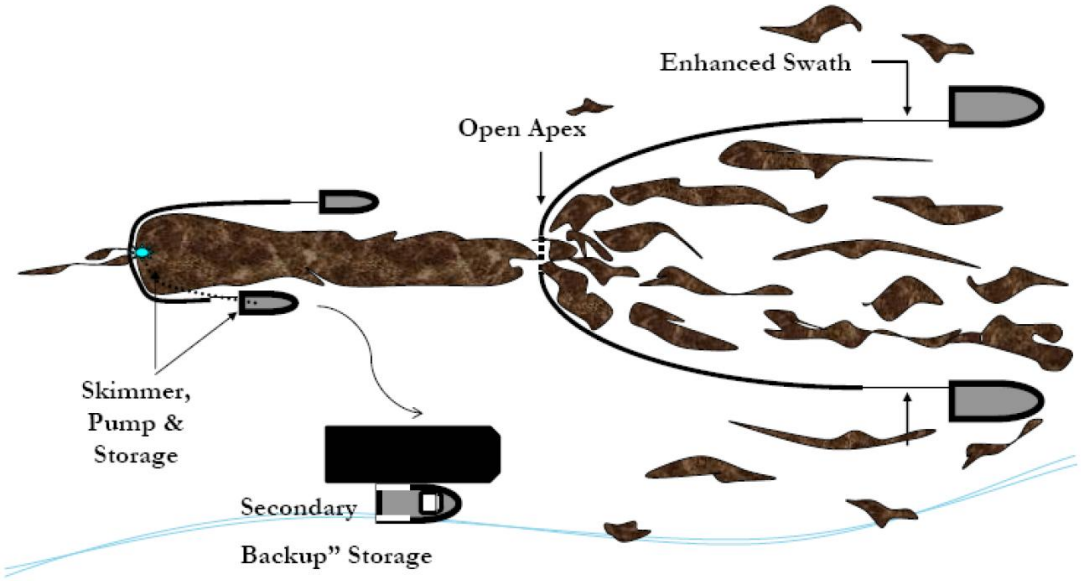
Tactical Overview

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 America. 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 bbl. 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.

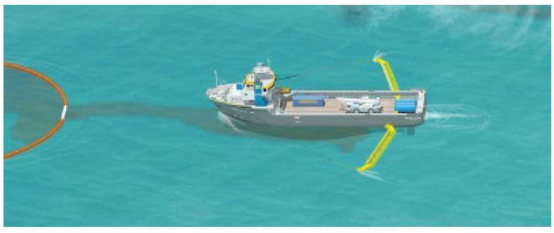
Maximum Sea Conditions - Under most circumstances the larger OSVs are capable of remaining on scene well past the Skimming Arms maximum sea state of 9.8'. Ultimately it will be the decision of the VOO Captain, with input from the T&T Supervisor onboard, to determine when the sea conditions have exceeded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

- Operate with aerial spotter directing systems to observe oil slicks

VOO
- Use Murphy's contracted resources as applicable
- Industry vessels are usually best for deployment of Vessel of Opportunity Skimming Systems (VOSS)
- Acquiring 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
- 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 that 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 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
- Requisition 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 sand, 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., landowners, 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 cleanup of marshes should be 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 roadways
- Discuss and gain approval prior to 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 watercraft
    - Use of communication systems appropriately to ensure command and control of assets
    - Use of appropriate boom in areas that 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 is 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 GOA

Texas
Prevailing winds, waves and currents along the Texas coast are from the southeast and northeast quadrants. 10-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 have a considerable effect on the tides and currents. 15-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 range 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
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 America 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 peak 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 from 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 Murphys WCD and information in the BOEM Oil Spill Risk Analysis Model (OSRAM) for the Central and Western Gulf of America available on the BOEM website using 30-day impact. The results are tabulated below.

Area/Block	OCS-G	Launch Area	Land Segment and/or Resource	Conditional Probability (%)
Drilling and completion of Well Location S in Lease OCS-G 16987, Walker Ridge Block 425, respectively **WR 425, Well Loc S** *173 miles from shore*	*G16987*	*C48*	Matagorda, TX Brazoria, TX **Galveston, TX** Jefferson, TX **Cameron, LA** Vermilion, LA Terrebonne, LA **Plaquemines, LA**	1 1 2 1 2 1 1 2

WCD Scenario – <u>BASED ON WELL BLOWOUT DRILLING OPERATIONS</u> (173 miles from shore)
57,8000 bbl. of crude oil (Volume considering natural weathering)
API Gravity 30°

FIGURE 2 – Equipment Response Time to Walker Ridge 469, Well Loc S

Dispersant/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	1.1	5.1
DC 3	1200	2	Houma	2	2	1.4	5.4
Aero Commander	NA	2	Houma	2	2	1.1	5.1
MSRC							
737-500	4,125	3	Weyers Cave, VA	2	0.5	2.2	4.7
737-500	4,125	3	Moses Lake, WA	2	0.5	4.4	6.9

Offshore Response

Offshore Equipment Pre-Determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs. to Procure	Hrs. to Loadout	Hrs. to GOA	Travel to Spill Site	Hrs. to Deploy	Total Hrs.
CGA											
HOSS Barge	76285	4000	3 Tugs	8	Harvey	6	0	10	23	2	41
95' FRV	22885	249	NA	6	Galveston	2	0	2	16	1	21
95' FRV	22885	249	NA	6	Leeville	2	0	2	9	1	14
95' FRV	22885	249	NA	6	Venice	2	0	2	10	1	15
95' FRV	22885	249	NA	6	Vermilion	2	0	2	12	1	17
Boom Barge (CGA-300) 42" Auto Boom (25000')	NA	NA	1 Tug 50 Crew	4 (Barge) 2 (Per Crew)	Leeville	8	0	4	26	2	40

Recovered Oil Storage Pre-Determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs. to Procure	Hrs. to Loadout	Hrs. to GOM	Travel to Spill Site	Hrs. to Deploy	Total Hrs.
Kirby Offshore (available through contract with CGA)											
DBL 78	NA	80,384	1 Tug	6	Port Arthur	24	12	0	42	0	78
DBL 81	NA	86,498	1 Tug	6	Port Arthur	24	12	0	42	0	78

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 Koseq 502 (1)	4528	4000	1 OSV	2	Galveston	0	12	12	16	0	40
FRU Koseq 502 (5)	22640	20000	5 OSVs	10	Harvey	0	12	12	16	0	40

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs. to Procure	Hrs. to Loadout	Travel to Staging	Travel to Site	Hrs. to Deploy	Total Hrs.
CGA											
Hydro-Fire Boom	NA	NA	8 Utility	40	Harvey	0	24	3	19	6	52
MSRC											
67" Curtain Pressure Boom (53570')	NA	NA	80*	160	Houston	1	2	11	30	1	45
1000' Fire Resistant Boom	NA	NA	3*	6	Galveston	1	4	12	27	6	50
16000' Fire Resistant Boom	NA	NA	3*	6	Houston	1	4	11	30	6	52
2000' Hydro Fire Boom	NA	NA	8*	8	Lake Charles	1	4	7	25	6	43

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

Nearshore Response Louisiana

Nearshore Recovered Oil Storage No Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs. to Procure	Hrs. to Loadout	Hrs. to GOM	Travel to Site	Hrs. to Deploy	Total Hrs.
Kirby Offshore (available through contract with CGA)											
Penn No 80	NA	82,482	1 Tug	6	Port Arthur	24	12	0	6	0	42
Chesapeake	NA	35,000	1 Tug	6	Port Arthur	24	12	0	6	0	42
CGA											
Trinity SWS	21500	249	NA	4	Leeville	2	0	NA	34	1	37
Trinity SWS	21500	249	NA	4	Venice	2	0	NA	52	1	55
46' FRV	15257	65	NA	6	Leeville	2	0	2	7	1	12
46' FRV	15257	65	NA	4	Venice	2	0	2	7	1	12

Staging Area: Cameron

Nearshore Equipment With Staging	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											
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	1.5	2	2	21.5
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

Shoreline Protection

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 Letter of Intent)									
34,050' 18" Boom	13 Crew	26	New Iberia, LA	2	2	3.5	2	12	21.5
16,000' 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
11,800' 18" Boom	5 Crew	10	Gonzales, LA	2	2	9	2	2	17
16,000' 18" Boom	7 Crew	14	Port Arthur, TX	2	2	1.5	2	6	13.5
2,700' 18" Boom	2 Crew	4	Decatur, GA	2	2	20	2	6	32
E3 OMI (available through Letter of Intent)									
11,500' 18" Boom	5 Crew	10	Lake Charles, LA	1	1	2	2	3	9
2,000' 18" Boom	1 Crew	2	Shreveport, LA	1	1	7	2	3	14
9,600' 18" Boom	5 Crew	10	Baton Rouge, LA	1	1	5	2	3	12
12,800' 18" Boom	6 Crew	12	Lafayette, LA	1	1	3	2	3	10
4,200' 18" Boom	2 Crew	4	New Orleans, LA	1	1	7	2	3	14
53,600' 18" Boom	24 Crew	72	Jackson, LA	1	1	10	2	3	17
14,000' 18" Boom	6 Crew	12	Mobile, AL	1	1	10	2	3	17
4,000' 18" Boom	2 Crew	4	Pensacola, FL	1	1	12	2	3	19
5,000' 18" Boom	3 Crew	6	Deer Park, TX	1	1	4	2	3	11
12,000' 18" Boom	6 Crew	12	La Marque, TX	1	1	4	2	3	11
12,000' 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	3.6	1	2	10.6
Bird Scare Guns (12)	NA	NA	NA	2	Aransas Pass	2	2	9.9	1	2	16.9
Bird Scare Guns (24)	NA	NA	NA	2	Vermilion	2	2	2	1	2	9
Bird Scare Guns (24)	NA	NA	NA	2	Leeville	2	2	6.8	1	2	13.8

Response Asset	Total
Offshore EDRC	194,993
Offshore Recovered Oil Capacity	195,878
Nearshore / Shallow Water EDRC	89,511
Nearshore / Shallow Water Recovered Oil Capacity	118,748

(c) Modeling Report

Not required for the location of the activities proposed in this plan.

SECTION H
ALASKA PLANNING INFORMATION

The activities being proposed under this plan are not located in the Alaska OCS Region; therefore, this section does not apply.

SECTION I
ENVIRONMENTAL MONITORING

(a) and (b) Monitoring Systems and Incidental Takes

No incidental takes are anticipated. Murphy implements the mitigation measures and monitors for incidental takes of protected species according to the following notices to lessees and operators from BOEM/BSEE:

- NTL 2015-G03 "Marine Trash and Debris Awareness and Elimination"
- BOEM NTL 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"

National Marine Fisheries Service Biological Opinion of March 13, 2020

Murphy has reviewed the referenced opinion and provides the following to assist BOEM in the evaluation process to ensure the ESA listed species are protected as provided for in the BiOp of March 13, 2020.

The drillship that will be used during drilling and completion operations will have a typical moonpool that is used in all Deepwater Dynamic Positioned Drillships and Semisubmersibles. The moonpool is located in the center of the rig with a rectangular opening measuring. The moonpool's purpose is to allow access to the water to drill, complete and workover wells. This also allows access to run Blowout Preventers to latch up to the well for well control in the event of an emergency. There is no closing mechanism for the moonpool as it is always open to the sea.

In the extremely rare instance that marine life would get entrapped or entangled by equipment in the moonpool, or by any other equipment on the rig, below are mitigations that will be put in place to protect marine life in case there was an incident.

- Monitor video from cameras that are focused on the moonpool area 24 hours a day.
- If endangered marine life is seen in the area, a live video feed will be streamed real-time for additional coverage.
- A marine observer will be used if endangered marine life is seen in the area for additional monitoring.
- If marine life is entrapped or entangled, we can safely lower someone into the moonpool to free it.

In addition, as described above, vessel personnel will maintain a vigilant watch for marine mammals and sea turtles and slow down or stop their vessel to avoid striking protected species. If whales are sighted, maintain a distance of 100 yards (91 meters) or greater from the whale. If the whale is believed to be a North Atlantic right whale, vessel personnel will maintain a minimum distance of 500 yards (460 meters) from the animal. If sea turtles or small cetaceans are sighted, maintain a distance of 50 yards (45 meters) or greater whenever possible. When cetaceans are sighted while a vessel is underway, attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area. Reduce vessel speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel when safety permits. A single cetacean at the surface may indicate the presence of submerged animals in the vicinity of the vessel; therefore, precautionary measures will always be exercised.

Whales may surface in unpredictable locations or approach slowly moving vessels. When vessel personnel sight animals in the vessel's path or in close proximity to a moving vessel, reduce speeds and shift the engine to neutral. Do not engage the engines until the animals are clear of the area. Injured/Dead Protected

Species Reporting Vessel personnel will report sightings of any injured or dead protected species (marine mammals and sea turtles) immediately, regardless of whether the injury or death is caused by the vessel in use. Marine mammals reports will be made to the NMFS Southeast Marine Mammal Stranding Hotline at 1-877-433-8299 and sea turtles to the State Coordinators for the Sea Turtle Stranding and Salvage Network (STSSN). Any injured or dead protected species will be reported to takereport.nmfsser@noaa.gov.

In addition, if the injury or death was caused by a collision with a vessel, BSEE will be notified within 24 hours of the strike by email to protectedspecies@bsee.gov. The report will include date and location (latitude/longitude) of the strike, vessel name, and the species identification or a description of the animal.

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in the Gulf of Mexico
			Lease Area	Coastal	
Marine Mammals					
Manatee, West Indian	*Trichechus manatus latirostris*	E	--	X	Florida (peninsular)
Giant Manta Ray	*Manta birostris*	E	X	--	None
Whale, Blue	*Balaenoptera masculus*	E	X*	--	None
Whale, Finback	*Balaenoptera physalus*	E	X*	--	None
Whale, Humpback	*Megaptera novaeangliae*	E	X*	--	None
Whale, North Atlantic Right	*Eubalaena glacialis*	E	X*	--	None
Whale, Sei	*Balaenopiera borealis*	E	X*	--	None
Whale, Sperm	*Physeter catodon (=macrocephalus)*	E	X	--	None
Whale, Bryde's	*Balaenoptera edeni*	E	X	--	None
Terrestrial Mammals					
Mouse, Beach (Alabama, Choctawatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus*	E	-	X	Alabama, Florida (panhandle) beaches
Birds					
Plover, Piping	*Charadrius melodus*	T	-	X	Coastal Texas, Louisiana, Mississippi, Alabama and Florida (panhandle)
Crane, Whooping	*Grus Americana*	E	-	X	Coastal Texas

Reptiles					
Sea Turtle, Green	*Chelonia mydas*	T,E**	X	X	None
Sea Turtle, Hawksbill	*Eretmochelys imbricata*	E	X	X	None
Sea Turtle, Kemp's Ridley	*Lepidochelys kempli*	E	X	X	None
Sea Turtle, Leatherback	*Dermochelys coriacea*	E	X	X	None
Sea Turtle, Loggerhead	*Caretta caretta*	T	X	X	Texas, Louisiana, Mississippi, Alabama, Florida
Fish					
Sturgeon, Gulf	*Acipenser oxyrinchus (=oxyrhynchus) desotoi*	T	X	X	Coastal Louisiana, Mississippi, Alabama and Florida (panhandle)
Oceanic Whitetip Shark	*Carcharhinus longimanus*	E	X	--	None
Corals					
Coral, Elkhorn	*Acopora palmate*	T	-	X	Florida Keys and Dry Tortugas
Coral, Staghorn	*Acopora cervicornis*	T	-	X	Florida

- NTL 2016-G02 "Implementation of Seismic Survey Mitigation Measure & Protected Species Observer Program"

(c) Flower Garden Banks National Marine Sanctuary (FGBNMS)

Proposed exploration activities are not within the protective zones of the FGBNMS, therefore a description for monitoring the impacts of an oil spill on the environmentally sensitive resources is not included.

SECTION J
LEASE STIPULATIONS

Although Walker Ridge Blocks 425 & 469 did not incur lease stipulations for Leases OCS-G 16987 and 16997, Murphy will operate in accordance with NTL 2015-G03 “Marine Trash and Debris Awareness and Elimination”, NTL 2016-G01, “Vessel Strike Avoidance and Injured/Dead Protected Species Reporting” and NTL 2016-G02 “Implementation of Seismic Survey Mitigation Measure & Protect Species Observer Program”, to minimize the risk of vessel strikes to protected species and report observations of injured or dead protected species, and the prevention of intentional and/or accidental introduction of debris into the marine environment.

SECTION K
MITIGATION MEASURES

(a) Measures taken to minimize or mitigate environmental impacts
Murphy does not plan to use any additional measures beyond those required by the regulations.

(b) Incidental takes
Murphy does not anticipate any incidental takes related to the proposed operations. Murphy implements the mitigation measures and monitors for incidental takes of protected species according to the following notices to lessees and operators from both BOEM and BSEE:

- NTL 2015-G03 "Marine Trash and Debris Awareness and Elimination"
- NTL 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"
- NTL 2016-G02 "Implementation of Seismic Survey Mitigation Measure & Protected Species Observer Program"

SECTION L
SUPPORT VESSELS, OFFSHORE VEHICLES, AND AIRCRAFT

(a) General
Murphy will utilize the most practical, direct route from the shore base as permitted by weather and traffic conditions.

(b) Air emissions
The table below describes the support vessels, offshore vehicles, and aircraft Murphy will use that will operate within 25 miles of our drilling unit.

Type of Vessel	Maximum Fuel Tank Storage Capacity	Maximum Number of Vessels in Area at Any Time	Trip Frequency or Duration
Crew Boat	45,000 gallons	1 vessel	3 trips per week
Supply Boat	85,000 gallons	2 vessels	2 trips per week
Helicopter	350 gallons	1 aircraft	11 flights per week

(c) Drilling fluid and chemical products transportation
Please see *Table 1 "Generated Wastes which will be Treated, Disposed of Downhole or Discharged to the GOM" and Table 2 Wastes you will transport and/or dispose of onshore*".

(d) Solid and liquid wastes transportation
A description of solid and liquid waste transportation is included on *Table 2: "Wastes you will transport and/or dispose of onshore".*

(e) Vicinity Map
A vicinity map is enclosed as ***Attachment L-1***, showing the location of the activities proposed herein relative to the shoreline with the distance of the proposed activities from the shoreline and the primary route(s) of the support vessels and aircraft that will be used when traveling between the onshore support facilities and the drilling unit.

TABLE 1

GENERATED WASTES WHICH WILL BE TREATED, DISPOSED OF DOWNHOLE OR DISCHARGED TO THE GOM

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

Projected generated waste			Projected ocean discharges		Projected Downhole Disposal
Type of Waste	Composition	Projected Amount	Discharge Rate	Discharge Method	Yes or No
Will drilling occur? If yes, you should list muds and cuttings					
Water-based drilling fluid	Sodium Chloride brine, barite, sodium chloride powder, xanthan gum	8,000 bbls/well	2000 bbls/well/day	At seabed after being circulated through the well	N/A
Cuttings wetted with water-based fluid	clay, sand	280 bbls/well	140 bbls/well/day	At seabed after being circulated out of the well	N/A
Cuttings wetted with synthetic-based fluid	claystone, sandstone internal olefin based fluid	1050 bbls/well	130 bbls/well/day	Discharged overboard after being treated to meet regulations	N/A
Will humans be there? If yes, expect conventional waste					
Domestic waste (kitchen water, shower water)	grey water	22466 bbls/well	239 bbls/well/day	Remove floating solids and discharge	No
Sanitary water (toilet water)	treated sanitary waste	13010 bbls/well	138.4 bbls/well/day	Chlorinate and discharge	No
Is there a deck? If yes, there will be Deck Drainage					
Deck Drainage	Deck drainage resulting from rainfall	0-4000 bbls/well	15 bbls/hr (max separator discharge)	Treat for oil and gas then discharge	No
Will you conduct well treatment, completion, or workover?					
Well treatment fluids	Gelled Seawater	600 bbls/well	8 bbls/min/well	discharge used fluids overboard	No
Well completion fluids	N/A	N/A	N/A	N/A	
Workover fluids	N/A	N/A	N/A	N/A	N/A
fill in those associated with your					
Desalinization unit discharge	Uncontaminated spent saltwater used for portable water generation unit	128,464 m bbls/well	1835 bbls/day	Discharge overboard	No
Blowout prevent fluid	Completion brine (CaBr2)	12-17 bbls	N/A	Contained	No
Ballast water	Saltwater used for ballast control	6686 bbls/well	6686 bbls/day - 1 day	Discharge overboard	No
Bilge water	Fresh water and salt water overflow/leakage accumulated from machinery operations	977 bbls/well	13.9 bbls/day	Discharge overboard	No
Excess cement at seafloor	N/A	N/A	N/A	N/A	N/A
Fire water	Saltwater	13714 bbls/well	195 bbls/day	Discharge overboard	No
Cooling water	Saltwater	40.7 mm bbls/well	581,510 bbls/day	Discharge overboard	No
Will you produce hydrocarbons? If yes fill in for producted water.					
Produced water	N/A	N/A	N/A	N/A	N/A
Will you be covered by an individual or general NPDES permit?					
NPDES ID: GMG29062K					

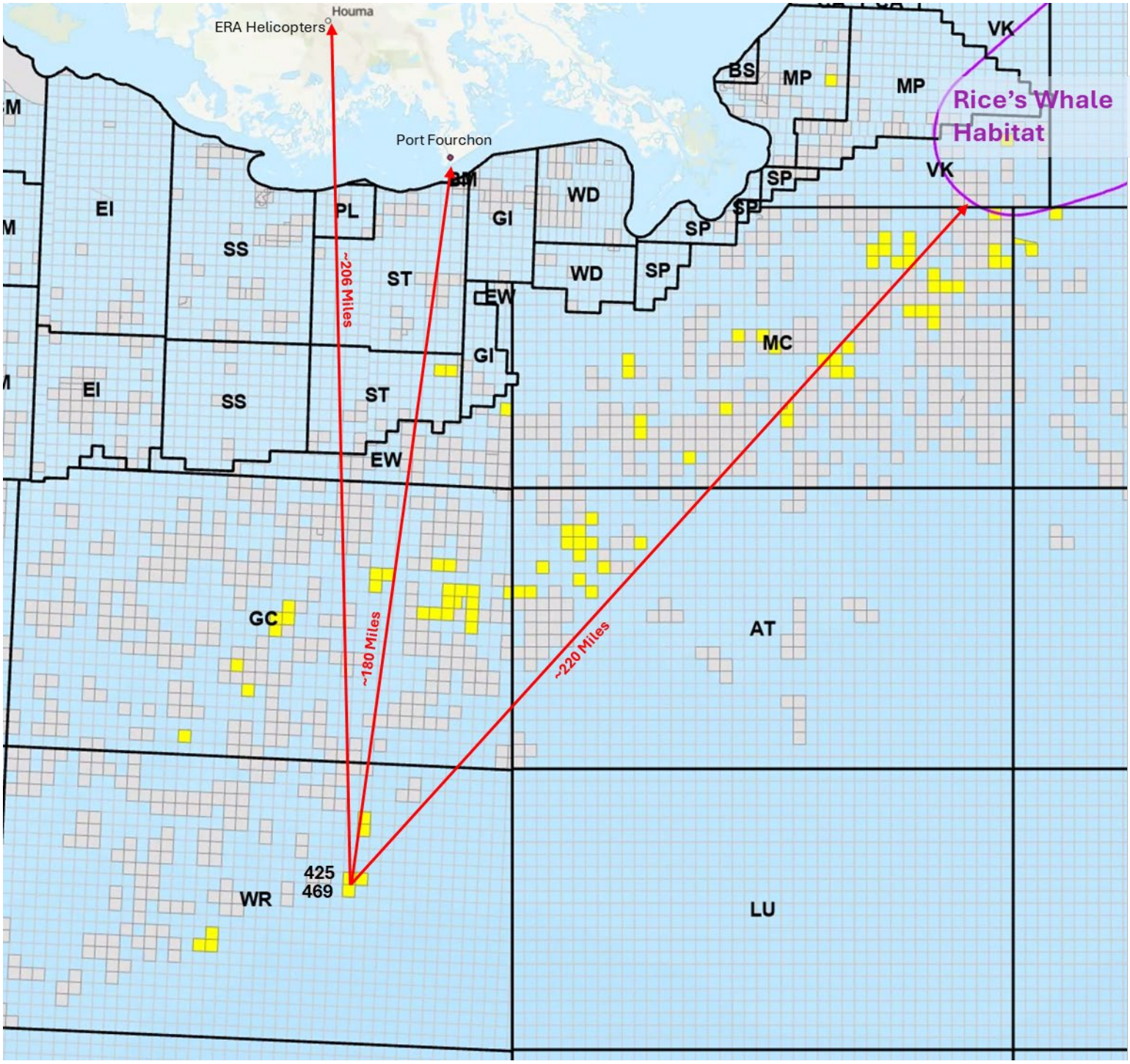
NOTE: If you will not have a type of waste, enter NA in the row.

TABLE 2
WASTES TO BE TRANSPORTED AND/OR DISPOSED OF ONSHORE

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

	Projected generated waste	Solid and Liquid Wastes transportation	Waste Disposal		
Type of Waste	Composition	Transport Method	Name/Location of Facility	Amount	Disposal Method
Will drilling occur? If yes, fill in the muds and cuttings					
Oil-based drilling fluid or mud	N/A	N/A	N/A	N/A	N/A
Synthetic-based drilling fluid or mud	Internal olefin based	Below deck storage tanks on offshore support vessels	MI Drilling Fluids in Fourchon, LA	600 bbls/well	Recycled
Cuttings wetted with Water-based fluid	Clay, sand, containing NaCl, barite and xanthan gum	N/A	Discoverer Deep Seas	280 bbls/well	At seabed after being circulated out of well.
Cuttings wetted with synthetic-based fluid	Claystone, sand, fluid containing internal olefin	N/A	Discoverer Deep Seas	1000 bbls/well	Discharged overboard after being treated to meet regulations.
Cuttings wetted with oil-based fluid	N/A	N/A	N/A	N/A	N/A
Will you produce hydrocarbons? If yes fill in for produced sand.					
Produced sand	N/A	N/A	N/A	N/A	N/A
Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.					
Trash and debris	trash and debris	storage bins on supply boat	Newpark Environmental in Fourchon, LA	500 cu. ft. total	landfill & recycled
Used oil	spent oil from machinery	USCG approved tote tanks	Newpark Environmental in Fourchon, LA	200 bbls/well	Recycled
Wash water	wash water with SBM residue	barged in cutting boxes or mud tanks	Newpark Environmental in Fourchon, LA	2000 bbls/well	disposal well injection or land farm
Chemical product wastes	spent treatment and/or damaged chemicals	barged in cutting boxes	Newpark Environmental in Fourchon, LA	15 bbls/well	Recycled
Displacement spacers	xanthan/biopolymer/solvent/ surfactant/barite	MPTs	Newpark Environmental in Fourchon, LA	1000 bbls/well	disposal well
SBM interface from displacement	Synthetic based mud/spacer	MPTs	Newpark Environmental in Fourchon, LA	100 bbls/well	disposal well
SBM displaced from well for completion operation	Synthetic based mud	storage tanks on supply boat	MI Swaco in Fourchon, LA	7000 bbls/well	reconditioned for later use
Completion brine	CaBr2/MEG	storage tanks on supply boat	MI Swaco in Fourchon, LA	2500 bbls/well	stored for later use
Will you be covered by an individual or general NPDES permit?					
NPDES ID: GMG29062K					

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



MURPHY

Walker Ridge
Block 425 OCS-G16987
Block 469 OCS-G16997

Chinook
WR425-WR469
Vicinity Map

SECTION M
ONSHORE SUPPORT FACILITIES

(a) General

The table below reflects the onshore facilities that will be used to provide supplies and service support for the proposed activities under this plan:

Name of Shorebase	*Location*	*Existing/New/Modified*
Fourchon, LA – Gulf Offshore Logistics	C-Port 2 / OSS Yard (Bldg 18) 180 1st Street Golden Meadow, LA 70357	Existing
Bristows Heliport	Houma, LA	Existing

The distance from Bristows Heliport to the proposed activities under this plan is 183 nautical miles.

(b) Air emissions

A description of the source, composition, frequency, and duration of the air emissions (attributable to our proposed exploration activities) likely to be generated by the onshore support facilities we will use is in the table below.

Type of Vessel	**Maximum Fuel Tank Storage Capacity**	**Maximum Number of Vessels in Area at Any Time**	**Trip Frequency or Duration**
Crew Boat	45,000 gallons	1 vessel	3 trips per week
Supply Boat	85,000 gallons	2 vessels	2 trips per week
Helicopter	350 gallons	1 aircraft	11 flights per week

(c) Unusual solid and liquid wastes

Murphy does not plan to utilize any unusual or unregulated solid or liquid wastes other than what is described in our NPDES permit.

(d) Waste disposal

A description of waste disposal is included on *Table 2: "Wastes you will transport and/or dispose of onshore".*

TABLE 2
WASTES TO BE TRANSPORTED AND/OR DISPOSED OF ONSHORE

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

	Projected generated waste	Solid and Liquid Wastes transportation	Waste Disposal		
Type of Waste	**Composition**	**Transport Method**	**Name/Location of Facility**	**Amount**	**Disposal Method**
Will drilling occur? If yes, fill in the muds and cuttings					
Oil-based drilling fluid or mud	N/A	N/A	N/A	N/A	N/A
Synthetic-based drilling fluid or mud	Internal olefin based	Below deck storage tanks on offshore support vessels	MI Drilling Fluids in Fourchon, LA	600 bbls/well	Recycled
Cuttings wetted with Water-based fluid	Clay, sand, containing NaCl, barite and xanthan gum	N/A	Discoverer Deep Seas	280 bbls/well	At seabed after being circulated out of well.
Cuttings wetted with synthetic-based fluid	Claystone, sand, fluid containing internal olefin	N/A	Discoverer Deep Seas	1000 bbls/well	Discharged overboard after being treated to meet regulations.
Cuttings wetted with oil-based fluid	N/A	N/A	N/A	N/A	N/A
Will you produce hydrocarbons? If yes fill in for produced sand.					
Produced sand	N/A	N/A	N/A	N/A	N/A
Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.					
Trash and debris	trash and debris	storage bins on supply boat	Newpark Environmental in Fourchon, LA	500 cu. ft. total	landfill & recycled
Used oil	spent oil from machinery	USCG approved tote tanks	Newpark Environmental in Fourchon, LA	200 bbls/well	Recycled
Wash water	wash water with SBM residue	barged in cutting boxes or mud tanks	Newpark Environmental in Fourchon, LA	2000 bbls/well	disposal well injection or land farm
Chemical product wastes	spent treatment and/or damaged chemicals	barged in cutting boxes	Newpark Environmental in Fourchon, LA	15 bbls/well	Recycled
Displacement spacers	xanthan/biopolymer/solvent/ surfactant/barite	MPTs	Newpark Environmental in Fourchon, LA	1000 bbls/well	disposal well
SBM interface from displacement	Synthetic based mud/spacer	MPTs	Newpark Environmental in Fourchon, LA	100 bbls/well	disposal well
SBM displaced from well for completion operation	Synthetic based mud	storage tanks on supply boat	MI Swaco in Fourchon, LA	7000 bbls/well	reconditioned for later use
Completion brine	CaBr2/MEG	storage tanks on supply boat	MI Swaco in Fourchon, LA	2500 bbls/well	stored for later use
Will you be covered by an individual or general NPDES permit?					
NPDES ID: GMG29062K					

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

Section N
COASTAL ZONE MANAGEMENT (CZMA)

LOUISIANA CONSISTENCY CERTIFICATION

SUPPLEMENTAL EXPLORATION PLAN

WALKER RIDGE BLOCKS 425 & 469

OCS-G 16987 & 16997

The proposed activities described in detail in this OCS Plan will comply with all enforceable policies such as Louisiana's approved Coastal Management Program and will be conducted in a manner consistent with such program(s).

Murphy Exploration & Production Company – USA
Lessee or Operator

Certifying Official

March 02, 2026

Date

SECTION O
ENVIRONMENTAL IMPACT ANALYSIS (EIA)

In accordance with the requirements of 30 CFR 550.227 an Environmental Impact Analysis (EIA) is attached.

Attachments:
Environmental Report

Murphy Exploration and Production Company – USA (Murphy)

Supplemental Exploration Plan
Walker Ridge Block Number 425 and 469
OCS-G 16987/16997

(A) Impact Producing Factors

ENVIRONMENTAL IMPACT ANALYSIS WORKSHEET

Environment Resources	Impact Producing Factors (IPFs) Categories and Examples Refer to recent GOM OCS Lease Sale EIS for a more complete list of IPFs					
	Emissions (air, noise, light, etc.)	**Effluents (muds, cutting, other discharges to the water column or seafloor)**	**Physical disturbances to the seafloor (rig or anchor emplacements, etc.)**	**Wastes sent to shore for treatment or disposal**	**Accidents (e.g., oil spills, chemical spills, H_2S releases)**	**Discarded Trash & Debris**
Site-specific at Offshore Location						
Designated topographic features		(1)	(1)		(1)	
Pinnacle Trend area live bottoms		(2)	(2)		(2)	
Eastern Gulf live bottoms		(3)	(3)		(3)	
Benthic communities			(4)			
Water quality		X			X	
Fisheries		X			X	
Marine Mammals	X(8)	X			X(8)	X
Sea Turtles	X(8)	X			X(8)	X
Air quality	X(9)					
Shipwreck sites (known or potential)			(7)			
Prehistoric archaeological sites			(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 Outer Continental Shelf (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 operations 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, Alabama Beach	*Peromyscus polionotus ammobates*	E	-	X	Alabama beaches	Alabama beaches
Mouse, Choctawatchee Beach	*Peromyscus polionotus allophrys*	E	-	X	Florida panhandle beaches	Florida panhandle beaches
Mouse, Perdido Key Beach	*Peromyscus polionotus trissyllepsis*	E	-	X	Alabama, Florida (panhandle) beaches	Alabama, Florida (panhandle) beaches
Mouse, St. Andrew Beach	*Peromyscus polionotus peninsularis*	E	-	X	Florida panhandle beaches	Florida panhandle beaches
Jaguarundi, Gulf Coast	*Puma yagouaroundi cacomitli*	E	-	X	None	Texas
Ocelot	*Leopardus (=Felis) pardalis*	E	-	X	None	Texas
Bat, Florida Bonneted	*Eumops floridanus*	E	-	X	None	Florida

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in the Gulf of Mexico	Gulf of Mexico Range
			Lease Area	Coastal		
Panther, Florida	*Puma (=Felis) concolor coryi*	E	-	X	None	Florida
Vole, Florida Salt Marsh	*Microtus pennsylvanicus dukecampbelli*	E	-	X	None	Florida
Deer, Key	*Odocoileus virginianus clavium*	E	-	X	None	Florida Keys
Rabbit, Lower Keys Marsh	*Sylvilagus palustris hefneri*	E	-	X	None	Florida Keys
Rat, Silver Rice	*Oryzomys palustris natator*	E	-	X	None	Florida Keys
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
Caracara, Audubon's Crested	*Polyborus plancus audubonii*	T	-	X	None	Coastal Florida Peninsula
Curlew, Eskimo	*Numenius borealis*	E	-	X	None	Coastal Texas
Falcon, Northern Aplomado	*Falco femoralis septentrionalis*	E	-	X	None	Coastal Texas
Prairie-chicken, Attwater's Greater	*Tympanuchus cupido attwateri*	E	-	X	None	Coastal Texas
Scrub-jay, Florida	*Aphelocoma coerulescens*	T	-	X	None	Coastal Florida
Kite, Everglade Snail	*Rostrhamus sociabilis plumbeus*	E	-	X	None	Coastal Southern Florida
Knot, Red	*Calidris canutus rufa*	T	-	X	None	Coastal GOM
Rail, Eastern Black	*Laterallus jamaicensis ssp. jamaicensis*	T	-	X	None	Coastal GOM
Sparrow, Cape Sable Seaside	*Ammodramus maritimus mirabilis*	E	-	X	Everglades	Coastal Florida
Stork, Wood	*Mycteria americana*	T	-	X	None	Coastal Alabama and Florida

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in the Gulf of Mexico	Gulf of Mexico Range
			Lease Area	Coastal		
Tern, Roseate	*Sterna dougallii dougallii*	T	-	X	None	Coastal Southern Florida
Warbler, Bachman's	*Vermivora bachmanii*	E	-	X	None	Coastal Southern Florida
Woodpecker, Red-cockaded	*Picoides borealis*	E	-	X	None	Coastal Louisiana and Florida
Marine 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
Terrestrial Reptiles						
Turtle, Alabama Red-bellied	*Pseudemys alabamensis*	E	-	X	None	Coastal Mississippi and Alabama
Crocodile, American	*Crocodylus acutus*	T	-	X	Everglades and Florida Keys	Coastal Florida
Snake, Eastern Indigo	*Drymarchon couperi*	T	-	X	None	Coastal Mississippi, Alabama, and Florida
Tortoise, Gopher	*Gopherus polyphemus*	T	-	X	None	Coastal Louisiana, Mississippi, and Alabama
Turtle, Ringed Map	*Graptemys oculifera*	T	-	X	None	Coastal Louisiana and Mississippi
Turtle, Yellow-blotched Map	*Graptemys flavimaculata*	T	-	X	None	Coastal Mississippi
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	T	X	_	None	GOM
Sawfish, Smalltooth	Pristis pectinate	E	-	X	None	Florida
Grouper, Nassau	Epinephelus striatus	T	-	X	Florida[5]	Florida
Ray, Giant Manta	Manta birostris	T	X	--	None	GOM
Sturgeon, Pallid	Scaphirhynchus albus	E	-	X	None	Louisiana Coastal Rivers
Corals						
Coral, Elkhorn	*Acopora palmate*	T	X[2]	X	Florida[5]	Flower Garden Banks and Florida
Coral, Staghorn	*Acopora cervicornis*	T	X	X	Florida[5]	Florida

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in the Gulf of Mexico	Gulf of Mexico Range
			Lease Area	Coastal		
Coral, Boulder Star	*Orbicella franksi*	T	X	X	Flower Garden Banks and Florida	Flower Garden Banks and Florida
Coral, Lobed Star	*Orbicella annularis*	T	X	X	Flower Garden Banks and Florida	Flower Garden Banks and Florida
Coral, Mountainous Star	*Orbicella faveolate*	T	X	X	Flower Garden Banks and Florida	Flower Garden Banks and Florida
Coral, Rough Cactus	*Mycetophyllia ferox*	T	-	X	Florida[5]	Florida and Southern Gulf of Mexico
Coral, Pillar	*Dendrogyra cylindrus*	T	-	X	Florida[5]	Florida

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.

5 Critical habitat is in the Gulf of Mexico, but outside of planning area. Species may still occur in the Gulf of Mexico.

(B) Analysis

Site-Specific at Walker Ridge Blocks 425 and 469
Proposed operations consist of the drilling of one location – S. The operations will be conducted with a 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: Walker Ridge Blocks 425 and 469 are 106.7 miles from the closest designated Topographic Features Stipulation Block (Diaphus Bank); therefore, no adverse impacts are expected. Additionally, a drillship is being used for the proposed operations; therefore, only an insignificant amount of seafloor will be disturbed.

Effluents: Walker Ridge Blocks 425 and 469 are 106.7 miles from the closest designated Topographic Features Stipulation Block (Diaphus Bank); therefore, no adverse impacts are expected.

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 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 Murphy's Regional OSRP (refer to information submitted in **Appendix H**).

If dispersants were utilized as a response method, the fate and effects of spilled oil would be impacted. Dispersants have been utilized in previous spill response efforts and were used extensively in the response to the Deepwater Horizon oil spill, with both surface and sub-surface applications. Reports on dispersant usage on surface oil indicate that a majority of the dispersed oil remains in the top 10 meters of the water column, with 60 percent of the oil in the top two meters of water (McAuliffe et al, 1981; Lewis and Aurand, 1997; OCS Report BOEM 2017-007). Lubchenco et al. (2010) report that most chemically dispersed surface oil from the Deepwater Horizon explosion and oil spill remained in the top six meters of the water column where it mixed with surrounding waters and biodegraded (BOEM 2017-007). None of the topographic features or potentially sensitive biological features in the GOM are shallower than 10 meters (33 feet), and only the Flower Garden Banks are shallower than 20 meters (66 feet).

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

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

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

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

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

With the exception of special Federal management areas or designated exclusion areas, dispersants have been preapproved for surface use, which provides the USCG On-Scene Coordinator with the authority to approve the use of dispersants. However, that approval would only be granted upon completion of the protocols defined in the appropriate Area Contingency Plan (ACP) and the Regional Response Team (RRT) Dispersant Plan. The protocols include conducting an environmental benefit analysis to determine if the dispersant use will prevent a substantial threat to the public health or welfare or minimize serious environmental damage. The Regional Response Team would be notified immediately to provide technical support and guidance in determining if the dispersant use meets the established criteria and provide an environmental benefit. Additionally, there is currently no preapproval for subsea dispersant injection and the USCG On-Scene Coordinator must approve use of this technology before any subsea application. Due to the unprecedented volume of dispersants applied for an extended period of time, the U.S. National

Response Team has developed guidance for atypical dispersant operations to ensure that planning and response activities will be consistent with national policy (BOEM 2017-007).

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

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

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

2. Pinnacle Trend Area Live Bottoms

[NO]

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: Walker Ridge Blocks 425 and 469 are 223 miles from the closest live bottom (pinnacle trend) area; therefore, no adverse impacts are expected. Additionally, a drillship is being used for the proposed operations; 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, Walker Ridge Blocks 425 and 469 are 223 miles from the closest live bottom (pinnacle trend) area; therefore, no adverse impacts are expected.

Effluents: Walker Ridge Blocks 425 and 469 are 223 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 operations (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 Murphy's Regional OSRP (refer to information submitted in **Appendix H**).

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

There are no other IPFs (including wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact 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: Walker Ridge Blocks 425 and 469 are not located in an area characterized by the existence of live bottoms, and this lease does not contain a Live-Bottom Stipulation requiring a photo documentation survey and survey report. Additionally, a drillship is being used for the proposed operations; 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, Walker Ridge Blocks 425 and 469 are not located in an area characterized by the existence of live bottoms; therefore, no adverse impacts are expected.

Effluents: Walker Ridge Blocks 425 and 469 are 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 operations (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 Murphy's Regional OSRP (refer to information submitted in **Appendix H**).

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

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

4. Deepwater Benthic Communities

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

Walker Ridge Blocks 425 and 469 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, Walker Ridge Blocks 425 and 469 are approximately 37.5 miles from a known deepwater benthic community site (Green Canyon Block 866), listed in NTL 2009-G40. Additionally, a drillship is being used for the proposed operations; therefore, only an insignificant amount of seafloor will be disturbed. Due to the distance from the closest known deepwater benthic community and because physical disturbances to the seafloor will be minimized by the use of a drillship, Murphy's proposed operations in Walker Ridge Blocks 425 and 469 are not likely to impact deepwater benthic communities.

Deepwater benthic communities would potentially be subject to detrimental effects from a catastrophic seafloor blowout due to sediment and oiled sediment from the initial event (BOEM 2017-007). However, this is unlikely due to the distancing requirements described in NTL 2009-G40. Additionally, the potential impacts would be localized due to the directional movement of oil plumes by water currents and the scattered, patchy distribution of sensitive habitats. Although widely dispersed, biodegraded particles of a passing oil plume might impact patchy habitats, no significant impacts would be expected to the Gulfwide population. Most deepwater benthic communities are expected to experience no impacts from a catastrophic seafloor blowout due to the directional movement of oil plumes by the water currents and their scattered, patchy distribution. Impacts may be expected if a spill were to occur close to a deepwater benthic habitat,

however, beyond the localized area of impact particles would become increasingly biodegraded and dispersed. Localized impacts to deepwater benthic organisms would be expected to be mostly sublethal (BOEM 2017-007).

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

5. Water Quality

Potential IPFs that could result in water quality degradation from the proposed operations in Walker Ridge Blocks 425 and 469 include disturbances to the seafloor, effluents, and accidents.

Physical disturbances to the seafloor: Bottom area disturbances resulting from the emplacement of drill rigs, the drilling of wells and the installation of platforms and pipelines would increase water-column turbidity and re-suspension of any accumulated pollutants, such as trace metals and excess nutrients. This would cause short-lived impacts on water quality conditions in the immediate vicinity of the emplacement operations. Additionally, a drillship is being used for the proposed operations; 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 operations. 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 Murphy's Regional Oil Spill Response Plan, which discusses potential response actions in more detail (refer to information submitted in **Appendix H**).

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

6. Fisheries

There are multiple species of fish in the Gulf of Mexico, including the endangered and threatened species listed in **Table 1** at the beginning of this Environmental Impact Assessment. More information regarding the endangered gulf sturgeon (**Item 20.2**), oceanic whitetip shark (**Item 20.3**), and giant manta ray (**Item 20.4**) can be found below. Potential IPFs to fisheries as a result of the proposed operations in Walker Ridge Blocks 425 and 469 include physical disturbances to the seafloor, emissions (noise / sound), effluents, and accidents.

Physical disturbances to the seafloor: The emplacement of a structure or drilling rig results in minimal loss of bottom trawling area to commercial fishermen. Pipelines cause gear conflicts which result in losses of trawls and shrimp catch, business downtime and vessel damage. Most financial losses from gear conflicts are covered by the Fishermen's Contingency Fund (FCF). The emplacement and removal of facilities are not expected to cause significant adverse impacts to fisheries. Additionally, a drillship is being used for the proposed operations; 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 are 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 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, Murphy 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 operations (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 Murphy's Regional OSRP (refer to information submitted in **Appendix H**).

There are no other IPFs (including wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact 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 operations. 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 Walker Ridge Blocks 425 and 469 include emissions (noise / sound), effluents, discarded trash and debris, and accidents.

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

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

be insignificant to sperm whales and Rice's whales. Therefore, we find that any disturbance that may result from aircraft associated with the proposed operations 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 operations 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).

Murphy 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. Murphy 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 Murphy 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 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. Murphy'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, Murphy 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 operations (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 Murphy'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 Murphy's OSRP (refer to information submitted in accordance with **Appendix H**).

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

NMFS Protected Resources Contacts for the Gulf of Mexico:

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

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

8. Sea Turtles

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

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

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

Murphy 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. Murphy 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 Murphy 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. Murphy'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, Murphy 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 operations (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 Murphy's Regional Oil Spill Response Plan (refer to information submitted in accordance with **Appendix H**).

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

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

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

9. Air Quality

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

The projected air emissions identified in **Appendix G** 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. Walker Ridge Blocks 425 and 469 are beyond the 200-kilometer (124 mile) buffer for the Breton Wilderness Area and are 173 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 Walker Ridge Blocks 425 and 469 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, Murphy 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 Walker Ridge Blocks 425 and 469 include physical disturbances to the seafloor and accidents.

Physical disturbances to the seafloor: A drillship is being used for the proposed operations; therefore, only an insignificant amount of seafloor will be disturbed. Because physical disturbances to the seafloor will be minimized by the use of a drillship, Murphy's proposed operations in Walker Ridge Blocks 425 and 469 that are not likely to impact shipwreck sites.

Additionally, Walker Ridge Blocks 425 and 469 are not located in or adjacent to an OCS block designated by BOEM as having a high probability for occurrence of shipwrecks. Should Murphy 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.

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

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

11. Prehistoric Archaeological Sites

In accordance with BOEM NTL 2005-G07, Murphy 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 Walker Ridge Blocks 425 and 469 include disturbances to the seafloor and accidents. Walker Ridge Blocks 425 and 469 are located outside the Archaeological Prehistoric high probability line, therefore, no adverse impacts are expected. Should Murphy 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 drillship is being used for the proposed operations; therefore, only an insignificant amount of seafloor will be disturbed. Because physical disturbances to the seafloor will be minimized by the use of a drillship, Murphy's proposed operations in Walker Ridge Blocks 425 and 469 are not likely to impact 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 operations (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by Murphy's Regional Oil Spill Response Plan (refer to information submitted in accordance with **Appendix H**).

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

Vicinity of Offshore Location

12. Essential Fish Habitat (EFH)

Potential IPFs to EFH as a result of the proposed operations in Walker Ridge Blocks 425 and 469 include physical disturbances to the seafloor, effluents, and accidents. EFH includes all estuarine and marine waters and substrates in the Gulf of Mexico.

Physical disturbances to the seafloor: Turbidity and sedimentation resulting from the bottom disturbing activities included in the proposed operations would be short term and localized. Fish are mobile and would avoid these temporarily suspended sediments. Additionally, the Live Bottom Low Relief Stipulation, the Live Bottom (Pinnacle Trend) Stipulation, and the Eastern Gulf Pinnacle Trend Stipulation have been put in place to minimize the impacts of bottom disturbing activities. Additionally, a drillship is being used for the proposed operations; 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 operations (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by Murphy's Regional OSRP (refer to information submitted in **Appendix H**).

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

13. Marine and Pelagic Birds

Potential IPFs to marine birds as a result of the proposed operations 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 operations (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 Murphy's Regional OSRP (refer to information submitted in **Appendix H**).

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

Murphy 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. Murphy 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 Murphy 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 operations 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 operations that are likely to impact public health and safety. In accordance with NTL No.'s 2008-G04, 2009-G27, and 2009-G31, sufficient information is included in **Appendix D** to justify our request that our proposed operations be classified by BSEE as H_2S absent.

Coastal and Onshore

15. Beaches

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

Accidents: Oil spills contacting beaches would have impacts on the use of recreational beaches and associated resources. Due to the distance from shore (173 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 Murphy's Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: Trash on the beach is recognized as a major threat to the enjoyment and use of beaches. There will only be a limited amount of marine debris, if any, resulting from the proposed operations. 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).

Murphy 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. Murphy 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 Murphy 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 operations (refer to **Item 5**, Water Quality). Due to the distance from shore (173 miles) and the response capabilities that would be implemented, no impacts are expected. The operations proposed in this plan will be covered by Murphy's Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: There will only be a limited amount of marine debris, if any, resulting from the proposed operations. 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).

Murphy 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. Murphy 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 Murphy 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 impact shore birds and coastal nesting birds. However, it is unlikely that an oil spill would occur from the proposed operations (refer to **Item 5**, Water Quality). Given the distance from shore (173 miles) and the response capabilities that would be implemented, no impacts are expected. The operations proposed in this plan will be covered by Murphy's Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: Shore birds and coastal nesting 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).

Murphy 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. Murphy 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 Murphy 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 operations could impact coastal wildlife refuges. 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 shore (173 miles) and the response capabilities that would be implemented, no impacts are expected. The operations proposed in this plan will be covered by Murphy's Regional OSRP (refer to information submitted in **Appendix H**).

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

Murphy 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. Murphy 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 Murphy 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 operations could impact 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 (216 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 Murphy's Regional OSRP (refer to information submitted in **Appendix H).**

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

Murphy 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. Murphy 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 Murphy 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 225.5 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 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, Murphy 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 (234.8 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 Murphy's Regional OSRP (refer to information submitted in **Appendix H)**.

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

Discarded trash and debris: Trash and debris are not expected to impact the Gulf sturgeon. There will only be a limited amount of marine debris, if any, resulting from the proposed operations. 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).

Murphy 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. Murphy 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 Murphy 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 Walker Ridge Blocks 425 and 469 include accidents. Additional information on ESA-listed fish may be found in **Item 6**.

Accidents: Collisions between support vessels and the oceanic whitetip shark would be unusual events, however, should one occur, death or injury to the oceanic whitetip shark is possible. Contract vessel operators can avoid protected aquatic species and reduce potential deaths by maintaining a vigilant watch and a distance of 50 meters or greater, with the exception of animals that approach the vessel. Vessel personnel should use a Gulf of Mexico reference guide that includes identifying information on marine mammals, sea turtles, and other marine protected species (i.e., Endangered Species Act listed species such as Gulf sturgeon, giant manta ray, or oceanic whitetip shark) that may be encountered in the Gulf of Mexico 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, Murphy 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 operations (refer to **Item 5**, Water Quality). The operations proposed in this plan will be covered by Murphy's Regional OSRP (refer to information submitted in **Appendix H**).

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

There will only be a limited amount of marine debris, if any, resulting from the proposed operations. 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).

Murphy 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. Murphy 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 Murphy 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 Walker Ridge Blocks 425 and 469 include accidents. Additional information on ESA-listed fish may be found in **Item 6**.

Accidents: Collisions between support vessels and the giant manta ray would be unusual events, however, should one occur, death or injury to the giant manta ray is possible. Contract vessel operators can avoid protected aquatic species and reduce potential deaths by maintaining a vigilant watch and a distance of 50 meters or greater, with the exception of animals that approach the vessel. Vessel personnel should use a Gulf of Mexico reference guide that includes identifying information on marine mammals, sea turtles, and other marine protected species (i.e., Endangered Species Act listed species such as Gulf sturgeon, giant manta ray, or oceanic whitetip shark) that may be encountered in the Gulf of Mexico 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, Murphy 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 (131.6 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 operations (refer to **Item 5**, Water Quality). The operations proposed in this plan will be covered by Murphy's Regional OSRP (refer to information submitted in **Appendix H**).

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

There will only be a limited amount of marine debris, if any, resulting from the proposed operations. 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).

Murphy 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. Murphy 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 Murphy 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 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. Winter areas, breeding areas, and constricted migratory corridors are not located in the planning area.

There are multiple IPFs that may impact loggerhead sea turtles (see **Item 8**). However, the closest loggerhead nearshore reproductive critical habitat is located 276.4 miles from Walker Ridge Blocks 425 and 469; therefore, no adverse impacts are expected. 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, including designated critical habitats, are noncontiguous and occur in the Flower Garden Banks National Marine Sanctuary and Florida. Five banks in the Flower Garden Banks National Marine Sanctuary have been designated as critical habitats for boulder star (Orbicella franksi), lobed star (Orbicella annularis), and mountainous star (Orbicella faveolate) corals. Elkhorn coral can also be found in the Flower Garden Banks, though the area is not a designated critical habitat for this coral. Various coastal counties in Florida are also designated as critical habitats for protected coral species. These coral habitats are located outside of the planning area and are not expected to be impacted by the proposed operations. The following table comprehensively details the designated critical habitat for each protected coral species in the Flower Garden Banks National Marine Sanctuary and Florida.

		Protected Corals						
		Elkhorn Coral *Acopora palmate*	Staghorn Coral *Acopora cervicornis*	Boulder Star Coral *Orbicella franksi*	Lobed Star Coral *Orbicella annularis*	Mountainous Star Coral *Orbicella faveolate*	Rough Cactus Coral *Mycetophyllia ferox*	Pillar Coral *Dendrogyra cylindrus*
Designated Critical Habitat	**Flower Garden Banks National Marine Sanctuary**							
	East Flower Garden Bank			X	X	X		
	West Flower Garden Bank			X	X	X		
	Rankin Bank			X	X	X		
	Rankin Bank			X	X	X		
	Geyer Bank			X	X	X		
	McGrail Bank			X	X	X		
	Florida (outside of planning area)							
	Martin County					X		
	Palm Beach County	X	X	X	X	X		X
	Broward County	X	X	X	X	X	X	X
	Miami-Dade County	X	X	X	X	X	X	X
	Monroe County	X	X	X	X	X	X	X

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 National Marine Sanctuary (131.6 miles) and other critical coral habitats, no adverse impacts are expected. The operations proposed in this plan will be covered by Murphy's Regional OSRP (refer to information submitted in **Appendix H**).

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

20.7 - Endangered Beach Mice

There are four subspecies of endangered beach mouse that are found in the dune systems along parts of Alabama and northwest Florida. Due to the location of Walker Ridge Blocks 425 and 469 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 OPERATIONS

The site–specific environmental conditions have been taken into account for the proposed operations. 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, Walker Ridge Blocks 425 and 469 may experience hurricane and tropical storm force winds and related sea currents. These factors can adversely impact the integrity of the operations covered by this plan. A significant storm may present physical hazards to operators and vessels, damage exploration or production equipment, or result in the release of hazardous materials (including hydrocarbons). Additionally, the displacement of equipment may disrupt the local benthic habitat and pose a threat to local species.

The following preventative measures included in this plan may be implemented to mitigate these impacts:

1. Drilling & completion

a. Secure well
b. Secure rig / platform
c. Evacuate personnel

Drilling activities will be conducted in accordance with NTL No.'s 2008-G09, 2009-G10, and 2010-N10.

2. Structure Installation
   Operator will not conduct structure installation operations during Tropical Storm or Hurricane threat.

(E) ALTERNATIVES
No alternatives to the proposed operations were considered to reduce environmental impacts.

(F) MITIGATION MEASURES
No mitigation measures other than those required by regulation will be employed to avoid, diminish, or eliminate potential impacts on environmental resources.

(G) CONSULTATION
No agencies or persons were consulted regarding potential impacts associated with the proposed operations. Therefore, a list of such entities has not been provided.

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(I) REFERENCES
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ABS Consulting Inc. 2016. 2016 Update of Occurrence Rates for Offshore Oil Spills. July 13, 2016. Contract #E15PX00045, Deliverable 7 (ABS, 2016)

Adcroft, A., R. Hallberg, J.P. Dunne, B.L. Samuels, J. A. Galt, C.H. Barker, and B. Payton. 2010. Simulations of underwater plumes of dissolved oil in the Gulf of Mexico. Geophysical Research Letters, Vol. 37, L18605, 5 pp. doi: 10.1029/2010GL044689. (Adcroft et al., 2010)

American Petroleum Institute (API). 1989. Effects of offshore petroleum operations on cold water marine mammals: a literature review. Washington, DC: American Petroleum Institute. 385 pp.

Andrew, R. K., B. M. Howe, and J. A. Mercer. 2011. Long-time trends in ship traffic noise for four sites off the North American West Coast. Journal of the Acoustical Society of America 129(2):642-651.

Balazs, G.H. 1985. Impact of ocean debris on marine turtles: entanglement and ingestion. In: Shomura, R.S. and H.O. Yoshida, eds. Proceedings, Workshop on the Fate and Impact of Marine Debris, 26-29 November 1984, Honolulu, HI. U.S. Dept. of Commerce. NOAA Tech. Memo. NOAA-TM-NMFS-SWFC-54. Pp 387-429.

Burke, C.J. and J.A. Veil. 1995. Potential benefits from regulatory consideration of synthetic drilling muds. Environmental Assessment Division, Argonne National Laboratory, ANL/EAD/TM-43.

Catastrophic Spill Event Analysis: High-Volume, Extended-Duration Oil Spill Resulting from Loss of Well Control on the Gulf of Mexico Outer Continental Shelf, 1st Revision (BOEM 2017-007)

Daly, J.M. 1997. Controlling the discharge of synthetic-based drilling fluid contaminated cuttings in waters of the United States. U.S. Environmental Protection Agency, Office of Water. Work Plan, June 24, 1997.

Engås, A., S. Løkkeborg, E. Ona, and A.V. Soldal. 1996. Effects of seismic shooting on local abundance and catch rates of cod (Gadus morhua) and haddock (Melanogrammusaeglefinus). Canadian Journal of Fisheries and Aquatic Science 53:2238-2249 (Engås et al., 1996)

GOM Deepwater Operations and Activities. Environmental Assessment. BOEM 2000-001.

Gulf of Mexico OCS Oil & Gas Lease Sales: 2017-2022, Gulf of Mexico Lease Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and 261, Final Multisale Environmental Impact Statement. (BOEM 2017-009)

Gulf of Mexico OCS Oil and Gas Lease Sales 259 and 261: Final Supplemental Environmental Impact Statement. (BOEM 2023-001)

Haddad, R. and S. Murawski. 2010. Analysis of hydrocarbons in samples provided from the cruise of the R/V Weatherbird II, May 23-26, 2010. U.S. Dept. of Commerce, National Oceanographic and Atmospheric Administration, Silver Spring, MD. 14 pp. (Haddad and Murawski, 2010)

Hansen, D.J. 198l. The relative sensitivity of seabird populations in Alaska to oil pollution. U.S. Dept. of the Interior, Bureau of Land Management, Alaska OCS Region, Anchorage. BLM-YK-ES-81-006-1792.

Hildebrand, J.A. 2009. Anthropogenic and natural sources of ambient noise in the ocean. Marine Ecology Progress Series 395:5-20. Internet website: http://www.int-res.com/articles/theme/m395p005.pdf. (Hildebrand, 2009)

Joint Analysis Group. 2010. Review of R/V Brooks McCall data to examine subsurface oil. 58 pp. (Joint Analysis Group, 2010)

Ladich, F. 2013. Effects of noise on sound detection and acoustic communication in fishes. In: Brumm, H., ed. Animal communication and noise. Berlin Heidelberg: Springer-Ver lag. Pp. 65- (Ladich, 2013)

Laist, D.W. 1997. Impacts of marine debris: entanglement of marine life in marine debris including a comprehensive list of species with entanglement and ingestion records. In: Coe, J.M. and D.B. Rogers, eds. Marine debris: sources, impacts, and solutions. New York, NY: Springer-Verlag. Pp. 99-139.

Lee, K., T. Nedwed, R. C. Prince, and D. Palandro. 2013a. Lab tests on the biodegradation of chemically dispersed oil should consider the rapid dilution that occurs at sea. Marine Pollution Bulletin 73(1):314-318. DOI: 10.1016/j.marpolbul.2013.06.005. (Lee et al., 2013a)

Lee, K., M. Boufadel, B. Chen, J. Foght, P. Hodson, S. Swanson, and A. Venosa. 2015. The Behaviour and Environmental Impacts of Crude Oil Released into Aqueous Environments. https://www.cepa.com/wp-content/uploads/2014/01/OIWReport.compressed.pdf. (Lee et al., 2015)

Lewis, A. and D. Aurand. 1997. Putting dispersants to work: Overcoming obstacles. 1997 International Oil Spill Conference. API 4652A. Technical Report IOSC-004. (Lewis and Aurand, 1997)

Løkkeborg, S., E. Ona, A. Vold, and A. Salthaug. 2012. Sounds from seismic air guns: gear-and species specific effects on catch rates and fish distribution. Canadian Journal of Fisheries and Aquatic Sciences 69:1,278-1,291. (Løkkeborg et al., 2012)

Lubchenco, J., M. McNutt, B. Lehr, M. Sogge, M. Miller, S. Hammond, and W. Conner. 2010. BP Deepwater Horizon oil budget: What happened to the oil? 5 pp. (Lubchenco et al. 2010)

Luksenburg, J. and E. Parsons, 2009. The effects of aircraft on cetaceans: implications for aerial whale watching. Proceedings of the 61st Meeting of the International Whaling Commission.

Majors, A.P. and A.C. Myrick, Jr. 1990. Effects of noise on animals: implications for dolphins exposed to seal bombs in the eastern tropical Pacific purse-seine fishery–an annotated bibliography. NOAA Administrative Report LJ-90-06.

Marine Mammal Commission. 1999. Annual report to Congress – 1998.

McAuliffe, C.D., B.L. Steelman, W.R. Leek, D.F. Fitzgerald, J. P. Ray, and C.D. Barker. 1981. The 1979 southern California dispersant treated research oil spills. In: Proceedings 1981 Oil Spill Conference. March 2-5, 1981, Atlanta, GA. Washington, DC: American Petroleum Institute. Pp. 269-282. (McAuliffe et al, 1981)

McKenna, M.F., D. Ross, S.M. Wiggins, and J.A. Hildebrand. 2012. Underwater radiated noise from modern commercial ships. Journal of the Acoustical Society of America 131(1):92-103. (McKenna et al., 2012)

Miller, M. H., and C. Klimovich. 2017. Endangered Species Act Status Review Report: Giant Manta Ray (Manta birostris) and Reef Manta Ray (Manta alfredi). NMFS.

National Academies of Sciences, Engineering, and Medicine 2020. The Use of Dispersants in Marine Oil Spill Response. Washington, DC: The National Academies Press. https://doi.org/10.17226/25161. (NAS 2020)

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)

NMFS. 2017b. Biological and Conference Opinion on the Issuance of Permit No. 20465 to NMFS Alaska Fisheries Science Center Marine Mammal Laboratory for Research on Cetaceans. Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, FPR-2017-9186, Silver Spring, Maryland.

NMFS. 2017f. Letter of concurrence on the issuance of Permit No. 20527 to Ann Pabst for vessel and aerial surveys of blue, fin, North Atlantic right, sei, and sperm whales. Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, FPR-2017-9199, Silver Spring, Maryland.

NRC. 2005. Oil Spill Dispersants: Efficacy and Effects. Washington, DC: The National Academies Press. (NRC, 2005)

Patenaude, N. J., W. J. Richardson, M. A. Smultea, W. R. Koski, G. W. Miller, B. Wursig, and C. R. Greene. 2002. Aircraft sound and disturbance to bowhead and beluga whales during spring migration in the Alaskan Beaufort Sea. Marine Mammal Science 18(2):309-335.

Piatt, J.F., C.J. Lensink, W. Butler, M. Kendziorek, and D.R. Nysewander. 1990. Immediate impact of the Exxon Valdez oil spill on marine birds. The Auk. 107 (2): 387-397.

Popper, A.N., R.R. Fay, C. Platt, and O. Sand. 2003. Sound detection mechanisms and capabilities of teleost fishes. In: Collin, S.P. and N.J. Marshall, eds. Sensory processing in aquatic environments. New York, NY: Springer-Verlag. Pp. 3-3 (Popper et al., 2003)

Popper, A.N., M.E. Smith, P.A. Cott, B.W. Hanna, A.O. MacGillivray, M.E. Austin, and D.A. Mann. 2005. Effects of exposure to seismic airgun use on hearing of three fish species. Journal of the Acoustical Society of America 117(6):3958-3971. (Popper et al., 2005)

Popper, A.N., A.D. Hawkins, R.R. Fay, D.A. Mann, S. Bartol, T.J. Carlson, S. Coombs, W.T. Ellison, R. Gentry, M.B. Halvorsen, S. Lokkeborg, P. Rogers, B.L. Southall, D.G. Zeddies, and W.N. Tavolga. 2014. ASA S3/SC1. 4 TR -2014 sound exposure guidelines for fishes and sea turtles. A technical report prepared by ANSI-Accredited Standards Committee S3/SC1 and Registered with ANSI. New York, NY: Springer. 78 pp. (Popper et al., 2014)

Popper, A.N. and M.C. Hastings. 2009. Effects of anthropogenic sources of sound on fishes. Journal of Fish Biology 75:455-498 (Popper and Hastings, 2009)

Radford, A.N., E. Kerridge, and S.D. Simpson. 2014. Acoustic communication in a noisy world: Can fish compete with anthropogenic noise? Behavioral Ecology 00(00):1-9. doi:10.1093/beheco/aru029 (Radford et al., 2014)

Richter, C., S. Dawson, and E. Slooten. 2006. Impacts of commercial whale watching on male sperm whales at Kaikoura, New Zealand. Marine Mammal Science 22(1):46-63. (Richter et al. 2006)

Silva, M., P.J. Etnoyer, and I.R. MacDonald. 2015. Coral injuries observed at mesophotic reefs after the Deepwater Horizon oil discharge. Deep Sea Research Part II: Topical studies in oceanography. doi: 10.1016/j.dsr2.2015.05.013. (Silva et al., 2015)

Slabbekoorn, H., N. Bouton, I. van Opzeeland, A. Coers, C. ten Cate, and A.N. Popper. 2010. A noisy spring: The impact of globally rising underwater sound levels on fish. Trends in Ecology & Evolution 25:419-427. (Slabbekoorn et al., 2010)

Smultea, M. A., J. J. R. Mobley, D. Fertl, and G. L. Fulling. 2008a. An unusual reaction and other observations of sperm whales near fixed-wing aircraft. Gulf and Caribbean Research 20:75-80.

Tyack, P.L. 2008. Implications for marine mammals of large-scale changes in the marine acoustic environment. Journal of Mammology 89(3):549-558 (Tyack, 2008)

U.S. Dept. of Commerce. National Marine Fisheries Service. 2010b. Final recovery plan for the sperm whale (Physeter macrocephalus). U.S. Dept. of Commerce, National Marine Fisheries Service, Silver Spring, MD. 165 pp. Internet website: http://www.nmfs.noaa.gov/pr/pdfs/recovery/final_sperm_whale_recovery_plan_21dec.pdf (USDOC, NMFS, 2010b)

U.S. Dept. of the Interior. Fish and Wildlife Service. 2011. Endangered Species Act – Section 7 consultation on the construction of a second explosive handling wharf at Bangor Navy Base, Kitsap County. Conducted by the U.S. Dept. of the Interior, Fish and Wildlife Service, Lacey, WA. 137 pp. (USDOI, FWS, 2011)

Vauk, G., E. Hartwig, B. Reineking, and E. Vauk-Hentzelt. 1989. Losses of seabirds by oil pollution at the German North Sea coast. Topics in Marine Biology. Ros, J.D, ed. Scient. Mar. 53 (2-3): 749-754.

Vermeer, K. and R. Vermeer, 1975 Oil threat to birds on the Canadian west coast. The Canadian Field-Naturalist. 89:278-298.

Wardle, C.S., T.J. Carter, G.G. Urquhart, A.D.F. Johnstone, A.M. Ziolkowski, G. Hampson, and D. Mackie. 2001. Effects of seismic air guns on marine fish. Continental Shelf Research21(8):1005-1027 (Wardle et al., 2001)

Wursig, B., S. K. Lynn, T. A. Jefferson, and K. D. Mullin. 1998. Behaviour of cetaceans in the northern Gulf of Mexico relative to survey ships and aircraft. Aquatic Mammals 24(1):41-50.

Wysocki, L.E. and F. Ladich. 2005. Hearing in fishes under noise conditions. Journal of the Association for Research in Otolaryngology 6:28-36. (Wysocki and Ladich, 2005)

Young, C. N., Carlson, J., Hutchinson, M., Hutt, C., Kobayashi, D., McCandless, C.T., Wraith, J. 2016. Status Review Report: oceanic whitetip shark (Carcharhinius longimanus). Final report to the National Marine Fisheries Service, Office of Protected Resourses.:162.

Although not cited, the following were utilized in preparing this EIA:

- Hazard Surveys

SECTION P
ADMINISTRATIVE INFORMATION

(a) Exempted Information Description

All data related to the bottom-hole location of the proposed wells have been removed from the public information copy of the Supplemental EP as well as any discussions of the target objectives, geologic or geophysical data, and any interpreted geology.

(b) Bibliography

- Supplemental Exploration Plan Control No. S-8193.
- Approved: August 27, 2025