UNITED STATES GOVERNMENT May 28, 2021
MEMORANDUM

To: Public Information

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

Subject: Public Information copy of plan

Control # - S-08049

Type - Supplemental Development Operations Coordination Document

Lease(s) - OCS-G01623 Block - 38 Main Pass Area

Operator - Cantium, LLC

Description – 3 LT Pipelines, Platform A, Well A001, Well A002, Well A003, Well A004, Well A005, Well A006

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.

Henry Emembolu
Plan Coordinator

PUBLIC COPY
April 23, 2021

INITIAL DEVELOPMENT OPERATIONS COORDINATION DOCUMENT

Main Pass Block 38
OCS-G 01623
Main Pass Block 40 Field Unit (Unit Agreement # 891003847)
Affected States: Louisiana and Mississippi

Estimated Startup Date: November 11, 2021

SUBMITTED BY:
Cantium, LLC
111 Park Place Drive, Suite 100
Covington, LA 70433

Susan Alonso, P.E.
(832) 434-5031
susan.alonso@cantium.us

AUTHORIZED REPRESENTATIVE:
Dena Rodriguez
J. Connor Consulting, Inc.
19219 Katy Freeway, Suite 200
Houston, Texas 77094
(281) 698-8512
dena.rodriguez@jccteam.com

TABLE OF CONTENTS

SECTION ATTACHMENTS

Section 1	**Plan Contents**
1-A	OCS Plan Information Form
1-B	Well Location Plat
1-C	Structural Schematic
1-D	Pay.gov Receipt
Section 2	**General Information**
2-A	SDS
Section 3	**Geological, Geophysical Information**
3-A	Proprietary Information
3-B	Proprietary Information
3-C	Proprietary Information
3-D	Proprietary Information
Section 7	**Wastes and Discharges Information**
7-A	Waste You Will Generate, Treat and Downhole Dispose or Discharge to the GOM
Section 8	**Air Emissions Information**
8-A	Emissions Worksheets
Section 9	**Oil Spill Information**
9-A	Oil Spill Response Discussion
Section 14	**Support Vessels and Aircraft Information**
14-A	Waste You Will Transport and/or Dispose Onshore Table
14-B	Vicinity Map
Section 16	**Coastal Zone Management Act (CZMA) Information**
16-A	Coastal Zone Consistency Certifications
Section 17	**Environmental Impact Analysis (EIA)**
17-A	Environmental Impact Analysis (EIA)

SECTION 1
PLAN CONTENTS

1.1 PLAN INFORMATION

Under this Initial Development Operations Coordination Document, Cantium, LLC (Cantium) proposes to drill and complete six wells, install three lease term pipelines, install a 12-slot four pile platform, and place six wells on production. These development operations are in approximately 46 feet of water. The wells will be drilled with a jackup MODU. The lease term pipelines will be installed using a lay barge. The platform will be installed using a derrick barge.

The operations proposed will utilize pile-driving. Cantium will install four 48" piles with a hydraulic hammer as recommended by the installation contractor. These will be installed sequentially and is expected to take approximately 48 hours per pile for a total of 8 days. Piles will be driven through layers of primarily sand and clay.

Cantium is not proposing any new pipelines expected to make landfall.

The OCS Plan Information Form BOEM-137 is included as **Attachment 1-A.**

1.2 LOCATION

A Well Location Plat depicting the surface locations of the proposed wells and water depths is included as **Attachment 1-B**. No anchors are associated with the activities proposed in this plan. A structural schematic is included as **Attachment 1-C**.

1.3 SAFETY AND POLLUTION PREVENTION FEATURES

A description of the drilling unit which complies with all relevant regulations is included on the OCS Plan Information Form. Rig specifications will be made part of each Application for Permit to Drill.

The rig will be equipped with safety and fire-fighting equipment required to comply with United States Coast Guard (USCG) regulations. Appropriate lifesaving equipment such as life rafts, life jackets, ring buoys, etc. as prescribed by the USCG, will be maintained on the rig at all times.

Safety features on the drilling unit will include well control, pollution prevention, and blowout prevention equipment as described in BSEE regulations 30 CFR 250 C, D, E, O, Q and S; and as further clarified by BSEE Notices to Lessees, and current policy making invoked by the BSEE, Environmental Protection Agency (EPA) and the USCG.

Pollution prevention measures include installation of curbs, gutters, drip pans, and drains on drilling deck areas to collect all contaminants and debris. Compliance will be maintained with the EPA NPDES Permit. The rig will be monitored daily and any waste or fuel resulting in pollution

of the Gulf waters will be reported to the representative in charge for immediate isolation and correction of the problem. All spills will be reported to the appropriate governmental agencies.

1.4 STORAGE TANKS AND PRODUCTION VESSELS

The table below provides storage tanks with capacity of 25 barrels or more that will store fuels, oil and lubricants.

Type of Storage Tank	Type of Facility	Tank Capacity (bbl)	Number of Tanks	Total Capacity (bbl)	Fluid Gravity (API)
Fuel oil (marine diesel)	MODU	1,092	2	2,184	32.4°
Production	MODU	25	2	50	26°
Test Separator	Production	21.1	1	21.1	32°
HP Separator	Production	48.6	1	48.6	32°
LP/IP Separator	Production	48.6	1	48.6	32°
Sump Tank	Production	45	1	45	32°
Surge Tank (Future)	Production	111	1	111	32°

1.5 POLLUTION PREVENTION MEASURES

These operations do not propose activities for which the State of Florida is an affected state.

1.6 ADDITIONAL MEASURES

Cantium does not propose any additional safety, pollution prevention, or early spill detection measures beyond those required by 30 CFR Part 250.

1.7 COST RECOVERY FEE

Documentation of the $25,428 cost recovery fee payment is included as **Attachment 1-D.**

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

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

OCS PLAN INFORMATION FORM

General Information

Type of OCS Plan:		Exploration Plan (EP)	X	Development Operations Coordination Document (DOCD)			
Company Name: Cantium, LLC				BOEM Operator Number: 03481			
Address: 111 Park Place Drive, Suite 100				Contact Person: Dena Rodriguez			
Covington, LA 70433				Phone Number: 281-578-3388			
				E-Mail Address: dena.rodriguez@jccteam.com			
If a service fee is required under 30 CFR 550.125(a), provide the		Amount paid	$25,428.00	Receipt No.	26RSA5CQ		

Project and Worst Case Discharge (WCD) Information

Lease: OCS-G 01623		Area: Main Pass			Block: 38			Project Name:			
Objectives:	X	Oil	X	Gas		Sulphur		Salt	Onshore Support Bases: Venice, LA; Golden Meadow, LA		
Platform / Well Name: Well No. 006				Total Volume of WCD: 3,141,495 bbl				API Gravity: 30°			
Distance to Closest Land (Miles): 11.8				Volume from uncontrolled blowout: 69,811 bbl/day							

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	R-6939			
Do you propose to use new or unusual technology to conduct your activities?		Yes	X	No
Do you propose to use a vessel with anchors to install or modify a structure?		Yes	X	No
Do you propose any facility that will serve as a host facility for deepwater subsea development?		Yes	X	No

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

Proposed Activity	Start Date	End Date	No. of Days
Pipeline Installation	11/11/2021	12/10/2021	30
Jacket Installation	02/15/2022	02/28/2022	14
Deck and Topsides Installation	03/03/2022	03/09/2022	7
Riser Hook-Up and Commissioning	03/15/2022	04/13/2022	30
Drill, Complete, Test, Commence Production – Well No. A001	04/15/2022	05/12/2022	28
Production – Well No. A001	005/13/2022	05/13/2037	15 year reserve life
Drill, Complete, Test, Commence Production – Well No. A002	05/14/2022	06/10/2022	28
Production – Well No. A002	06/11/2022	06/11/2037	15 year reserve life
Drill, Complete, Test, Commence Production – Well No. A003	06/12/2022	07/09/2022	28
Production – Well No. A003	07/10/2022	07/10/2037	15 year reserve life
Drill, Complete, Test, Commence Production – Well No. A004	07/11/2022	08/07/2022	28
Production – Well No. A004	08/08/2022	08/08/2037	15 year reserve life
Drill, Complete, Test, Commence Production – Well No. A005	08/09/2022	09/05/2022	28
Production – Well No. A005	09/06/2022	09/06/2037	15 year reserve life
Drill, Complete, Test, Commence Production – Well No. A006	09/07/2022	10/04/2022	28
Production – Well No. A006	10/05/2022	10/05/2037	15 year reserve life
Future Well Intervention Activities – Wells A001, A002, A003, A004, A005, A006	01/01/2023	12/31/2030	150 days/year

Description of Drilling Rig				Description of Structure			
X	Jackup		Drillship		Caisson		Tension leg platform
	Gorilla Jackup		Platform rig	X	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): Enterprise 205 or equivalent jackup							

Description of Lease Term Pipelines			
From (Facility/Area/Block)	**To (Facility/Area/Block)**	**Diameter (Inches)**	**Length (Feet)**
MP38 A	MP41 B	8.625”	46,045’
MP38 A	MP41 B	6.625”	46,045’
MP38 A	MP41 B	6.625”	46,045’

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

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): A					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 a surface BOP on a floating facility to conduct your proposed activities?							Yes	X	No

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day): 69,811	For structures, volume of all storage and pipelines (Bbls): 10,078.3	API Gravity of fluid	30°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 01623		OCS OCS
Area Name	Main Pass		
Block No.	38		
Blockline Departures (in feet)	N/S Departure: 3,256.83’ FSL	N/S Departure:	N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 2,834.74’ FEL	E/W Departure:	E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 2,780,015.26	X:	X: X: X:
	Y: 281,336.83	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude: 29° 25’ 2.5866” N	Latitude:	Latitude Latitude Latitude
	Longitude: 88° 52’ 59.7046” W	Longitude:	Longitude Longitude Longitude

Water Depth (Feet): 46’	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet: N/A				

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

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

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

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): A001					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 a surface BOP on a floating facility to conduct your proposed activities?							Yes	X	No

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day): 69,811	For structures, volume of all storage and pipelines (Bbls): 10,078.3	API Gravity of fluid	30°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 01623	OCS-G 01623	OCS OCS
Area Name	Main Pass	Main Pass	
Block No.	38	38	
Blockline Departures (in feet)	N/S Departure: 3,251.15' FSL	N/S Departure:	N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 2,829.36' FEL	E/W Departure:	E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 2,780,020.64	X:	X: X: X:
	Y: 281,331.15	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude: 29° 25' 2.5292" N	Latitude:	Latitude Latitude Latitude
	Longitude: 88° 52' 59.6451" W	Longitude:	Longitude Longitude Longitude

Water Depth (Feet): 46'	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet: N/A				

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

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

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

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): A002					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 a surface BOP on a floating facility to conduct your proposed activities?							Yes	X	No

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day): 69,811	For structures, volume of all storage and pipelines (Bbls): 10,078.3	API Gravity of fluid	30°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 01623	OCS-G 01623	OCS OCS
Area Name	Main Pass	Main Pass	
Block No.	38	38	
Blockline Departures (in feet)	N/S Departure: 3,253.54' FSL	N/S Departure:	N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 2,835.94' FEL	E/W Departure:	E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 2,780,014.06	X:	X: X: X:
	Y: 281,333.54	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude: 29° 25' 2.5543" N	Latitude:	Latitude Latitude Latitude
	Longitude: 88° 52' 59.7189" W	Longitude:	Longitude Longitude Longitude

Water Depth (Feet): 46'	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet: N/A				

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

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

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

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): A003					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 a surface BOP on a floating facility to conduct your proposed activities?							Yes	X	No

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day): 69,811	For structures, volume of all storage and pipelines (Bbls): 10,078.3	API Gravity of fluid	30°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 01623	OCS-G 01623	OCS OCS
Area Name	Main Pass	Main Pass	
Block No.	38	38	
Blockline Departures (in feet)	N/S Departure: 3,255.94' FSL	N/S Departure:	N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 2,842.51' FEL	E/W Departure:	E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 2,780,007.49	X:	X: X: X:
	Y: 281,335.94	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude: 29° 25' 2.5794" N	Latitude:	Latitude Latitude Latitude
	Longitude: 88° 52' 59.7927" W	Longitude:	Longitude Longitude Longitude

Water Depth (Feet): 46'	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet: N/A				

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

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

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

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): A004					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 a surface BOP on a floating facility to conduct your proposed activities?							Yes	X	No

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day): 69,811	For structures, volume of all storage and pipelines (Bbls): 10,078.3	API Gravity of fluid	30°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 01623	OCS-G 01623	OCS OCS
Area Name	Main Pass	Main Pass	
Block No.	38	38	
Blockline Departures (in feet)	N/S Departure: 3,249.36' FSL	N/S Departure:	N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 2,844.91' FEL	E/W Departure:	E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 2,780,005.09	X:	X: X: X:
	Y: 281,329.36	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude: 29° 25' 2.5148" N	Latitude:	Latitude Latitude Latitude
	Longitude: 88° 52' 59.8214" W	Longitude:	Longitude Longitude Longitude

Water Depth (Feet): 46'	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet: N/A				

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

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

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

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): A005					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 a surface BOP on a floating facility to conduct your proposed activities?							Yes	X	No

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day): 69,811	For structures, volume of all storage and pipelines (Bbls): 10,078.3	API Gravity of fluid	30°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 01623	OCS-G 01623	OCS OCS
Area Name	Main Pass	Main Pass	
Block No.	38	38	
Blockline Departures (in feet)	N/S Departure: 3,244.57' FSL	N/S Departure:	N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 2,831.75' FEL	E/W Departure:	E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 2,780,018.25	X:	X: X: X:
	Y: 281,324.57	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude: 29° 25' 2.4646" N	Latitude:	Latitude Latitude Latitude
	Longitude: 88° 52' 59.6738" W	Longitude:	Longitude Longitude Longitude

Water Depth (Feet): 46'	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet: N/A				

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

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

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

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): A006					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 a surface BOP on a floating facility to conduct your proposed activities?							Yes	X	No

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day): 69,811	For structures, volume of all storage and pipelines (Bbls): 10,078.3	API Gravity of fluid	30°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 01623	OCS-G 01623	OCS OCS
Area Name	Main Pass	Main Pass	
Block No.	38	38	
Blockline Departures (in feet)	N/S Departure: 3,246.96' FSL	N/S Departure:	N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 2,838.33' FEL	E/W Departure:	E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 2,780,011.67	X:	X: X: X:
	Y: 281,326.96	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude: 29° 25' 2.4897" N	Latitude:	Latitude Latitude Latitude
	Longitude: 88° 52' 59.7476" W	Longitude:	Longitude Longitude Longitude

Water Depth (Feet): 46'	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet: N/A				

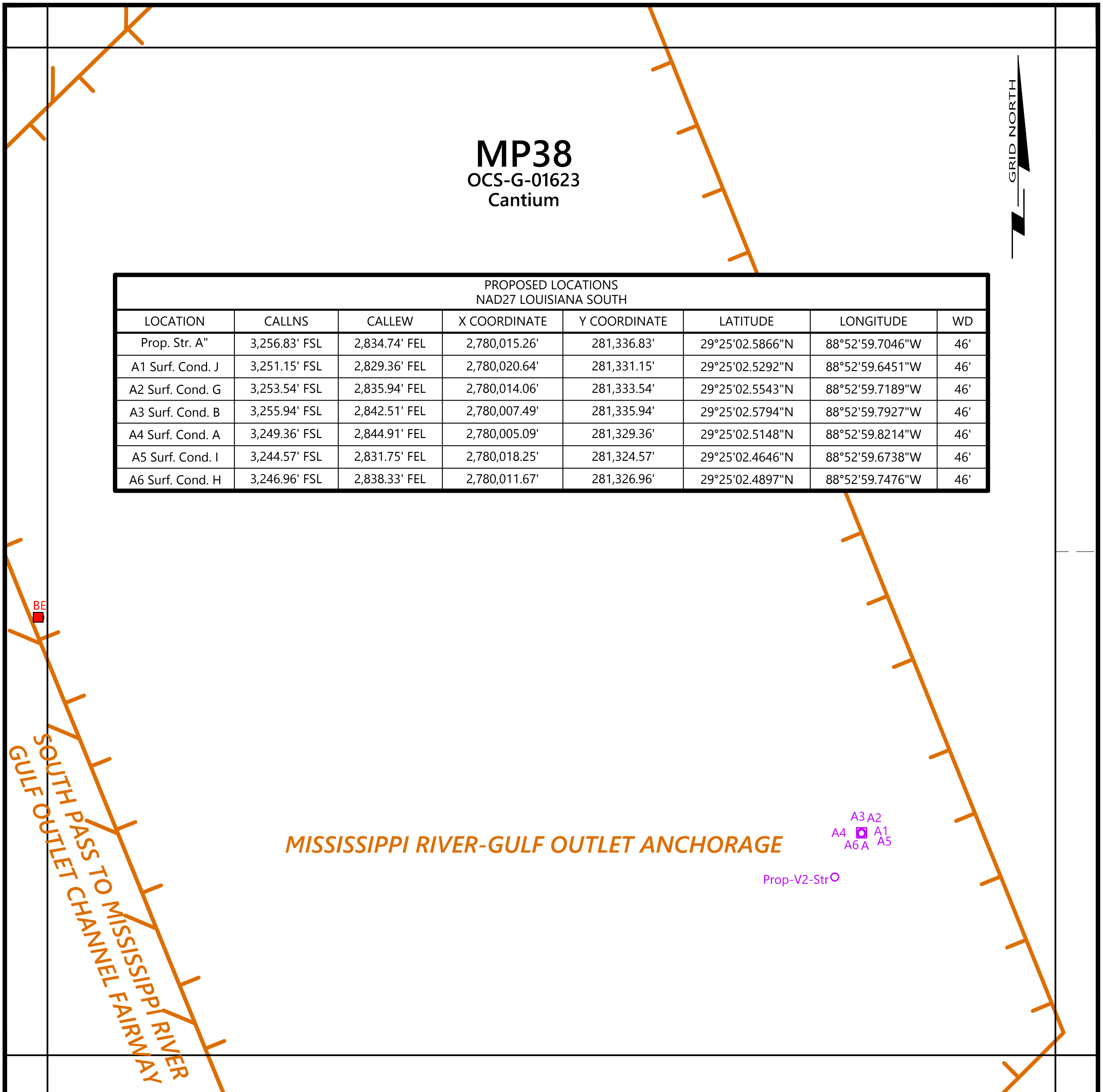
Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

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

ATTACHMENT 1-B

MP38
OCS-G-01623
Cantium

PROPOSED LOCATIONS NAD27 LOUISIANA SOUTH							
LOCATION	CALLNS	CALLEW	X COORDINATE	Y COORDINATE	LATITUDE	LONGITUDE	WD
Prop. Str. A"	3,256.83' FSL	2,834.74' FEL	2,780,015.26'	281,336.83'	29°25'02.5866"N	88°52'59.7046"W	46'
A1 Surf. Cond. J	3,251.15' FSL	2,829.36' FEL	2,780,020.64'	281,331.15'	29°25'02.5292"N	88°52'59.6451"W	46'
A2 Surf. Cond. G	3,253.54' FSL	2,835.94' FEL	2,780,014.06'	281,333.54'	29°25'02.5543"N	88°52'59.7189"W	46'
A3 Surf. Cond. B	3,255.94' FSL	2,842.51' FEL	2,780,007.49'	281,335.94'	29°25'02.5794"N	88°52'59.7927"W	46'
A4 Surf. Cond. A	3,249.36' FSL	2,844.91' FEL	2,780,005.09'	281,329.36'	29°25'02.5148"N	88°52'59.8214"W	46'
A5 Surf. Cond. I	3,244.57' FSL	2,831.75' FEL	2,780,018.25'	281,324.57'	29°25'02.4646"N	88°52'59.6738"W	46'
A6 Surf. Cond. H	3,246.96' FSL	2,838.33' FEL	2,780,011.67'	281,326.96'	29°25'02.4897"N	88°52'59.7476"W	46'



CANTIUM
Velox, Elegantes, et Efficiens

DEVELOPMENT OPERATIONS COORDINATION DOCUMENT
OCS-G-01623 BLOCK 38
MAIN PASS AREA
GULF OF MEXICO

Geodetic Datum: NAD27
Projection: LOUISIANA SOUTH
Grid Units: US SURVEY FEET

SCALE 1:24000 — 0 2000 FEET

FUGRO
FUGRO USA MARINE, INC.
6100 Hillcroft Ave.
Houston, Texas 77081
(713) 346-3700

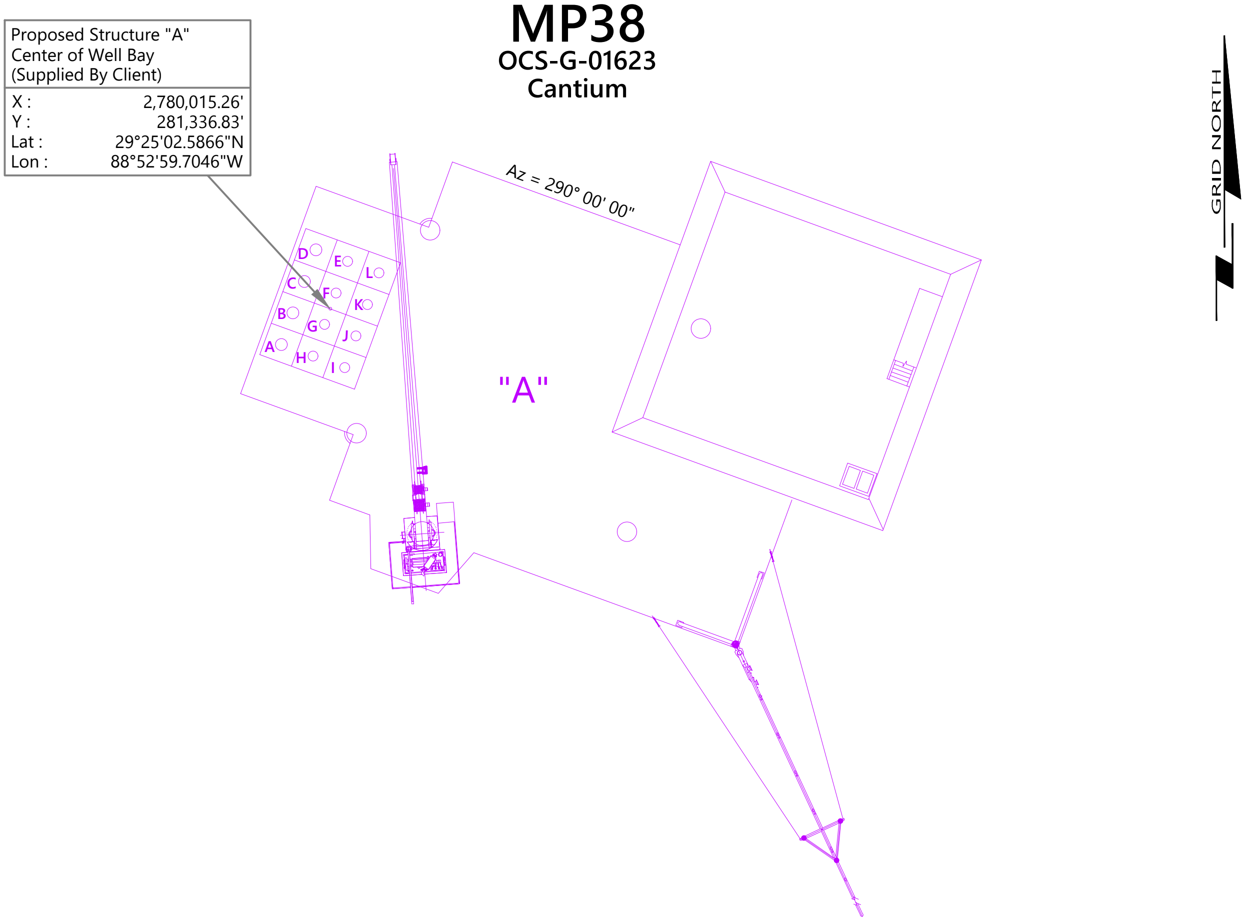
Job No.: 21000201 | Date: 4/14/2021 | Drwn: EA | Chart: 1 Of: 1

DWG File: 21000201_MP38-A_A1-A6_DOCD_G01623

4/14/2021

PUBLIC INFORMATION

MP38
OCS-G-01623
Cantium



PROPOSED CONDUCTOR REPORT NAD27 LOUISIANA SOUTH						
COND	CALLNS	CALLEW	X Coordinate	Y Coordinate	Latitude	Longitude
A	3,249.36' FSL	2,844.91' FEL	2,780,005.09'	281,329.36'	29°25'02.5148"N	88°52'59.8214"W
B	3,255.94' FSL	2,842.51' FEL	2,780,007.49'	281,335.94'	29°25'02.5794"N	88°52'59.7927"W
C	3,262.51' FSL	2,840.12' FEL	2,780,009.88'	281,342.51'	29°25'02.6440"N	88°52'59.7640"W
D	3,269.09' FSL	2,837.73' FEL	2,780,012.27'	281,349.09'	29°25'02.7086"N	88°52'59.7354"W
E	3,266.70' FSL	2,831.15' FEL	2,780,018.85'	281,346.70'	29°25'02.6835"N	88°52'59.6616"W
F	3,260.12' FSL	2,833.54' FEL	2,780,016.46'	281,340.12'	29°25'02.6189"N	88°52'59.6903"W
G	3,253.54' FSL	2,835.94' FEL	2,780,014.06'	281,333.54'	29°25'02.5543"N	88°52'59.7189"W
H	3,246.96' FSL	2,838.33' FEL	2,780,011.67'	281,326.96'	29°25'02.4897"N	88°52'59.7476"W
I	3,244.57' FSL	2,831.75' FEL	2,780,018.25'	281,324.57'	29°25'02.4646"N	88°52'59.6738"W
J	3,251.15' FSL	2,829.36' FEL	2,780,020.64'	281,331.15'	29°25'02.5292"N	88°52'59.6451"W
K	3,257.72' FSL	2,826.97' FEL	2,780,023.03'	281,337.72'	29°25'02.5938"N	88°52'59.6165"W
L	3,264.30' FSL	2,824.57' FEL	2,780,025.43'	281,344.30'	29°25'02.6584"N	88°52'59.5878"W

NOTES

1. PROPOSED POSITION AND ORIENTATION OF STR. "A" OBTAINED FROM EDG DRAWING MP38SPL-9046-05-001.PDF.
2. PIPELINE RISERS AND APPROACHES ARE APPROXIMATE, AND REMAIN TO BE VERIFIED.

CANTIUM
Velox, Elegantes, et Efficiens

PROPOSED POSITION STRUCTURE "A"

BLOCK 38
MAIN PASS AREA
GULF OF MEXICO

Geodetic Datum: NAD27
Projection: LOUISIANA SOUTH
Grid Units: US SURVEY FEET

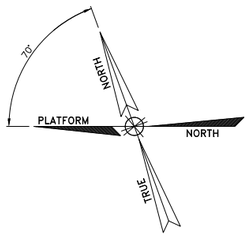
SCALE 1:480 — 0 40 FEET

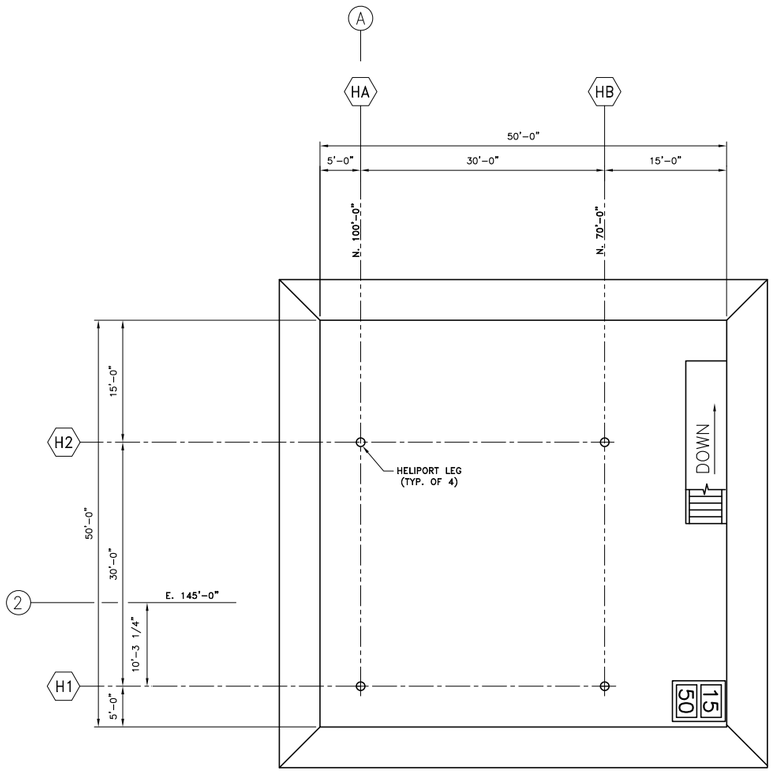
FUGRO USA MARINE, INC.
6100 Hillcroft Ave.
Houston, Texas 77081
(713) 346-3700

Job No.: 21000201 | Date: 4/14/2021 | Drwn: EA | Chart: 1 Of: 1

DWG File: 21000201_MP38_Prop-Str_A_Cond

4/14/2021





HELIPORT PLAN

SCALE: 1/8"= 1'-0"
T.O.S. EL. (+) 110'-0"

EQUIPMENT LEGEND

MK.	DESCRIPTION	
1	CHEMICAL INJECTION SKID	7'-8" x 24'-0"
2	POTABLE WATER TANK	12'-0" x 12'-0"
3	PRESSURE SET	6'-0" x 6'-0"
4A	MCC/SWGR/STORAGE BUILDING (LOWER LEVEL)	12'-0" x 30'-0"
4A	OFFICE/SLEEPER/KITCHEN BUILDING (UPPER LEVEL)	12'-0" x 30'-0"
5	PLATFORM DC SYSTEM BATTERY BOX	3'-0" x 3'-0"
6	CO2 BOTTLE RACK	1'-2" x 3'-4"
7	CO2 BOTTLE RACK	1'-5" x 6'-7"
8	GAS COMPRESSOR (XXXX HP) (FUTURE)	11'-6" x 38'-0"
9	GAS LIFT MANIFOLD	4'-0" x 15'-0"
10	FUEL GAS SKID	8'-0" x 12'-0"
11	GAS GENERATOR (FUTURE)	7'-0" x 15'-0"
12	DIESEL GENERATOR (XXX KW)	7'-0" x 15'-0"
13	TOOL BUILDING	8'-0" x 8'-0"
14	MANIFOLD	12'-0" x 24'-0"
15	TEST SEPARATOR SKID	10'-0" x 20'-0"
16	H.P. SEPARATOR SKID	12'-0" x 26'-0"
17	I.P/L.P. SEPARATOR SKID	12'-0" x 26'-0"
18	SURGE TANK/PUMPS (FUTURE)	12'-0" x 26'-0"
19	RELIEF SCRUBBER	9'-0" x 9'-0"
20	SCADA PANEL	2'-0" x 5'-6" x 6'-0"
21	WELL CONTROL PANEL	2'-1" x 5'-0" x 6'-0"
22	MASTER PANEL	1'-4" x 10'-0" x 6'-0"
23	DIESEL TRANSFER PUMP SKID	6'-0" x 4'-0"
24	FLOATATION CELL (FUTURE)	8'-11 1/2" x 24'-0"
25	WATER SKIMMER SKID (FUTURE)	12'-0" x 26'-0"
26	NAV.-AID BOX	1'-7" x 2'-11"
27	ELECTRIC FIREWATER PUMP (FUTURE)	16" DIA.
28	SUMP TANK SKID	6'-1" x 10'-1"
29	PIG LAUNCHER SKID (3 LAUNCHERS)	10'-0" x 14'-0"
30	CRANE	20 TON x 80' BOOM
	DECK STEEL (STRUCTURAL)	
	TOTAL EQUIPMENT WEIGHT	
	TOTAL I.C.P. WEIGHT	
	TOTAL I&E WEIGHT	
	TOTAL LIFT WEIGHT	

9 APR 21
FOR CLIENT REVIEW

REV.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR CLIENT REVIEW	RM	CJF	–	04/09/21

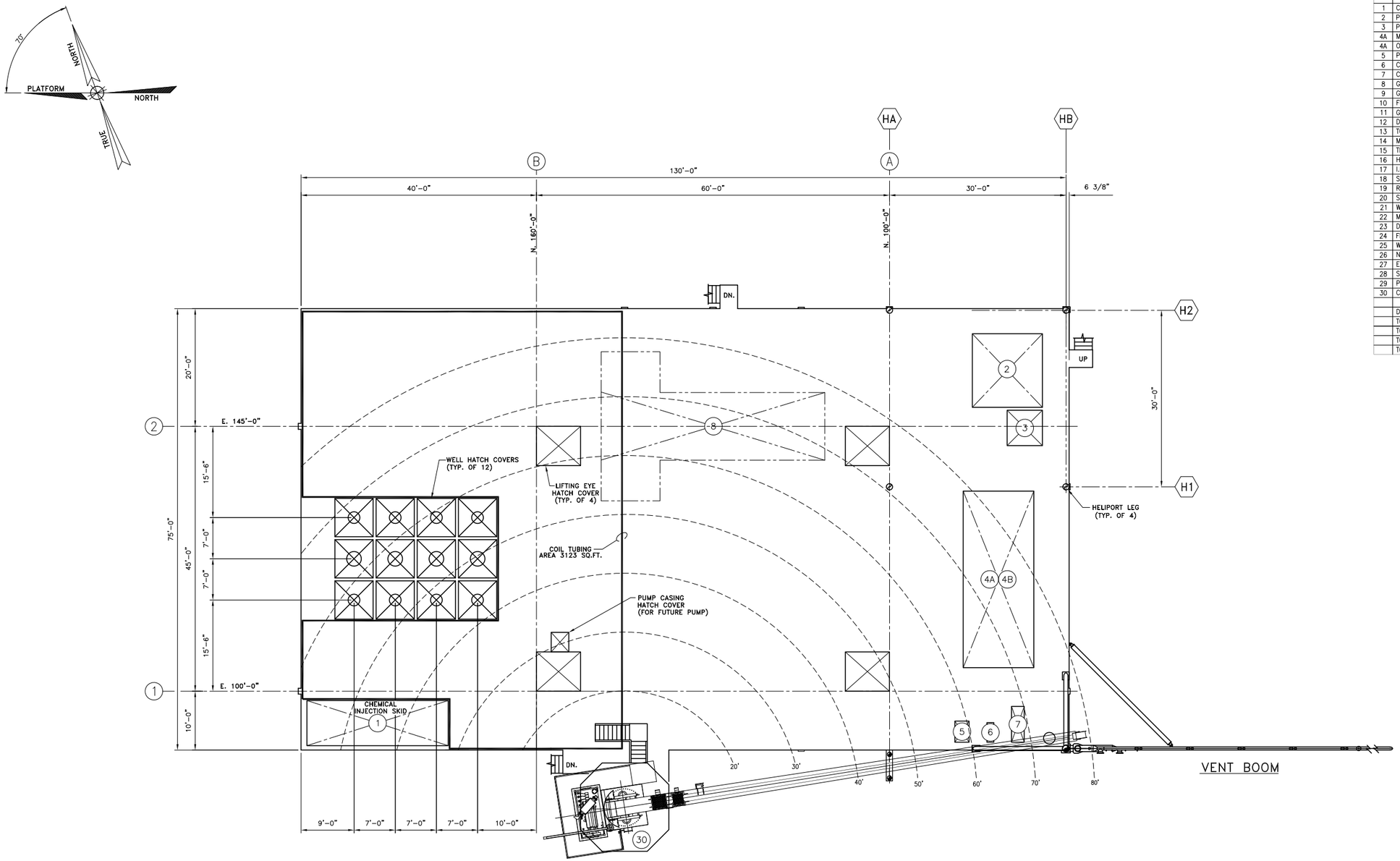
EDG, INC.

CLIENT			
APPROVED			
CHECKED	CJF	03/23/21	
DRAWN	CJB	03/23/21	

CANTIUM

MAIN PASS BLOCK 38 "A"
12 WELL 4-PILE STRUCTURE
HELIDECK LAYOUT

JOB NO. 9046.001 | DWG. NO. MP38A-9046-05-100 | A



MAIN DECK PLAN

SCALE: 1/8"= 1'-0"
T.O.S. EL. (+) 85'-0"

EQUIPMENT LEGEND

MK.	DESCRIPTION	
1	CHEMICAL INJECTION SKID	7'-8" x 24'-0"
2	POTABLE WATER TANK	12'-0" x 12'-0"
3	PRESSURE SET	6'-0" x 6'-0"
4A	MCC/SWGR/STORAGE BUILDING (LOWER LEVEL)	12'-0" x 30'-0"
4A	OFFICE/SLEEPER/KITCHEN BUILDING (UPPER LEVEL)	12'-0" x 30'-0"
5	PLATFORM DC SYSTEM BATTERY BOX	3'-0" x 3'-0"
6	CO2 BOTTLE RACK	1'-2" x 3'-4"
7	CO2 BOTTLE RACK	1'-5" x 6'-7"
8	GAS COMPRESSOR (XXXX HP) (FUTURE)	11'-6" x 38'-0"
9	GAS LIFT MANIFOLD	4'-0" x 15'-0"
10	FUEL GAS SKID	8'-0" x 12'-0"
11	GAS GENERATOR (FUTURE)	7'-0" x 15'-0"
12	DIESEL GENERATOR (XXX KW)	7'-0" x 15'-0"
13	TOOL BUILDING	8'-0" x 8'-0"
14	MANIFOLD	12'-0" x 24'-0"
15	TEST SEPARATOR SKID	10'-0" x 20'-0"
16	H.P. SEPARATOR SKID	12'-0" x 26'-0"
17	I.P/L.P. SEPARATOR SKID	12'-0" x 26'-0"
18	SURGE TANK/PUMPS (FUTURE)	12'-0" x 26'-0"
19	RELIEF SCRUBBER	9'-0" x 9'-0"
20	SCADA PANEL	2'-0" x 5'-6" x 6'-0"
21	WELL CONTROL PANEL	2'-1" x 5'-0" x 6'-0"
22	MASTER PANEL	1'-4" x 10'-0" x 6'-0"
23	DIESEL TRANSFER PUMP SKID	6'-0" x 4'-0"
24	FLOATATION CELL (FUTURE)	8'-11 1/2" x 24'-0"
25	WATER SKIMMER SKID (FUTURE)	12'-0" x 26'-0"
26	NAV.-AID BOX	1'-7" x 2'-11"
27	ELECTRIC FIREWATER PUMP (FUTURE)	16" DIA.
28	SUMP TANK SKID	6'-1" x 10'-1"
29	PIG LAUNCHER SKID (3 LAUNCHERS)	10'-0" x 14'-0"
30	CRANE	20 TON x 80' BOOM
	DECK STEEL (STRUCTURAL)	
	TOTAL EQUIPMENT WEIGHT	
	TOTAL I.C.P. WEIGHT	
	TOTAL I&E WEIGHT	
	TOTAL LIFT WEIGHT	

9 APR 21
FOR CLIENT REVIEW

REV.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR CLIENT REVIEW	RM	CJF	–	04/09/21

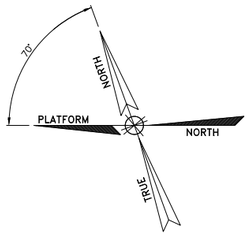
EDG, INC.

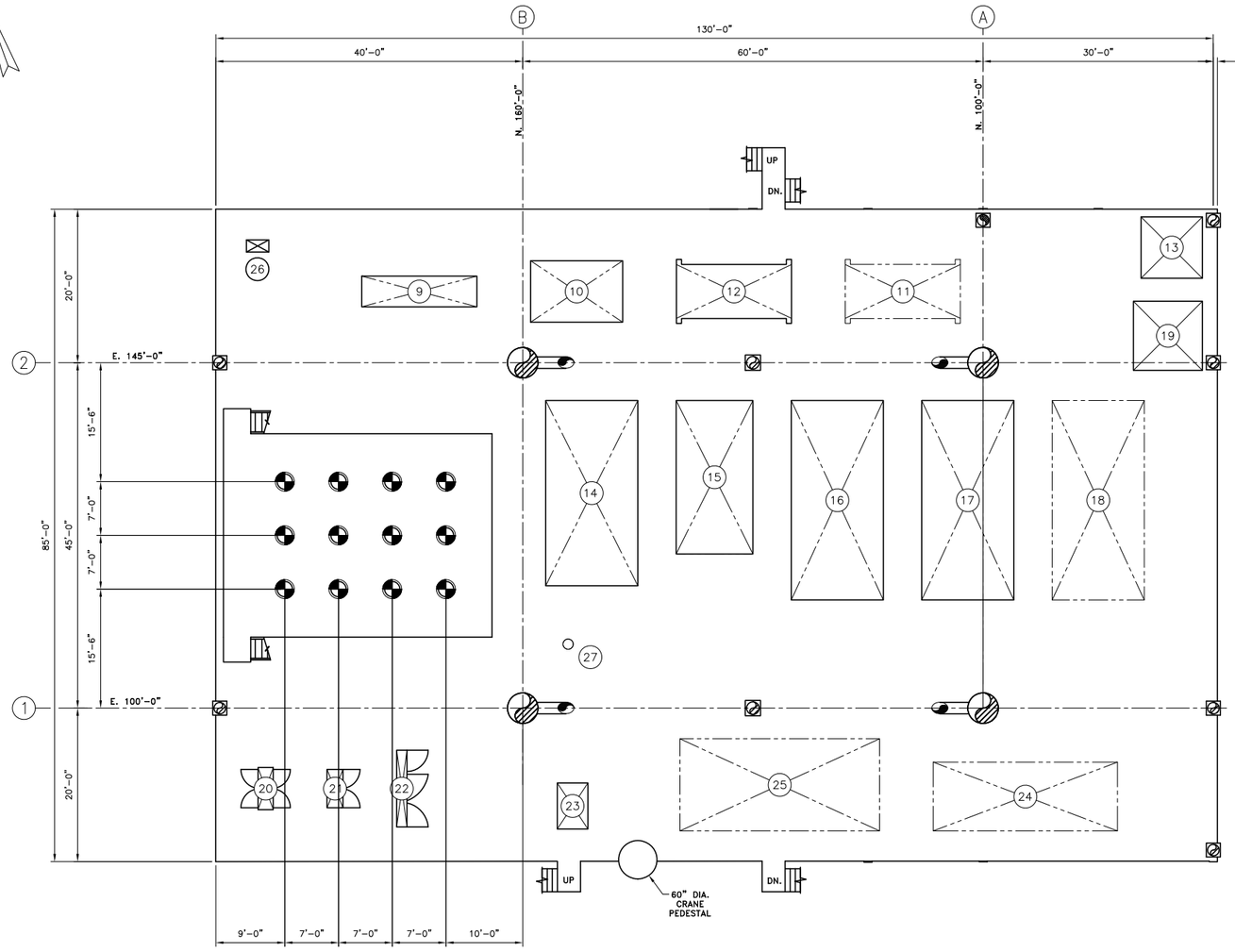
CLIENT			
APPROVED			
CHECKED	CJF	03/23/21	
DRAWN	CJB	03/23/21	

CANTIUM

MAIN PASS BLOCK 38 "A"
12 WELL 4-PILE STRUCTURE
MAIN DECK GENERAL ARRANGEMENT PLAN

JOB NO. 9046.001 | DWG. NO. MP38A-9046-05-101 | A





EQUIPMENT LEGEND

MK.	DESCRIPTION	
1	CHEMICAL INJECTION SKID	7'-8" x 24'-0"
2	POTABLE WATER TANK	12'-0" x 12'-0"
3	PRESSURE SET	6'-0" x 6'-0"
4A	MCC/SWGR/STORAGE BUILDING (LOWER LEVEL)	12'-0" x 30'-0"
4A	OFFICE/SLEEPER/KITCHEN BUILDING (UPPER LEVEL)	12'-0" x 30'-0"
5	PLATFORM DC SYSTEM BATTERY BOX	3'-0" x 3'-0"
6	CO2 BOTTLE RACK	1'-2" x 3'-4"
7	CO2 BOTTLE RACK	1'-5" x 6'-7"
8	GAS COMPRESSOR (XXXX HP) (FUTURE)	11'-6" x 38'-0"
9	GAS LIFT MANIFOLD	4'-0" x 15'-0"
10	FUEL GAS SKID	8'-0" x 12'-0"
11	GAS GENERATOR (FUTURE)	7'-0" x 15'-0"
12	DIESEL GENERATOR (XXX KW)	7'-0" x 15'-0"
13	TOOL BUILDING	8'-0" x 8'-0"
14	MANIFOLD	12'-0" x 24'-0"
15	TEST SEPARATOR SKID	10'-0" x 20'-0"
16	H.P. SEPARATOR SKID	12'-0" x 26'-0"
17	I.P/L.P. SEPARATOR SKID	12'-0" x 26'-0"
18	SURGE TANK/PUMPS (FUTURE)	12'-0" x 26'-0"
19	RELIEF SCRUBBER	9'-0" x 9'-0"
20	SCADA PANEL	2'-0" x 5'-6" x 6'-0"
21	WELL CONTROL PANEL	2'-1" x 5'-0" x 6'-0"
22	MASTER PANEL	1'-4" x 10'-0" x 6'-0"
23	DIESEL TRANSFER PUMP SKID	6'-0" x 4'-0"
24	FLOATATION CELL (FUTURE)	8'-11 1/2" x 24'-0"
25	WATER SKIMMER SKID (FUTURE)	12'-0" x 26'-0"
26	NAV.-AID BOX	1'-7" x 2'-11"
27	ELECTRIC FIREWATER PUMP (FUTURE)	16" DIA.
28	SUMP TANK SKID	6'-1" x 10'-1"
29	PIG LAUNCHER SKID (3 LAUNCHERS)	10'-0" x 14'-0"
30	CRANE	20 TON x 80' BOOM
	DECK STEEL (STRUCTURAL)	
	TOTAL EQUIPMENT WEIGHT	
	TOTAL I.C.P. WEIGHT	
	TOTAL I&E WEIGHT	
	TOTAL LIFT WEIGHT	

CELLAR DECK PLAN

SCALE: 1/8"= 1'-0"
T.O.S. EL. (+) 60'-0"

9 APR 21
FOR CLIENT REVIEW

REV.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR CLIENT REVIEW	RM	CJF	–	04/09/21

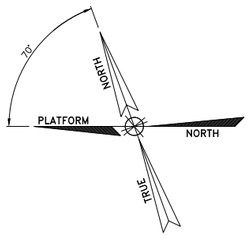
EDG, INC.

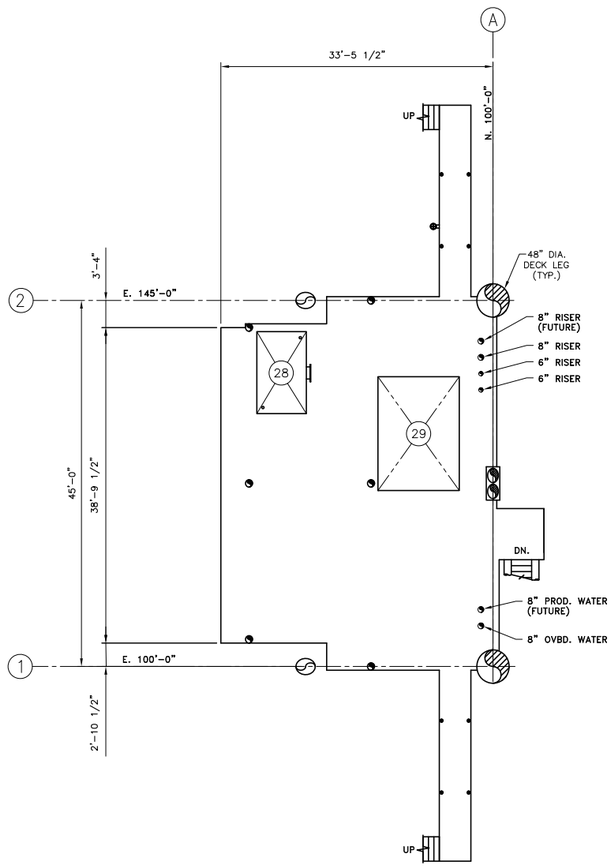
CLIENT
APPROVED
CHECKED CJF 03/23/21
DRAWN CJB 03/23/21

CANTIUM

MAIN PASS BLOCK 38 "A"
12 WELL 4-PILE STRUCTURE
CELLAR DECK GENERAL ARRANGEMENT PLAN

JOB NO. 9046.001 | DWG. NO. MP38A-9046-05-102 | A





SUMP DECK PLAN
SCALE: 1/8"= 1'-0"
T.O.S. EL. 45'-0"

EQUIPMENT LEGEND

MK.	DESCRIPTION	
1	CHEMICAL INJECTION SKID	7'-8" x 24'-0"
2	POTABLE WATER TANK	12'-0" x 12'-0"
3	PRESSURE SET	6'-0" x 6'-0"
4A	MCC/SWGR/STORAGE BUILDING (LOWER LEVEL)	12'-0" x 30'-0"
4A	OFFICE/SLEEPER/KITCHEN BUILDING (UPPER LEVEL)	12'-0" x 30'-0"
5	PLATFORM DC SYSTEM BATTERY BOX	3'-0" x 3'-0"
6	CO2 BOTTLE RACK	1'-2" x 3'-4"
7	CO2 BOTTLE RACK	1'-5" x 6'-7"
8	GAS COMPRESSOR (XXXX HP) (FUTURE)	11'-6" x 38'-0"
9	GAS LIFT MANIFOLD	4'-0" x 15'-0"
10	FUEL GAS SKID	8'-0" x 12'-0"
11	GAS GENERATOR (FUTURE)	7'-0" x 15'-0"
12	DIESEL GENERATOR (XXX KW)	7'-0" x 15'-0"
13	TOOL BUILDING	8'-0" x 8'-0"
14	MANIFOLD	12'-0" x 24'-0"
15	TEST SEPARATOR SKID	10'-0" x 20'-0"
16	H.P. SEPARATOR SKID	12'-0" x 26'-0"
17	I.P/L.P. SEPARATOR SKID	12'-0" x 26'-0"
18	SURGE TANK/PUMPS (FUTURE)	12'-0" x 26'-0"
19	RELIEF SCRUBBER	9'-0" x 9'-0"
20	SCADA PANEL	2'-0" x 5'-6" x 6'-0"
21	WELL CONTROL PANEL	2'-1" x 5'-0" x 6'-0"
22	MASTER PANEL	1'-4" x 10'-0" x 6'-0"
23	DIESEL TRANSFER PUMP SKID	6'-0" x 4'-0"
24	FLOATATION CELL (FUTURE)	8'-11 1/2" x 24'-0"
25	WATER SKIMMER SKID (FUTURE)	12'-0" x 26'-0"
26	NAV.-AID BOX	1'-7" x 2'-11"
27	ELECTRIC FIREWATER PUMP (FUTURE)	16" DIA.
28	SUMP TANK SKID	6'-1" x 10'-1"
29	PIG LAUNCHER SKID (3 LAUNCHERS)	10'-0" x 14'-0"
30	CRANE	20 TON x 80' BOOM
	DECK STEEL (STRUCTURAL)	
	TOTAL EQUIPMENT WEIGHT	
	TOTAL I.C.P. WEIGHT	
	TOTAL I&E WEIGHT	
	TOTAL LIFT WEIGHT	

9 APR 21
FOR CLIENT REVIEW

REV.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR CLIENT REVIEW	RM	CJF	–	04/09/21

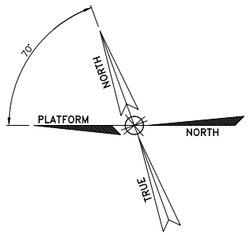
EDG, INC.

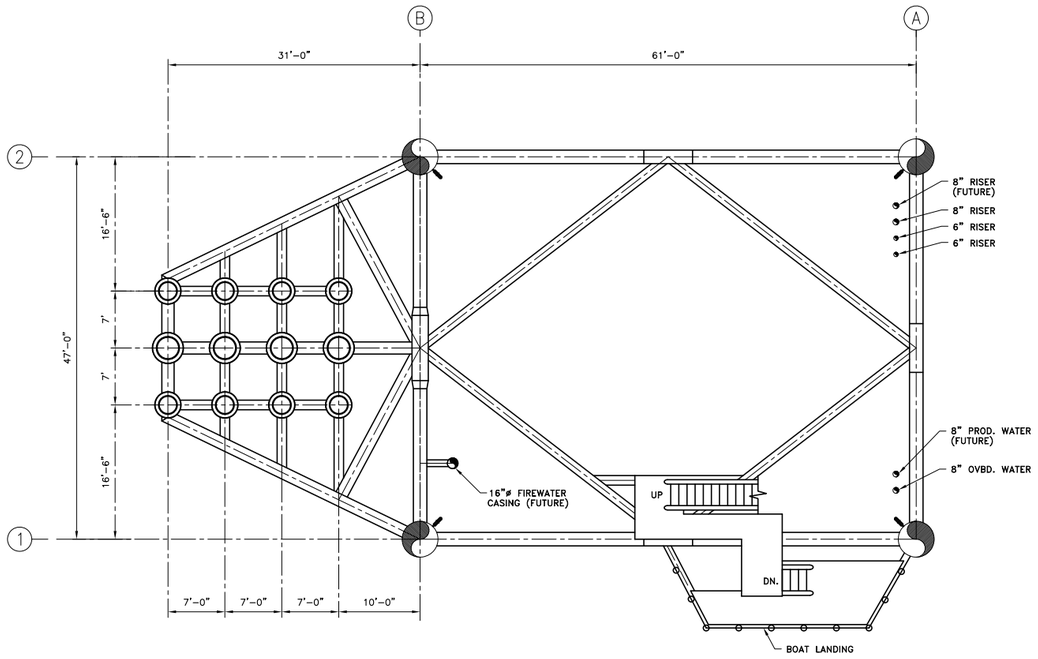
CLIENT
APPROVED
CHECKED CJF 03/23/21
DRAWN CJB 03/23/21

CANTIUM

MAIN PASS BLOCK 38 "A"
12 WELL 4-PILE STRUCTURE
SUMP DECK GENERAL ARRANGEMENT PLAN

JOB NO. 9046.001 | DWG. NO. MP38A-9046-05-103 | A





TOP OF JACKET WALKWAY
SCALE: 1/8"= 1'-0"
T.O.S. EL. 12'-10"

9 APR 21
FOR CLIENT REVIEW

REV.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR CLIENT REVIEW	RM	CJF	–	04/09/21

EDG, INC.

CLIENT			
APPROVED			
CHECKED	CJF	03/23/21	
DRAWN	CJB	03/23/21	

CANTIUM

MAIN PASS BLOCK 38 "A"
12 WELL 4-PILE STRUCTURE
TOP OF JACKET
GENERAL ARRANGEMENT PLAN

JOB NO. 9046.001 | DWG. NO. MP38A-9046-05-104 | A

We value your feedback!

ATTACHMENT 1-D

Let us know how we did. Complete our short two minute survey.

Tracking Information

Pay.gov Tracking ID: 26RSA5CQ

Agency Tracking ID: 76097669129

Form Name: BOEM Development Operations Coordination Document or DPP

Application Name: BOEM Development/DOCD Plan - BD

Payment Information

Payment Type: Bank account (ACH)

Payment Amount: $25,428.00

Transaction Date: 04/19/2021 06:00:56 PM EDT

Payment Date: 04/20/2021

Region: Gulf of Mexico

Contact: Sheri Merrell 5042563602

Company Name/No: Cantium, LLC, 03481

Lease Number(s): 01623, , , ,

Area-Block: Main Pass MP, 38: , : , : , : ,

Type-Wells: Initial Plan, 6

Account Information

Account Holder Name: Cantium, LLC

Routing Number: 065403626

Account Number: **********0117

Register today!

Create an Account or Sign In

Please consider creating a Pay.gov account. With a Pay.gov account you can manage payments and view history.

SECTION 2
GENERAL INFORMATION

2.1 APPLICATIONS AND PERMITS

The table below provides the additional applications to be filed covering operations proposed in this DOCD.

Application/Permit	Issuing Agency	Status
APD	BSEE	To Be Submitted
Lease Term Pipeline Application	BSEE	To Be Submitted
Structure Application	BSEE	To Be Submitted
Surface Safety System	BSEE	To Be Submitted

2.2 DRILLING FLUIDS

The table below provides the types and estimated volumes of the drilling fluids Cantium plans to use to drill the proposed wells.

Type of Drilling Fluid	Estimated Volume of Drilling Fluid to be Used per Well (bbl)
Water-based (seawater, freshwater, barite)	5,000
Oil-based (diesel, mineral oil)	5,000
Synthetic-based (internal olefin, ester)	0

The major components of each oil-based drilling fluid are provided in the table below.

Product Name	Amount to be Used (bbl)	Reference Number
Carbo-Drill Oil-Based Drilling Mud (Diesel)	5,000 bbl	7437DFUS

A Safety Data Sheet (SDS) for each oil-based drilling fluid is included as **Attachment 2-A**.

2.3 PRODUCTION

Proprietary Information

2.4 OIL CHARACTERISTICS

Oil characteristics are not required to be submitted with this plan.

2.5 NEW OR UNUSUAL TECHNOLOGY

No new or unusual technology is proposed in this DOCD as defined by 30 CFR 550.200.

2.6 BONDING STATEMENT

The bond requirements for the activities and facilities proposed in this DOCD are satisfied by an area-wide bond, furnished and maintained according to 30 CFR 556.900 (a) and 30 CFR 556.901 (a) and (b) and NTL No. 2015-BOEM-N04, "General Financial Assurance"; and additional security under 30 CFR 556.901(d) – (f) and NTL No. 2016—BOEM-N01, “Requiring Additional Security” as required by BOEM.

2.7 OIL SPILL FINANCIAL RESPONSIBILITY (OSFR)

Cantium, LLC (Company No. 03481) has demonstrated oil spill financial responsibility for the facilities proposed in this DOCD according to 30 CFR Part 553.15 (a); and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities".

2.8 DEEPWATER WELL CONTROL STATEMENT

Operations proposed in this plan are located in water depths less than 300 meters (984 feet); therefore, a deepwater well control statement is not provided.

2.9 SUSPENSION OF PRODUCTION

Cantium does not anticipate filing any requests for Suspension of Production to hold the leases or unit addressed in this DOCD in active status.

2.10 BLOWOUT SCENARIO AND WORST CASE DISCHARGE CALCULATIONS

In accordance with NTL No. 2015-BOEM-N01, “Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the OCS for Worst Case Discharge and Blowout Scenarios” the Blowout Scenario and Worst Case Discharge Assumptions and Calculations were submitted and approved with DOCD Control No. R-6939.

The Worst Case Discharge is defined as an uncontrolled blowout through the drilling string during drilling operations.

Estimated initial flow rate: The calculated Worst Case Discharge for Main Pass Block 37 Well No. 006 is 69,811 bbl of crude.

Maximum duration/total volume that could occur if the Main Pass Block 37 Well No. 006 blew out:

Scenario	Maximum Discharge Rate (bbl/day)	Discharge Duration (days)	Total Volume Crude (bbl)
Relief Well	69,811	45	3,141,495

Potential of wellbore to bridge over during a blowout: Due to the unconsolidated nature of the sand quality of the proposed target reservoir, the potential for the well to bridge over is very high within the first 5-10 days of a loss of control incident. The planned casing program exits existing casing at a depth where fracture gradient is high enough to hold in the event the

wellbore has been fully evacuated with gas. Drilling techniques would likely experience an underground blowout as the path of least resistance preceded by bridging in the wellbore.

Likelihood for surface intervention to stop blowout: Most successful well kill operations are conducted via surface intervention by trained well control specialists. In the event of an actual blowout, intervention at the surface will be guided by well control specialists from Wild Well Control. The jack-up rig style offers good access to surface well control equipment for surface intervention.

Relief Well

Rig type capable of drilling relief well at water depth and to TD: The type of rig necessary to drill in water depths up to 46' would be either a mat jack-up or an independent leg rig. There are approximately 5 units of this type available in the Gulf of Mexico fleet. A relief well rig can be placed a safe distance from the affected rig and still reach intercept depths needed. Rigs we can use to drill a relief well are WFD #250, WFD #300, Enterprise #263, Enterprise #264 and Ensco #68.

Rig package constraints: Some rigs may be restricted during hurricane season, but there are several rigs available that are not restricted.

Time to acquire rig, move onsite and drill relief well:

Activity	Duration (days)
Assess the situation and obtain the optimum MODU; Secure the well at current location of MODU	15
Mobilization time to relief well location	5
Drill the relief well, intersect and kill the well	40
Total anticipated time	60

Statement whether possibility of using nearby platform was considered: The Main Pass 37 BE is the nearest platform, approximately 2 miles away. To reduce drill time with an easier directional approach, an open water location 500’ to 1000’ is a better choice with a Jack-up type rig.

Other measures to enhance ability to prevent a blowout: In Main Pass, any open hole wellbore influx would also include contributions from significant, exposed water sands, so in a blowout scenario, there would always be a large volume of fluids associated with the flow stream. Cantium will adhere to and conduct all operations in compliance with all regulations. This would include, but not be limited to:

- Sufficient mud weight margin can be maintained without mud losses.
- Test and certify BOPs with proper working pressure.
- Maintain enough barite on location to weight up the mud system 0.5 ppg.
- Properly test TIW and BOP on rig floor.

- Monitor trip speeds to minimize surge and swab pressures.
- Check well for flow regularly especially following drilling breaks.
- Rig up and function test gas detectors properly.
- Earnestly conduct well control drills with each crew.
- Thoroughly review offset information to identify drilling hazards.
- Drilling information will be available for real-time display and reviewed by office engineers and rig superintendents via a company like OFI. Drilling information will be available for monitoring 24/7 with geoscience team for accurate pore pressure analysis via OFI along with real time Baker LWD transmission

Measures to reduce the likelihood of a blowout:

- Perform offset-well history review. Most wells are drilled in known fields with established pressure profiles.
- Create proper mud design and maintain MW to control well as per the offset information.
- Design and maintain in proper functioning order the atmospheric degasser.
- Maintain stuck pipe spotting material on location.
- Maintain enough LCM material on location to mix two pills.
- Monitor pressures while making preparations to circulate the invading fluids out of the wellbore and regain hydrostatic pressure control of the formation pressure, should the well need to be shut it.
- Run cement bond logs where applicable.
- Make routine short trips when warranted.
- Circulate bottoms up frequently.
- Run centralizers by normally accepted practices where applicable.
- Model cement jobs and drilling fluid hydraulics for rate and ecd effects.

Measures to enhance ability to conduct effective and early intervention in event of a blowout:

- Minimize the impact of an event by having well trained personnel at the well site.
- Be sure drillers understand it is always acceptable to shut-in a well to evaluate well conditions at any time.
- Make initial contact with surface intervention specialist.
- Perform hazard assessment and operations assessment to establish path forward.
- Set up firefighting equipment of vessels.
- Begin firewater application to cool the area or to prevent ignition while working in proximity to flow.
- Clear debris and move onto the rig.
- Cut off damaged wellhead and BOPs.
- Install new wellhead.
- Install diverter and capping stack.
- Rig up snubbing unit.

- Snub in and kill well.

Arrangements for drilling relief wells:

- Maintain awareness of the location of other rigs working in the Gulf Shelf.
- Build relations with other operators in the Shelf, like Arena and Cox who also support an active drilling program.
- The company that is providing the rig for the project has 2 additional rigs at our call.
- Other shelf operators understand we would seek the most readily and capable rig to respond and would work with other Operators as needed to make them available.
- The type of rig necessary to drill in water depths of 46’ is either an independent leg jack-up rig or mat jack-up.
- There are approximately 5 rigs working on the shelf that are available in the Gulf of Mexico fleet.

Any other measures: N/A

SAFETY DATA SHEET

Section 1. Identification

Product name : CARBO-DRILL OIL-BASED DRILLING MUD (DIESEL)

Product code : 7437DFUS

Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Oil-Based Mud System

Print date : 11/7/2019

Validation date : 11/7/2019

Version : 5

Supplier's details : Baker Hughes
12645 W. Airport Blvd.
Sugar Land, TX 77478

Emergency telephone number (with hours of operation) : CHEMTREC 800-424-9300 (U.S. 24 hour)
(001)713-439-8900
CHEMTREC Int'l 01-703-527-3887 (International 24 hour)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : EYE IRRITATION - Category 2A
CARCINOGENICITY - Category 1A
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (lungs) - Category 2
AQUATIC HAZARD (ACUTE) - Category 3
AQUATIC HAZARD (LONG-TERM) - Category 3

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Causes serious eye irritation.
May cause cancer.
May cause damage to organs through prolonged or repeated exposure. (lungs)
Harmful to aquatic life with long lasting effects.

Precautionary statements

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Avoid release to the environment. Do not breathe vapor. Wash hands thoroughly after handling.

Response : Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Section 2. Hazards identification

Storage : Store locked up.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements : Avoid contact with skin and clothing. Wash thoroughly after handling.

Hazards not otherwise classified : Prolonged or repeated contact may dry skin and cause irritation.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
Diesel oil	60 - 70	68334-30-5
Barium sulphate	10 - 20	7727-43-7
Calcium carbonate	5 - 10	1317-65-3
Calcium chloride, anhydrous	5 - 10	10043-52-4
Calcium hydroxide	1 - 5	1305-62-0
Crystalline silica, quartz	1 - 5	14808-60-7
Ethylbenzene	0.1 - 1	100-41-4
Naphthalene	0.1 - 1	91-20-3

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Continue to rinse for at least 10 minutes. Check for and remove any contact lenses. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway.

Skin contact : Wash skin thoroughly with soap and water or use recognized skin cleanser. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : No known significant effects or critical hazards.

Skin contact : Defatting to the skin. May cause skin dryness and irritation.

Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : pain or irritation,watering,redness

Inhalation : No specific data.

Section 4. First aid measures

Skin contact : irritation,dryness,cracking

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst. This material is harmful to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : carbon dioxide,carbon monoxide,sulfur oxides,halogenated compounds,metal oxide/ oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

Section 6. Accidental release measures

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

If RQ (Reportable Quantity) is exceeded, report to National Spill Response Office at 1-800-424-8802.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Avoid release to the environment. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Diesel oil	**ACGIH TLV (United States, 3/2018). Absorbed through skin.** TWA: 100 mg/m³, (measured as total hydrocarbons) 8 hours. Form: Inhalable fraction and vapor
Barium sulphate	**ACGIH TLV (United States, 3/2018).** TWA: 5 mg/m³ 8 hours. Form: Inhalable fraction **OSHA PEL 1989 (United States, 3/1989).** TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 10 mg/m³ 8 hours. Form: Total dust **NIOSH REL (United States, 10/2016).** TWA: 5 mg/m³ 10 hours. Form: Respirable fraction

Section 8. Exposure controls/personal protection

	TWA: 10 mg/m³ 10 hours. Form: Total **OSHA PEL (United States, 5/2018).** TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 15 mg/m³ 8 hours. Form: Total dust
Calcium carbonate	**OSHA PEL 1989 (United States, 3/1989).** TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 15 mg/m³ 8 hours. Form: Total dust **NIOSH REL (United States, 10/2016).** TWA: 5 mg/m³ 10 hours. Form: Respirable fraction TWA: 10 mg/m³ 10 hours. Form: Total **OSHA PEL (United States, 5/2018).** TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 15 mg/m³ 8 hours. Form: Total dust
Calcium chloride, anhydrous	None.
Calcium hydroxide	**ACGIH TLV (United States, 3/2018).** TWA: 5 mg/m³ 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 5 mg/m³ 8 hours. **NIOSH REL (United States, 10/2016).** TWA: 5 mg/m³ 10 hours. **OSHA PEL (United States, 5/2018).** TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 15 mg/m³ 8 hours. Form: Total dust
Crystalline silica, quartz	**OSHA PEL Z3 (United States, 6/2016).** TWA: 250 mppcf / (%SiO2+5) 8 hours. Form: Respirable TWA: 10 mg/m³ / (%SiO2+2) 8 hours. Form: Respirable **OSHA PEL 1989 (United States, 3/1989).** TWA: 0.1 mg/m³, (as quartz) 8 hours. Form: Respirable dust **OSHA PEL (United States, 5/2018).** TWA: 50 µg/m³ 8 hours. Form: Respirable dust **ACGIH TLV (United States, 3/2018).** TWA: 0.025 mg/m³ 8 hours. Form: Respirable fraction **NIOSH REL (United States, 10/2016).** TWA: 0.05 mg/m³ 10 hours. Form: respirable dust
Ethylbenzene	**ACGIH TLV (United States, 3/2018).** TWA: 20 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours. STEL: 125 ppm 15 minutes. STEL: 545 mg/m³ 15 minutes. **NIOSH REL (United States, 10/2016).** TWA: 100 ppm 10 hours. TWA: 435 mg/m³ 10 hours. STEL: 125 ppm 15 minutes. STEL: 545 mg/m³ 15 minutes. **OSHA PEL (United States, 5/2018).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.
Naphthalene	**ACGIH TLV (United States, 3/2018). Absorbed through skin.** TWA: 52 mg/m³, 0 times per shift, 8 hours. TWA: 10 ppm, 0 times per shift, 8 hours. **NIOSH REL (United States, 10/2016).** STEL: 75 mg/m³, 0 times per shift, 15 minutes. STEL: 15 ppm, 0 times per shift, 15 minutes.

Section 8. Exposure controls/personal protection

	TWA: 50 mg/m³, 0 times per shift, 10 hours. TWA: 10 ppm, 0 times per shift, 10 hours. **OSHA PEL (United States, 5/2018).** TWA: 50 mg/m³, 0 times per shift, 8 hours. TWA: 10 ppm, 0 times per shift, 8 hours. **OSHA PEL 1989 (United States, 3/1989).** STEL: 75 mg/m³, 0 times per shift, 15 minutes. STEL: 15 ppm, 0 times per shift, 15 minutes. TWA: 50 mg/m³, 0 times per shift, 8 hours. TWA: 10 ppm, 0 times per shift, 8 hours.

Consult local authorities for acceptable exposure limits.

If OSHA permissible exposure levels are shown above they are the OSHA 1989 levels or are from subsequent OSHA regulatory actions. Although the 1989 levels have been vacated the 11th Circuit Court of Appeals, Baker Hughes recommends that these lower exposure levels be observed as reasonable worker protection.

Appropriate engineering controls : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Wear chemical safety goggles. When transferring material wear face-shield in addition to chemical safety goggles.

Hand protection : Chemical-resistant gloves.

Skin protection : Wear long sleeves to prevent repeated or prolonged skin contact.

Respiratory protection : If a risk assessment indicates it is necessary, use a properly fitted, air purifying or supplied air respirator complying with an approved standard. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Brown.

Odor : Hydrocarbon.

Odor threshold : Not available.

pH : Not available.

Melting/freezing point : Not available.

Boiling point : Not available.

Initial Boiling Point : Not available.

Flash point : Closed cup: >100°C (>212°F) [PMCC]

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Section 9. Physical and chemical properties

Vapor pressure : Not available.

Vapor density : Not available.

Relative density : 0.8 to 1.1 (15°C)

Density : 6.66 to 9.16 (lbs/gal)

Solubility in water : Insoluble

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : 220°C (428°F)

Decomposition temperature : Not available.

Viscosity : Not available.

VOC : Not available.

Pour Point : Not available.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Diesel oil	LD50 Oral	Rat	7500 mg/kg	-
Calcium chloride, anhydrous	LD50 Oral	Rat	1 g/kg	-
Calcium hydroxide	LD50 Oral	Rat	7340 mg/kg	-
Ethylbenzene	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-
Naphthalene	LD50 Dermal	Rabbit	>20 g/kg	-
	LD50 Oral	Rat	490 mg/kg	-

Irritation/Corrosion

No applicable toxicity data

Sensitization

No applicable toxicity data

Mutagenicity

No applicable toxicity data

Carcinogenicity

Section 11. Toxicological information

Product/ingredient name	OSHA	IARC	NTP
Crystalline silica, quartz	-	1	Known to be a human carcinogen.
Ethylbenzene	-	2B	-
Naphthalene	-	2B	Reasonably anticipated to be a human carcinogen.

Reproductive toxicity

No applicable toxicity data

Teratogenicity

No applicable toxicity data

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Calcium hydroxide	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Crystalline silica, quartz	Category 1	Inhalation	lungs
Ethylbenzene	Category 2	Inhalation	Not determined

Aspiration hazard

Name	Result
Ethylbenzene	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : No known significant effects or critical hazards.

Skin contact : Defatting to the skin. May cause skin dryness and irritation.

Ingestion : No known significant effects or critical hazards.

Potential chronic health effects

General : May cause damage to organs through prolonged or repeated exposure. Prolonged or repeated contact can defat the skin and lead to irritation, cracking and/or dermatitis.

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Barium sulphate	Acute EC50 634 mg/l Fresh water	Crustaceans - Cypris subglobosa	48 hours
	Acute EC50 32000 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
Calcium chloride, anhydrous	Acute EC50 3130000 µg/l Fresh water	Algae - Navicula seminulum	96 hours
	Acute EC50 52000 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 270 mg/l Marine water	Crustaceans - Americamysis bahia	48 hours
	Acute LC50 2110 mg/l Fresh water	Fish - Pimephales promelas	96 hours
Calcium hydroxide	Acute LC50 112.89 ppm Marine water	Crustaceans - Mysidopsis juniae	96 hours
	Acute LC50 457 mg/l Marine water	Fish - Gasterosteus aculeatus	96 hours
	Acute LC50 160 ppm Fresh water	Fish - Gambusia affinis - Adult	96 hours
	Chronic LOEL 125 ppm Marine water	Echinodermata - Lytechinus variegatus	-
	Chronic NOEC 62.5 ppm Marine water	Echinodermata - Lytechinus variegatus	-
Ethylbenzene	Acute EC50 4600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 3600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute EC50 2930 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 5200 µg/l Marine water	Crustaceans - Americamysis bahia	48 hours
	Acute LC50 4200 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours
	Chronic NOEC 1000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
Naphthalene	Acute EC50 1.6 ppm Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 2350 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 213 µg/l Fresh water	Fish - Melanotaenia fluviatilis - Larvae	96 hours
	Chronic NOEC 0.67 ppm Fresh water	Fish - Oncorhynchus kisutch	40 days

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Ethylbenzene	-	-	Readily

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	TDG Classification	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-	-
Transport hazard class(es)	-	-	-	-
Packing group	-	-	-	-
Environmental hazards	No.	No.	No.	No.

Additional information

DOT Classification : **Reportable quantity** 23255.8 lbs / 10558.1 kg [2936 gal / 11113.8 L]. Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

DOT Reportable Quantity Naphthalene, 2940 gal of this product.

Marine pollutant Not available.

North-America NAERG : 128

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 12(b) one-time export**: No products were found.

TSCA 12(b) annual export notification: No products were found.

United States inventory (TSCA 8b): All components are listed or exempted.

Clean Water Act (CWA) 307: naphthalene; ethylbenzene

Clean Water Act (CWA) 311: naphthalene; ethylbenzene

United States - Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs) :

List name	Status	Ingredient name	Name on list	Conc.
United States - Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)	Listed	Naphthalene	Naphthalene	0.1 - 1
United States - Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)	Listed	Ethylbenzene	Ethyl benzene	0.1 - 1

SARA 302/304 : No products were found.

SARA 311/312

Section 15. Regulatory information

Classification : Immediate (acute) health hazard
Delayed (chronic) health hazard

SARA 313

	Product name	CAS number	%
Supplier notification	Ethylbenzene Naphthalene	100-41-4 91-20-3	0.1 - 1 0.1 - 1

California Prop. 65

⚠ **WARNING**: This product can expose you to chemicals including Silica, crystalline, ethylbenzene, naphthalene, which are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Canada

Canada (CEPA DSL): : Not determined.

International regulations

National inventory

Australia : At least one component is not listed.

China : At least one component is not listed.

Europe : All components are listed or exempted.

Japan : **Japan inventory (ENCS)**: At least one component is not listed.
Japan inventory (ISHL): Not determined.

Malaysia : Not determined.

New Zealand : Not determined.

Philippines : At least one component is not listed.

Republic of Korea : Not determined.

Taiwan : Not determined.

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health	*	2
Flammability		1
Physical hazards		0
Personal protection		H

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

National Fire Protection Association (U.S.A.)

History

Date of printing : 11/7/2019

Notice to reader

Section 16. Other information

NOTE: The information on this SDS is based on data which is considered to be accurate. Baker Hughes, however, makes no guarantees or warranty, either expressed or implied of the accuracy or completeness of this information.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of this product.

This SDS was prepared and is to be used for this product. If the product is used as a component in another product, this SDS information may not be applicable.

SECTION 3
GEOLOGICAL AND GEOPHYSICAL INFORMATION

3.1 GEOLOGICAL DESCRIPTION

Proprietary Information

3.2 STRUCTURE CONTOUR MAPS

Proprietary Information

3.3 INTERPRETED SEISMIC LINES

Proprietary Information

3.4 GEOLOGICAL STRUCTURE CROSS-SECTIONS

Proprietary Information

3.5 SHALLOW HAZARDS REPORT

The proposed operations will be conducted from a previously approved surface location as provided for in EP (Control No. N-10097); therefore, in accordance with NTL No. 2008-G05, "Shallow Hazards Program," a shallow hazards report is not provided.

3.6 SHALLOW HAZARDS ASSESSMENT

The proposed operations will be conducted from a previously approved surface location as provided for in EP (Control No. N-10097), approved on February 14, 2020; therefore, in accordance with NTL No. 2008-G05, "Shallow Hazards Program," a site-specific shallow hazards assessment is not provided.

3.7 HIGH-RESOLUTION SEISMIC LINES

Proprietary Information

3.8 STRATIGRAPHIC COLUMN

Proprietary Information

3.9 TIME VS DEPTH TABLES

Proprietary Information

SECTION 4
HYDROGEN SULFIDE INFORMATION

4.1 CONCENTRATION

Cantium anticipates encountering 0 ppm H_2S during the proposed operations.

4.2 CLASSIFICATION

In accordance with Title 30 CFR 250.490(c), Cantium requests that the area of proposed operations be classified by the BOEM as H_2S absent.

4.3 H_2S CONTINGENCY PLAN

An H_2S Contingency Plan is not required for the activities proposed in this plan.

4.4 MODELING REPORT

Modeling reports are not required for the activities proposed in this plan.

SECTION 5
MINERAL RESOURCE CONSERVATION INFORMATION

5.1 TECHNOLOGY & RESERVOIR ENGINEERING PRACTICES AND PROCEDURES

Proprietary Information

5.2 TECHNOLOGY AND RECOVERY PRACTICES AND PROCEDURES

Proprietary Information

5.3 RESERVOIR DEVELOPMENT

Proprietary Information

SECTION 6
BIOLOGICAL, PHYSICAL AND SOCIOECONOMIC INFORMATION

6.1 DEEPWATER BENTHIC COMMUNITIES

Activities proposed in this DOCD are in water depths less than 300 meters (984 feet); therefore, information as outlined in Attachment A of NTL No. 2009-G40, "Deepwater Benthic Communities," is not provided.

6.2 TOPOGRAPHIC FEATURES (BANKS)

Activities proposed in this DOCD do not fall within 305 meters (1000 feet) of a topographic "No Activity Zone;" therefore, no map is required per NTL No. 2009-G39, "Biologically Sensitive Underwater Features and Areas."

6.3 TOPOGRAPHIC FEATURES STATEMENT (SHUNTING)

Activities proposed under this DOCD will be conducted outside all Topographic Feature Protective Zones; therefore, shunting of drill cuttings and drilling fluids is not required per NTL No. 2009-G39, "Biologically Sensitive Underwater Features and Areas."

6.4 LIVE-BOTTOMS (PINNACLE TREND FEATURES)

Main Pass Block 38 is not located within 61 meters (200 feet) of any pinnacle trend feature; therefore, a separate bathymetric map is not required per NTL No. 2009-G39, "Biologically Sensitive Underwater Features and Areas."

6.5 LIVE BOTTOMS (LOW RELIEF)

Main Pass Block 38 is not located within 30 meters (100 feet) of any live bottom (low relief) feature with vertical relief equal to or greater than 8 feet; therefore, live bottom (low relief) maps are not required per NTL No. 2009-G39, "Biologically Sensitive Underwater Features and Areas."

6.6 POTENTIALLY SENSITIVE BIOLOGICAL FEATURES

Main Pass Block 38 is not located within 30 meters (100 feet) of potentially sensitive biological features. In accordance with NTL No. 2009-G39, "Biologically Sensitive Underwater Features and Areas," biologically sensitive area maps are not required.

6.7 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
			Lease Area	Coastal	
Marine Mammals					
Manatee, West Indian	*Trichechus manatus latirostris*	T	--	X	Florida (peninsular)
Whale, Blue	*Balaenoptera masculus*	E	X*	--	None
Whale, Bryde's	*Balaenoptera edeni*	E	X	--	None
Whale, Fin	*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
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
Mississippi sandhill crane	*Grus Canadensis pulla*	E	-	X	Coastal Mississippi
Eskimo curlew	*Numenius borealis*	E	-	X	None
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	E	-	X	None
Red Knot	*Calidris canutus rufa*	T	-	X	None
Wood stork	*Mycteria americana*	T	-	X	None
Reptiles					
Sea Turtle, Green	*Chelonia mydas*	T	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

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in the Gulf of Mexico
			Lease Area	Coastal	
Smalltooth Sawfish	*Pristis pectinata*	E	-	X	None
Nassau Grouper	*Epinephelus striatus*	T	-	X	None
Giant Manta Ray	*Manta birostris*	E	X	-	None
Corals					
Coral, Elkhorn	*Acopora palmate*	T	X**	X	Florida Keys and Dry Tortugas
Coral, Staghorn	*Acopora cervicornis*	T	-	X	Florida
Boulder Star Coral	*Orbicella franksi*	T	X	X	None
Lobed Star Coral	*Orbicella annularis*	T	X	X	None
Mountainous Star Coral	*Orbicella faveolata*	T	X	X	None
Rough Cactus Coral	*Mycetophyllia ferox*	T	-	X	None

Abbreviations: E = Endangered; T = Threatened

* 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.

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

6.8 ARCHAEOLOGICAL REPORT

Main Pass Block 38 is located in an area where historic shipwrecks may exist. An archaeological report was prepared by Gulf Ocean Services, Inc. and it was determined that there are no known historic shipwrecks located in the block. An archaeological report for Main Pass Block 38 was previously submitted and approved on February 14, 2020, EP (Control No. N-10097).

6.9 AIR AND WATER QUALITY INFORMATION

Air and water quality information is not required to be included in this plan per NTL No. 2008-G04, “Information Requirements for Exploration Plans and Development Operations Coordination Documents.”

6.10 SOCIOECONOMIC INFORMATION

Socioeconomic information is not required to be included in this plan per NTL No. 2008-G04, “Information Requirements for Exploration Plans and Development Operations Coordination Documents.”

SECTION 7
WASTES AND DISCHARGES INFORMATION

7.1 PROJECTED GENERATED WASTES

"Wastes You Will Generate, Treat and Downhole Dispose or Discharge to the Gulf of Mexico" is included as **Attachment 7-A.**

7.2 MODELING REPORT

Modeling reports are not required for the activities proposed in this plan.

ATTACHMENT 7-A: WASTE ESTIMATED TO BE GENERATED, TREATED AND/OR DOWNHOLE DISPOSED OR DISCHARGED TO THE GOM

Please specify if the amount reported is a total or per well amount and be sure to include appropriate units.

Projected generated waste			Projected ocean discharges		Projected Downhole Disposal
Type of Waste	**Composition**	**Projected Amount**	**Discharge rate**	**Discharge Method**	**Answer *yes* or *no***
Will drilling occur ? If yes, you should list muds and cuttings					
Water-based drilling fluid	Spud Mud, Low-solids non dispersed water-based	4,500 bbls/well	24,000 bbls/day/well	discharged overboard	no
Cuttings wetted with water-based fluid	Cuttings gerneated while using water-based fluid	1,500 bbls/well	680 bbls/day/well	discharged overboard	no
Synthetic based drilling fluid	NA	NA	NA	NA	no
Cuttings wetted with synthetic-based fluid	NA	NA	NA	NA	no
Will humans be there? If yes, expect conventional waste					
Domestic waste	Grey water from living quarters	30,000 bbls/well	10 bbls/hr/well	discharged overboard	no
Sanitary waste	Black water from living quarters	3,000 bbls/well	1 bbl/hr/well	treated and discharged overboard	no
Is there a deck? If yes, there will be Deck Drainage					
Deck Drainage	Rain	15, 000 bbls/well	100 bbls/hr/well	discharged overboard	no
Will you conduct well treatment, completion, or workover?					
Well treatment fluids	NA	NA	NA	NA	no
Well completion fluids	NA	NA	NA	NA	no
Workover fluids	NA	NA	NA	NA	no
Miscellaneous discharges. If yes, only fill in those associated with your activity.					
Desalinization unit discharge	Super Saturated Seawater	44,000 bbl/well	15 bbls/hrwell	discharged overboard	no
Blowout prevent fluid	water based hydraulic fluid	750 bbl/well	0.25 bbls/hr/well	discharged overboard	no
Ballast water	Potable water	10,000 bbl/well	1,000 bbls/hr/well	discharged overboard	no
Bilge water	Seawater	10,000 bbls/well	1000 bbls/hr/well	discharged overboard	no
Excess cement at seafloor	Class H Cement	500 bbls/well	10 bbls/hr/well	discharged overboard	no
Fire water	Seawater	12,500 bbls/well	0.25 bbls/hr/well	discharged overboard	no
Cooling water	Seawater	300,000 bbls/well	100 bbls/hr/well	discharged overboard	no
Will you produce hydrocarbons? If yes fill in for produced water.					
Produced water	NA	NA	NA	NA	no
Please enter *individual* or *general* to indicate which type of NPDES permit you will be covered by?			General		
NOTE: If you will not have a type of waste for the activity being applied for, enter NA for all columns in the row.			NOTE: All discharged wastes should comply with the requirements of the NPDES permit.		

SECTION 8
AIR EMISSIONS INFORMATION

8.1 EMISSIONS WORKSHEETS AND SCREENING QUESTIONS

Screen Questions for DOCD's	Yes	No
Is any calculated Complex Total (CT) Emission amount (tons) associated with your proposed development activities more than 90% of the amounts calculated using the following formulas: CT = $3400D^{2/3}$ for CO, and CT = 33.3D for the other air pollutants (where D = distance to shore in miles)?		X
Do your emission calculations include any emission reduction measures or modified emission factors?		X
Does or will the facility complex associated with your proposed development and production activities process production from eight or more wells?	X	
Do you expect to encounter H_2S at concentrations greater than 20 parts per million (ppm)?		X
Do you propose to flare or vent natural gas for more than 48 continuous hours from any proposed well?		X
Do you propose to burn produced hydrocarbon liquids?		X
Are your proposed development and production activities located within 25 miles (40 kilometers) from shore?	X	
Are your proposed development and production activities located within 124 miles (200 kilometers) of the Breton Wilderness Area?	X	

8.2 SUMMARY INFORMATION

There are no existing facilities or activities co-located with the currently proposed activities; therefore, the Complex Total Emissions are the same as the Plan Emissions and are provided in **Attachment 8-A.**

Air emission worksheets have been prepared utilizing historical fuel usage for Enterprise 205 with a 25% safety factor added. An equivalent jack-up rig may be utilized but the air emissions will be equal to, or less than, the calculated plan emission amounts shown on the following pages.

This information was calculated by: Dena Rodriguez
281-578-3388
dena.rodriguez@jccteam.com

ATTACHMENT 8-A

DOCD/DPP - AIR QUALITY

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

COMPANY	Cantium, LLC
AREA	Main Pass
BLOCK	38
LEASE	OCS-G 01623
FACILITY	Platform A
WELLS	A001, A002, A003, A004, A005, A006
COMPANY CONTACT	Dena Rodriguez
TELEPHONE NO.	281-698-8512
REMARKS	Install lease term pipelines - 2021; Install Platform A - 2022; Drill, complete, test, produce Well Locations A001, A002, A003, A004, A005, A006 utilizing Enterprise 205 or equivalent jack-up - 2022; Historical fuel records used; Emissions provide for future operations on Well Locations A001, A002, A003, A004, A005, A006 including contingency drilling days each year for maintenance, workovers, recompletions, sidetracks, interventions and abandonment activities - 2023-2030.

LEASE TERM PIPELINE CONSTRUCTION INFORMATION:

YEAR	NUMBER OF PIPELINES	TOTAL NUMBER OF CONSTRUCTION DAYS
2021	3	30
2022		
2023		
2024		
2025		
2026		
2027		
2028		
2029		
2030		

AIR EMISSIONS COMPUTATION FACTORS

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

Equipment/Emission Factors	units	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	REF.	DATE	Reference Links
Natural Gas Turbine	g/hp-hr		0.0086	0.0086	0.0026	1.4515	0.0095	N/A	0.3719	N/A	AP42 3.1-1& 3.1-2a	4/00	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s01.pdf
RECIP. 2 Cycle Lean Natural Gas	g/hp-hr		0.1293	0.1293	0.0020	6.5998	0.4082	N/A	1.2009	N/A	AP42 3.2-1	7/00	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf
RECIP. 4 Cycle Lean Natural Gas	g/hp-hr		0.0002	0.0002	0.0020	2.8814	0.4014	N/A	1.8949	N/A	AP42 3.2-2	7/00	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf
RECIP. 4 Cycle Rich Natural Gas	g/hp-hr		0.0323	0.0323	0.0020	7.7224	0.1021	N/A	11.9408	N/A	AP42 3.2-3	7/00	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf
Diesel Recip. < 600 hp	g/hp-hr	1	1	1	0.0279	14.1	1.04	N/A	3.03	N/A	AP42 3.3-1	10/96	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s03.pdf
Diesel Recip. > 600 hp	g/hp-hr	0.32	0.182	0.178	0.0055	10.9	0.29	N/A	2.5	N/A	AP42 3.4-1 & 3.4-2	10/96	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s04.pdf
Diesel Boiler	lbs/bbl	0.0840	0.0420	0.0105	0.0089	1.0080	0.0084	5.14E-05	0.2100	0.0336	AP42 1.3-6; Pb and NH3: WebFIRE (08/2018)	9/98 and 5/10	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s03.pdf https://cfpub.epa.gov/webfire/
Diesel Turbine	g/hp-hr	0.0381	0.0137	0.0137	0.0048	2.7941	0.0013	4.45E-05	0.0105	N/A	AP42 3.1-1 & 3.1-2a	4/00	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s01.pdf
Dual Fuel Turbine	g/hp-hr	0.0381	0.0137	0.0137	0.0048	2.7941	0.0095	4.45E-05	0.3719	0.0000	AP42 3.1-1& 3.1-2a; AP42 3.1-1 & 3.1-2a	4/00	https://cfpub.epa.gov/webfire/
Vessels – Propulsion	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	
Vessels – Drilling Prime Engine, Auxiliary	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data
Vessels – Diesel Boiler	g/hp-hr	0.0466	0.1491	0.1417	0.4400	1.4914	0.0820	3.73E-05	0.1491	0.0003	USEPA 2017 NEI;TSP (units converted) refer to Diesel Boiler Reference	3/19	
Vessels – Well Stimulation	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19	
Natural Gas Heater/Boiler/Burner	lbs/MMscf	7.60	1.90	1.90	0.60	190.00	5.50	5.00E-04	84.00	3.2	AP42 1.4-1 & 1.4-2; Pb and NH3: WebFIRE (08/2018)	7/98 and 8/18	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s04.pdf https://cfpub.epa.gov/webfire/
Combustion Flare (no smoke)	lbs/MMscf	0.00	0.00	0.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18	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.apiwebstore.org/publications/item.cgi?9879d38a-8bc0-4abe-bb5c-9b623870125d
Glycol Dehydrator	tons/yr/dehydrator						19.240				2011 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2014	https://www.boem.gov/environment/environmental-studies/2011-gulfwide-emission-inventory
Cold Vent	tons/yr/vent						44.747				2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017	https://www.boem.gov/environment/environmental-studies/2014-gulfwide-emission-inventory
Waste Incinerator	lb/ton		15.0	15.0	2.5	2.0	N/A	N/A	20.0	N/A	AP 42 2.1-12	10/96	https://www3.epa.gov/ttnchie1/ap42/ch02/final/c02s01.pdf
On-Ice – Loader	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009	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	

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

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

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

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

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Cantium, LLC	Main Pass		38	OCS-G 01623	Platform A	A001, A002, A003, A004, A005, A006					Dena Rodriguez		281-698-8512		Install lease term pipelines - 2021;Install Platform A - 2022;Drill, complete, test, produce Well Locations A001, A002, A003, A004, A005, A006 utilizing Enterprise 205 or equivalent jack-up - 20										
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		0	0	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- 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
PIPELINE INSTALLATION	VESSELS - Pipeline Laying Vessel - Diesel		1500	77.1690001	1852.06	24	30	1.06	0.64	0.62	0.02	25.35	0.73	0.00	3.98	0.01	0.38	0.23	0.22	0.01	9.13	0.26	0.00	1.43	0.00
	VESSELS - Pipeline Burying - Diesel		2350	120.8981	2901.55	24	12	1.66	1.00	0.97	0.02	39.72	1.14	0.00	6.23	0.01	0.24	0.14	0.14	0.00	5.72	0.16	0.00	0.90	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
PRODUCTION	RECIP.<600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	VESSELS - Shuttle Tankers		0	0	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 - Well Stimulation		0	0	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
	Natural Gas Turbine		0	0	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	--
	Diesel Turbine		0	0	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	--
	Dual Fuel Turbine		0	0	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
	RECIP. 2 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Rich Natural Gas		0	0	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	--
	Diesel Boiler					0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Natural Gas Heater/Boiler/Burner		0	0	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
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	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	--
	COLD VENT				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	FUGITIVES				0	0	0	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	GLYCOL DEHYDRATOR				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	WASTE INCINERATOR		0			0	0	--	0.00	0.00	0.00	0.00	--	--	0.00	--	--	0.00	0.00	0.00	0.00	--	--	0.00	--
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
2021	**Facility Total Emissions**							**2.72**	**1.64**	**1.59**	**0.04**	**65.08**	**1.87**	**0.00**	**10.21**	**0.02**	**0.62**	**0.37**	**0.36**	**0.01**	**14.85**	**0.43**	**0.00**	**2.33**	**0.00**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**459.54**			**459.54**	**459.54**	**459.54**		**19,561.33**	
	13.8																								
DRILLING	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 - Service 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 - 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
PIPELINE INSTALLATION	VESSELS - Support Diesel, Laying		900	46.3014001	1111.23	24	18	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00	0.14	0.08	0.08	0.00	3.29	0.09	0.00	0.52	0.00
	VESSELS - Support Diesel, Burying		900	46.3014001	1111.23	24	12	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00	0.09	0.06	0.05	0.00	2.19	0.06	0.00	0.34	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Service 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
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
2021	**Non-Facility Total Emissions**							**1.27**	**0.77**	**0.74**	**0.02**	**30.42**	**0.87**	**0.00**	**4.77**	**0.01**	**0.23**	**0.14**	**0.13**	**0.00**	**5.48**	**0.16**	**0.00**	**0.86**	**0.00**

AIR EMISSIONS CALCULATIONS - 2ND YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL				CONTACT	PHONE	REMARKS
Cantium, LLC	Main Pass		38	OCS-G 01623	Platform A	A001, A002, A003, A004, A005, A006				Dena Rodriguez	281-698-8512	Install lease term pipelines - 2021;Install Platform A - 2022;Drill, complete, test, produce Well Locations A001, A002, A003, A004, A005, A006 utilizing Enterprise 205 or equivalent jack-up - 20

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	Enterprise 205	8000	411.568001	1837.50	24	168	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	2.12	1.28	1.24	0.03	50.71	1.46	0.00	7.95	0.01
	VESSELS- Drilling - Propulsion Engine - Diesel	or equivalent	0	0	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
PIPELINE INSTALLATION	VESSELS - Pipeline Laying Vessel - 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 - Pipeline Burying - 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 - Heavy Lift Vessel/Derrick Barge Diesel		5733	294.939918	7078.56	24	14	4.04	2.44	2.37	0.06	96.90	2.79	0.00	15.20	0.03	0.68	0.41	0.40	0.01	16.28	0.47	0.00	2.55	0.00
PRODUCTION	RECIP.<600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	VESSELS - Shuttle Tankers		0	0	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 - Well Stimulation		0	0	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
	Natural Gas Turbine		0	0	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	--
	Diesel Turbine		0	0	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	--
	Dual Fuel Turbine		0	0	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
	RECIP. 2 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Rich Natural Gas		0	0	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	--
	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
	Natural Gas Heater/Boiler/Burner		0	0	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
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	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	--
	COLD VENT				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	FUGITIVES				500	24	365	--	--	--	--	--	0.25	--	--	--	--	--	--	--	--	1.10	--	--	--
	GLYCOL DEHYDRATOR				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	WASTE INCINERATOR		0			0	0	--	0.00	0.00	0.00	0.00	--	--	0.00	--	--	0.00	0.00	0.00	0.00			0.00	
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			208333.33		24	12	2.19	2.19	2.19	0.12	14.87	7.49	--	67.81	--	0.31	0.31	0.31	0.02	2.14	1.08	--	9.76	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2022	**Facility Total Emissions**							**11.88**	**8.03**	**7.86**	**0.26**	**247.00**	**14.41**	**0.00**	**104.22**	**0.07**	**3.11**	**2.00**	**1.95**	**0.06**	**69.13**	**4.10**	**0.00**	**20.27**	**0.02**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**459.54**			**459.54**	**459.54**	**459.54**		**19,561.33**	
	13.8																								
DRILLING	VESSELS- Crew Diesel		6750	347.2605	8334.25	24	168	4.76	2.87	2.79	0.07	114.09	3.28	0.00	17.90	0.03	9.60	5.79	5.62	0.14	230.01	6.61	0.00	36.08	0.07
	VESSELS - Supply Diesel		7240	372.469041	8939.26	24	168	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	10.30	6.21	6.03	0.15	246.71	7.09	0.00	38.70	0.07
	VESSELS - Tugs Diesel		8400	432.146401	10371.51	18	4	5.93	3.58	3.47	0.09	141.98	4.08	0.00	22.27	0.04	0.21	0.13	0.12	0.00	5.11	0.15	0.00	0.80	0.00
PIPELINE INSTALLATION	VESSELS - Support Diesel, Laying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel, Burying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		900	46.3014001	1111.23	24	14	0.63	0.38	0.37	0.01	15.21	0.44	0.00	2.39	0.00	0.11	0.06	0.06	0.00	2.56	0.07	0.00	0.40	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		7240	372.469041	8939.26	24	88	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	5.39	3.25	3.16	0.08	129.23	3.72	0.00	20.27	0.04
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2022	**Non-Facility Total Emissions**							**21.54**	**12.99**	**12.60**	**0.31**	**516.04**	**14.84**	**0.00**	**80.94**	**0.15**	**25.61**	**15.45**	**14.99**	**0.37**	**613.62**	**17.64**	**0.00**	**96.24**	**0.18**

AIR EMISSIONS CALCULATIONS - 3RD YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL				CONTACT	PHONE	REMARKS
Cantium, LLC	Main Pass		38	OCS-G 01623	Platform A	A001, A002, A003, A004, A005, A006				Dena Rodriguez	281-698-8512	Install lease term pipelines - 2021;Install Platform A - 2022;Drill, complete, test, produce Well Locations A001, A002, A003, A004, A005, A006 utilizing Enterprise 205 or equivalent jack-up - 20

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	Enterprise 205	8000	411.568001	1837.50	24	100	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	1.26	0.76	0.74	0.02	30.19	0.87	0.00	4.73	0.01
	VESSELS- Drilling - Propulsion Engine - Diesel	or equivalent	0	0	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
PIPELINE INSTALLATION	VESSELS - Pipeline Laying Vessel - 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 - Pipeline Burying - 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 - 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
PRODUCTION	RECIP.<600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	VESSELS - Shuttle Tankers		0	0	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 - Well Stimulation		0	0	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
	Natural Gas Turbine		0	0	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	--
	Diesel Turbine		0	0	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	--
	Dual Fuel Turbine		0	0	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
	RECIP. 2 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Rich Natural Gas		0	0	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	--
	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
	Natural Gas Heater/Boiler/Burner		0	0	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
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	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	--
	COLD VENT				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	FUGITIVES				500	24	365	--	--	--	--	--	0.25	--	--	--	--	--	--	--	--	1.10	--	--	--
	GLYCOL DEHYDRATOR				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	WASTE INCINERATOR		0			0	0	--	0.00	0.00	0.00	0.00	--	--	0.00	--	--	0.00	0.00	0.00	0.00			0.00	
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2023	**Facility Total Emissions**							**5.64**	**3.41**	**3.30**	**0.08**	**135.22**	**4.14**	**0.00**	**21.21**	**0.04**	**1.26**	**0.76**	**0.74**	**0.02**	**30.19**	**1.96**	**0.00**	**4.73**	**0.01**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**459.54**			**459.54**	**459.54**	**459.54**		**19,561.33**	
	13.8																								
DRILLING	VESSELS- Crew Diesel		6750	347.2605	8334.25	24	100	4.76	2.87	2.79	0.07	114.09	3.28	0.00	17.90	0.03	5.71	3.45	3.34	0.08	136.91	3.94	0.00	21.47	0.04
	VESSELS - Supply Diesel		7240	372.469041	8939.26	24	100	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	6.13	3.70	3.59	0.09	146.85	4.22	0.00	23.03	0.04
	VESSELS - Tugs Diesel		8400	432.146401	10371.51	18	4	5.93	3.58	3.47	0.09	141.98	4.08	0.00	22.27	0.04	0.21	0.13	0.12	0.00	5.11	0.15	0.00	0.80	0.00
PIPELINE INSTALLATION	VESSELS - Support Diesel, Laying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel, Burying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		7240	372.469041	8939.26	24	265	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	16.24	9.80	9.51	0.24	389.15	11.19	0.00	61.04	0.11
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2023	**Non-Facility Total Emissions**							**20.90**	**12.61**	**12.23**	**0.30**	**500.83**	**14.40**	**0.00**	**78.55**	**0.15**	**28.30**	**17.07**	**16.56**	**0.41**	**678.03**	**19.49**	**0.00**	**106.35**	**0.20**

* This AQR includes contingency drilling days each year for maintenance, workovers, sidetracks, recompletions, interventions and abandonment activities. Facility is within 100 km of Breton Sound, however contingency activity emissions will not occur for consecutive three years.

AIR EMISSIONS CALCULATIONS - 4TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL				CONTACT	PHONE	REMARKS
Cantium, LLC	Main Pass		38	OCS-G 01623	Platform A	A001, A002, A003, A004, A005, A006				Dena Rodriguez	281-698-8512	Install lease term pipelines - 2021;Install Platform A - 2022;Drill, complete, test, produce Well Locations A001, A002, A003, A004, A005, A006 utilizing Enterprise 205 or equivalent jack-up - 20

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	Enterprise 205	8000	411.568001	1837.50	24	100	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	1.26	0.76	0.74	0.02	30.19	0.87	0.00	4.73	0.01
	VESSELS- Drilling - Propulsion Engine - Diesel	or equivalent	0	0	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
PIPELINE INSTALLATION	VESSELS - Pipeline Laying Vessel - 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 - Pipeline Burying - 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 - 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
PRODUCTION	RECIP.<600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	VESSELS - Shuttle Tankers		0	0	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 - Well Stimulation		0	0	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
	Natural Gas Turbine		0	0	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	--
	Diesel Turbine		0	0	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	--
	Dual Fuel Turbine		0	0	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
	RECIP. 2 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Rich Natural Gas		0	0	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	--
	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
	Natural Gas Heater/Boiler/Burner		0	0	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
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	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	--
	COLD VENT				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	FUGITIVES				500	24	365	--	--	--	--	--	0.25	--	--	--	--	--	--	--	--	1.10	--	--	--
	GLYCOL DEHYDRATOR				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	WASTE INCINERATOR		0			0	0	--	0.00	0.00	0.00	0.00	--	--	0.00	--	--	0.00	0.00	0.00	0.00			0.00	
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2024	**Facility Total Emissions**							**5.64**	**3.41**	**3.30**	**0.08**	**135.22**	**4.14**	**0.00**	**21.21**	**0.04**	**1.26**	**0.76**	**0.74**	**0.02**	**30.19**	**1.96**	**0.00**	**4.73**	**0.01**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**459.54**			**459.54**	**459.54**	**459.54**		**19,561.33**	
	13.8																								
DRILLING	VESSELS- Crew Diesel		6750	347.2605	8334.25	24	100	4.76	2.87	2.79	0.07	114.09	3.28	0.00	17.90	0.03	5.71	3.45	3.34	0.08	136.91	3.94	0.00	21.47	0.04
	VESSELS - Supply Diesel		7240	372.469041	8939.26	24	100	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	6.13	3.70	3.59	0.09	146.85	4.22	0.00	23.03	0.04
	VESSELS - Tugs Diesel		8400	432.146401	10371.51	18	4	5.93	3.58	3.47	0.09	141.98	4.08	0.00	22.27	0.04	0.21	0.13	0.12	0.00	5.11	0.15	0.00	0.80	0.00
PIPELINE INSTALLATION	VESSELS - Support Diesel, Laying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel, Burying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		7240	372.469041	8939.26	24	265	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	16.24	9.80	9.51	0.24	389.15	11.19	0.00	61.04	0.11
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2024	**Non-Facility Total Emissions**							**20.90**	**12.61**	**12.23**	**0.30**	**500.83**	**14.40**	**0.00**	**78.55**	**0.15**	**28.30**	**17.07**	**16.56**	**0.41**	**678.03**	**19.49**	**0.00**	**106.35**	**0.20**

* This AQR includes contingency drilling days each year for maintenance, workovers, sidetracks, recompletions, interventions and abandonment activities. Facility is within 100 km of Breton Sound, however contingency activity emissions will not occur for consecutive three years.

AIR EMISSIONS CALCULATIONS - 5TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL				CONTACT	PHONE	REMARKS
Cantium, LLC	Main Pass		38	OCS-G 01623	Platform A	A001, A002, A003, A004, A005, A006				Dena Rodriguez	281-698-8512	Install lease term pipelines - 2021;Install Platform A - 2022;Drill, complete, test, produce Well Locations A001, A002, A003, A004, A005, A006 utilizing Enterprise 205 or equivalent jack-up - 20

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	Enterprise 205	8000	411.568001	1837.50	24	100	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	1.26	0.76	0.74	0.02	30.19	0.87	0.00	4.73	0.01
	VESSELS- Drilling - Propulsion Engine - Diesel	or equivalent	0	0	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
PIPELINE INSTALLATION	VESSELS - Pipeline Laying Vessel - 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 - Pipeline Burying - 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 - 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
PRODUCTION	RECIP.<600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	VESSELS - Shuttle Tankers		0	0	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 - Well Stimulation		0	0	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
	Natural Gas Turbine		0	0	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	--
	Diesel Turbine		0	0	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	--
	Dual Fuel Turbine		0	0	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
	RECIP. 2 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Rich Natural Gas		0	0	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	--
	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
	Natural Gas Heater/Boiler/Burner		0	0	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
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	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	--
	COLD VENT				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	FUGITIVES				500	24	365	--	--	--	--	--	0.25	--	--	--	--	--	--	--	--	1.10	--	--	--
	GLYCOL DEHYDRATOR				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	WASTE INCINERATOR		0			0	0	--	0.00	0.00	0.00	0.00	--	--	0.00	--	--	0.00	0.00	0.00	0.00			0.00	
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2025	**Facility Total Emissions**							**5.64**	**3.41**	**3.30**	**0.08**	**135.22**	**4.14**	**0.00**	**21.21**	**0.04**	**1.26**	**0.76**	**0.74**	**0.02**	**30.19**	**1.96**	**0.00**	**4.73**	**0.01**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**459.54**			**459.54**	**459.54**	**459.54**		**19,561.33**	
	13.8																								
DRILLING	VESSELS- Crew Diesel		6750	347.2605	8334.25	24	100	4.76	2.87	2.79	0.07	114.09	3.28	0.00	17.90	0.03	5.71	3.45	3.34	0.08	136.91	3.94	0.00	21.47	0.04
	VESSELS - Supply Diesel		7240	372.469041	8939.26	24	100	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	6.13	3.70	3.59	0.09	146.85	4.22	0.00	23.03	0.04
	VESSELS - Tugs Diesel		8400	432.146401	10371.51	18	4	5.93	3.58	3.47	0.09	141.98	4.08	0.00	22.27	0.04	0.21	0.13	0.12	0.00	5.11	0.15	0.00	0.80	0.00
PIPELINE INSTALLATION	VESSELS - Support Diesel, Laying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel, Burying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		7240	372.469041	8939.26	24	265	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	16.24	9.80	9.51	0.24	389.15	11.19	0.00	61.04	0.11
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2025	**Non-Facility Total Emissions**							**20.90**	**12.61**	**12.23**	**0.30**	**500.83**	**14.40**	**0.00**	**78.55**	**0.15**	**28.30**	**17.07**	**16.56**	**0.41**	**678.03**	**19.49**	**0.00**	**106.35**	**0.20**

* This AQR includes contingency drilling days each year for maintenance, workovers, sidetracks, recompletions, interventions and abandonment activities. Facility is within 100 km of Breton Sound, however contingency activity emissions will not occur for consecutive three years.

AIR EMISSIONS CALCULATIONS - 6TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL				CONTACT	PHONE	REMARKS
Cantium, LLC	Main Pass		38	OCS-G 01623	Platform A	A001, A002, A003, A004, A005, A006				Dena Rodriguez	281-698-8512	Install lease term pipelines - 2021;Install Platform A - 2022;Drill, complete, test, produce Well Locations A001, A002, A003, A004, A005, A006 utilizing Enterprise 205 or equivalent jack-up - 20

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	Enterprise 205	8000	411.568001	1837.50	24	100	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	1.26	0.76	0.74	0.02	30.19	0.87	0.00	4.73	0.01
	VESSELS- Drilling - Propulsion Engine - Diesel	or equivalent	0	0	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
PIPELINE INSTALLATION	VESSELS - Pipeline Laying Vessel - 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 - Pipeline Burying - 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 - 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
PRODUCTION	RECIP.<600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	VESSELS - Shuttle Tankers		0	0	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 - Well Stimulation		0	0	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
	Natural Gas Turbine		0	0	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	--
	Diesel Turbine		0	0	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	--
	Dual Fuel Turbine		0	0	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
	RECIP. 2 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Rich Natural Gas		0	0	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	--
	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
	Natural Gas Heater/Boiler/Burner		0	0	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
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	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	--
	COLD VENT				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	FUGITIVES				500	24	365	--	--	--	--	--	0.25	--	--	--	--	--	--	--	--	1.10	--	--	--
	GLYCOL DEHYDRATOR				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	WASTE INCINERATOR		0			0	0	--	0.00	0.00	0.00	0.00	--	--	0.00	--	--	0.00	0.00	0.00	0.00			0.00	
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2026	**Facility Total Emissions**							**5.64**	**3.41**	**3.30**	**0.08**	**135.22**	**4.14**	**0.00**	**21.21**	**0.04**	**1.26**	**0.76**	**0.74**	**0.02**	**30.19**	**1.96**	**0.00**	**4.73**	**0.01**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**459.54**			**459.54**	**459.54**	**459.54**		**19,561.33**	
	13.8																								
DRILLING	VESSELS- Crew Diesel		6750	347.2605	8334.25	24	100	4.76	2.87	2.79	0.07	114.09	3.28	0.00	17.90	0.03	5.71	3.45	3.34	0.08	136.91	3.94	0.00	21.47	0.04
	VESSELS - Supply Diesel		7240	372.469041	8939.26	24	100	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	6.13	3.70	3.59	0.09	146.85	4.22	0.00	23.03	0.04
	VESSELS - Tugs Diesel		8400	432.146401	10371.51	18	4	5.93	3.58	3.47	0.09	141.98	4.08	0.00	22.27	0.04	0.21	0.13	0.12	0.00	5.11	0.15	0.00	0.80	0.00
PIPELINE INSTALLATION	VESSELS - Support Diesel, Laying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel, Burying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		7240	372.469041	8939.26	24	265	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	16.24	9.80	9.51	0.24	389.15	11.19	0.00	61.04	0.11
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2026	**Non-Facility Total Emissions**							**20.90**	**12.61**	**12.23**	**0.30**	**500.83**	**14.40**	**0.00**	**78.55**	**0.15**	**28.30**	**17.07**	**16.56**	**0.41**	**678.03**	**19.49**	**0.00**	**106.35**	**0.20**

* This AQR includes contingency drilling days each year for maintenance, workovers, sidetracks, recompletions, interventions and abandonment activities. Facility is within 100 km of Breton Sound, however contingency activity emissions will not occur for consecutive three years.

AIR EMISSIONS CALCULATIONS - 7TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL				CONTACT	PHONE	REMARKS
Cantium, LLC	Main Pass		38	OCS-G 01623	Platform A	A001, A002, A003, A004, A005, A006				Dena Rodriguez	281-698-8512	Install lease term pipelines - 2021;Install Platform A - 2022;Drill, complete, test, produce Well Locations A001, A002, A003, A004, A005, A006 utilizing Enterprise 205 or equivalent jack-up - 20

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	Enterprise 205	8000	411.568001	1837.50	24	100	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	1.26	0.76	0.74	0.02	30.19	0.87	0.00	4.73	0.01
	VESSELS- Drilling - Propulsion Engine - Diesel	or equivalent	0	0	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
PIPELINE INSTALLATION	VESSELS - Pipeline Laying Vessel - 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 - Pipeline Burying - 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 - 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
PRODUCTION	RECIP.<600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	VESSELS - Shuttle Tankers		0	0	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 - Well Stimulation		0	0	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
	Natural Gas Turbine		0	0	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	--
	Diesel Turbine		0	0	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	--
	Dual Fuel Turbine		0	0	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
	RECIP. 2 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Rich Natural Gas		0	0	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	--
	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
	Natural Gas Heater/Boiler/Burner		0	0	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
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	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	--
	COLD VENT				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	FUGITIVES				500	24	365	--	--	--	--	--	0.25	--	--	--	--	--	--	--	--	1.10	--	--	--
	GLYCOL DEHYDRATOR				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	WASTE INCINERATOR		0			0	0	--	0.00	0.00	0.00	0.00	--	--	0.00	--	--	0.00	0.00	0.00	0.00			0.00	
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2027	**Facility Total Emissions**							**5.64**	**3.41**	**3.30**	**0.08**	**135.22**	**4.14**	**0.00**	**21.21**	**0.04**	**1.26**	**0.76**	**0.74**	**0.02**	**30.19**	**1.96**	**0.00**	**4.73**	**0.01**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**459.54**			**459.54**	**459.54**	**459.54**		**19,561.33**	
	13.8																								
DRILLING	VESSELS- Crew Diesel		6750	347.2605	8334.25	24	100	4.76	2.87	2.79	0.07	114.09	3.28	0.00	17.90	0.03	5.71	3.45	3.34	0.08	136.91	3.94	0.00	21.47	0.04
	VESSELS - Supply Diesel		7240	372.469041	8939.26	24	100	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	6.13	3.70	3.59	0.09	146.85	4.22	0.00	23.03	0.04
	VESSELS - Tugs Diesel		8400	432.146401	10371.51	18	4	5.93	3.58	3.47	0.09	141.98	4.08	0.00	22.27	0.04	0.21	0.13	0.12	0.00	5.11	0.15	0.00	0.80	0.00
PIPELINE INSTALLATION	VESSELS - Support Diesel, Laying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel, Burying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		7240	372.469041	8939.26	24	265	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	16.24	9.80	9.51	0.24	389.15	11.19	0.00	61.04	0.11
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2027	**Non-Facility Total Emissions**							**20.90**	**12.61**	**12.23**	**0.30**	**500.83**	**14.40**	**0.00**	**78.55**	**0.15**	**28.30**	**17.07**	**16.56**	**0.41**	**678.03**	**19.49**	**0.00**	**106.35**	**0.20**

* This AQR includes contingency drilling days each year for maintenance, workovers, sidetracks, recompletions, interventions and abandonment activities. Facility is within 100 km of Breton Sound, however contingency activity emissions will not occur for consecutive three years.

AIR EMISSIONS CALCULATIONS - 8TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL				CONTACT	PHONE	REMARKS
Cantium, LLC	Main Pass		38	OCS-G 01623	Platform A	A001, A002, A003, A004, A005, A006				Dena Rodriguez	281-698-8512	Install lease term pipelines - 2021;Install Platform A - 2022;Drill, complete, test, produce Well Locations A001, A002, A003, A004, A005, A006 utilizing Enterprise 205 or equivalent jack-up - 20

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	Enterprise 205	8000	411.568001	1837.50	24	100	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	1.26	0.76	0.74	0.02	30.19	0.87	0.00	4.73	0.01
	VESSELS- Drilling - Propulsion Engine - Diesel	or equivalent	0	0	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
PIPELINE INSTALLATION	VESSELS - Pipeline Laying Vessel - 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 - Pipeline Burying - 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 - 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
PRODUCTION	RECIP.<600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	VESSELS - Shuttle Tankers		0	0	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 - Well Stimulation		0	0	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
	Natural Gas Turbine		0	0	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	--
	Diesel Turbine		0	0	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	--
	Dual Fuel Turbine		0	0	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
	RECIP. 2 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Rich Natural Gas		0	0	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	--
	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
	Natural Gas Heater/Boiler/Burner		0	0	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
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	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	--
	COLD VENT				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	FUGITIVES				500	24	365	--	--	--	--	--	0.25	--	--	--	--	--	--	--	--	1.10	--	--	--
	GLYCOL DEHYDRATOR				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	WASTE INCINERATOR		0			0	0	--	0.00	0.00	0.00	0.00	--	--	0.00	--	--	0.00	0.00	0.00	0.00			0.00	
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2028	**Facility Total Emissions**							**5.64**	**3.41**	**3.30**	**0.08**	**135.22**	**4.14**	**0.00**	**21.21**	**0.04**	**1.26**	**0.76**	**0.74**	**0.02**	**30.19**	**1.96**	**0.00**	**4.73**	**0.01**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**459.54**			**459.54**	**459.54**	**459.54**		**19,561.33**	
	13.8																								
DRILLING	VESSELS- Crew Diesel		6750	347.2605	8334.25	24	100	4.76	2.87	2.79	0.07	114.09	3.28	0.00	17.90	0.03	5.71	3.45	3.34	0.08	136.91	3.94	0.00	21.47	0.04
	VESSELS - Supply Diesel		7240	372.469041	8939.26	24	100	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	6.13	3.70	3.59	0.09	146.85	4.22	0.00	23.03	0.04
	VESSELS - Tugs Diesel		8400	432.146401	10371.51	18	4	5.93	3.58	3.47	0.09	141.98	4.08	0.00	22.27	0.04	0.21	0.13	0.12	0.00	5.11	0.15	0.00	0.80	0.00
PIPELINE INSTALLATION	VESSELS - Support Diesel, Laying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel, Burying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		7240	372.469041	8939.26	24	265	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	16.24	9.80	9.51	0.24	389.15	11.19	0.00	61.04	0.11
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2028	**Non-Facility Total Emissions**							**20.90**	**12.61**	**12.23**	**0.30**	**500.83**	**14.40**	**0.00**	**78.55**	**0.15**	**28.30**	**17.07**	**16.56**	**0.41**	**678.03**	**19.49**	**0.00**	**106.35**	**0.20**

* This AQR includes contingency drilling days each year for maintenance, workovers, sidetracks, recompletions, interventions and abandonment activities. Facility is within 100 km of Breton Sound, however contingency activity emissions will not occur for consecutive three years.

AIR EMISSIONS CALCULATIONS - 9TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL				CONTACT	PHONE	REMARKS
Cantium, LLC	Main Pass		38	OCS-G 01623	Platform A	A001, A002, A003, A004, A005, A006				Dena Rodriguez	281-698-8512	Install lease term pipelines - 2021;Install Platform A - 2022;Drill, complete, test, produce Well Locations A001, A002, A003, A004, A005, A006 utilizing Enterprise 205 or equivalent jack-up - 20

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	Enterprise 205	8000	411.568001	1837.50	24	100	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	1.26	0.76	0.74	0.02	30.19	0.87	0.00	4.73	0.01
	VESSELS- Drilling - Propulsion Engine - Diesel	or equivalent	0	0	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
PIPELINE INSTALLATION	VESSELS - Pipeline Laying Vessel - 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 - Pipeline Burying - 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 - 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
PRODUCTION	RECIP.<600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	VESSELS - Shuttle Tankers		0	0	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 - Well Stimulation		0	0	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
	Natural Gas Turbine		0	0	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	--
	Diesel Turbine		0	0	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	--
	Dual Fuel Turbine		0	0	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
	RECIP. 2 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Rich Natural Gas		0	0	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	--
	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
	Natural Gas Heater/Boiler/Burner		0	0	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
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	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	--
	COLD VENT				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	FUGITIVES				500	24	365	--	--	--	--	--	0.25	--	--	--	--	--	--	--	--	1.10	--	--	--
	GLYCOL DEHYDRATOR				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	WASTE INCINERATOR		0			0	0	--	0.00	0.00	0.00	0.00	--	--	0.00	--	--	0.00	0.00	0.00	0.00			0.00	
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2029	**Facility Total Emissions**							**5.64**	**3.41**	**3.30**	**0.08**	**135.22**	**4.14**	**0.00**	**21.21**	**0.04**	**1.26**	**0.76**	**0.74**	**0.02**	**30.19**	**1.96**	**0.00**	**4.73**	**0.01**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**459.54**			**459.54**	**459.54**	**459.54**		**19,561.33**	
	13.8																								
DRILLING	VESSELS- Crew Diesel		6750	347.2605	8334.25	24	100	4.76	2.87	2.79	0.07	114.09	3.28	0.00	17.90	0.03	5.71	3.45	3.34	0.08	136.91	3.94	0.00	21.47	0.04
	VESSELS - Supply Diesel		7240	372.469041	8939.26	24	100	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	6.13	3.70	3.59	0.09	146.85	4.22	0.00	23.03	0.04
	VESSELS - Tugs Diesel		8400	432.146401	10371.51	18	4	5.93	3.58	3.47	0.09	141.98	4.08	0.00	22.27	0.04	0.21	0.13	0.12	0.00	5.11	0.15	0.00	0.80	0.00
PIPELINE INSTALLATION	VESSELS - Support Diesel, Laying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel, Burying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		7240	372.469041	8939.26	24	265	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	16.24	9.80	9.51	0.24	389.15	11.19	0.00	61.04	0.11
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2029	**Non-Facility Total Emissions**							**20.90**	**12.61**	**12.23**	**0.30**	**500.83**	**14.40**	**0.00**	**78.55**	**0.15**	**28.30**	**17.07**	**16.56**	**0.41**	**678.03**	**19.49**	**0.00**	**106.35**	**0.20**

* This AQR includes contingency drilling days each year for maintenance, workovers, sidetracks, recompletions, interventions and abandonment activities. Facility is within 100 km of Breton Sound, however contingency activity emissions will not occur for consecutive three years.

AIR EMISSIONS CALCULATIONS - 10TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL				CONTACT	PHONE	REMARKS
Cantium, LLC	Main Pass		38	OCS-G 01623	Platform A	A001, A002, A003, A004, A005, A006				Dena Rodriguez	281-698-8512	Install lease term pipelines - 2021;Install Platform A - 2022;Drill, complete, test, produce Well Locations A001, A002, A003, A004, A005, A006 utilizing Enterprise 205 or equivalent jack-up - 20

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	Enterprise 205	8000	411.568001	1837.50	24	100	5.64	3.41	3.30	0.08	135.22	3.89	0.00	21.21	0.04	1.26	0.76	0.74	0.02	30.19	0.87	0.00	4.73	0.01
	VESSELS- Drilling - Propulsion Engine - Diesel	or equivalent	0	0	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
PIPELINE INSTALLATION	VESSELS - Pipeline Laying Vessel - 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 - Pipeline Burying - 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 - 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
PRODUCTION	RECIP.<600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	RECIP.>600hp Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	VESSELS - Shuttle Tankers		0	0	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 - Well Stimulation		0	0	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
	Natural Gas Turbine		0	0	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	--
	Diesel Turbine		0	0	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	--
	Dual Fuel Turbine		0	0	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
	RECIP. 2 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Lean Natural Gas		0	0	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	--
	RECIP. 4 Cycle Rich Natural Gas		0	0	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	--
	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
	Natural Gas Heater/Boiler/Burner		0	0	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
	MISC.		**BPD**	**SCF/HR**	**COUNT**																				
	STORAGE TANK				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	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	--
	COLD VENT				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	FUGITIVES				500	24	365	--	--	--	--	--	0.25	--	--	--	--	--	--	--	--	1.10	--	--	--
	GLYCOL DEHYDRATOR				0	1	1	--	--	--	--	--	0.00	--	--	--	--	--	--	--	--	0.00	--	--	--
	WASTE INCINERATOR		0			0	0	--	0.00	0.00	0.00	0.00	--	--	0.00	--	--	0.00	0.00	0.00	0.00			0.00	
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2030	**Facility Total Emissions**							**5.64**	**3.41**	**3.30**	**0.08**	**135.22**	**4.14**	**0.00**	**21.21**	**0.04**	**1.26**	**0.76**	**0.74**	**0.02**	**30.19**	**1.96**	**0.00**	**4.73**	**0.01**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**459.54**			**459.54**	**459.54**	**459.54**		**19,561.33**	
	13.8																								
DRILLING	VESSELS- Crew Diesel		6750	347.2605	8334.25	24	100	4.76	2.87	2.79	0.07	114.09	3.28	0.00	17.90	0.03	5.71	3.45	3.34	0.08	136.91	3.94	0.00	21.47	0.04
	VESSELS - Supply Diesel		7240	372.469041	8939.26	24	100	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	6.13	3.70	3.59	0.09	146.85	4.22	0.00	23.03	0.04
	VESSELS - Tugs Diesel		8400	432.146401	10371.51	18	4	5.93	3.58	3.47	0.09	141.98	4.08	0.00	22.27	0.04	0.21	0.13	0.12	0.00	5.11	0.15	0.00	0.80	0.00
PIPELINE INSTALLATION	VESSELS - Support Diesel, Laying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Support Diesel, Burying		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		7240	372.469041	8939.26	24	265	5.11	3.08	2.99	0.07	122.38	3.52	0.00	19.19	0.04	16.24	9.80	9.51	0.24	389.15	11.19	0.00	61.04	0.11
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2030	**Non-Facility Total Emissions**							**20.90**	**12.61**	**12.23**	**0.30**	**500.83**	**14.40**	**0.00**	**78.55**	**0.15**	**28.30**	**17.07**	**16.56**	**0.41**	**678.03**	**19.49**	**0.00**	**106.35**	**0.20**

* This AQR includes contingency drilling days each year for maintenance, workovers, sidetracks, recompletions, interventions and abandonment activities. Facility is within 100 km of Breton Sound, however contingency activity emissions will not occur for consecutive three years.

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	
Cantium, LLC	Main Pass	38	OCS-G 01623	Platform A	A001, A002, A003, A004, A005, A006	

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2021	0.62	0.37	0.36	0.01	14.85	0.43	0.00	2.33	0.00
2022	3.11	2.00	1.95	0.06	69.13	4.10	0.00	20.27	0.02
2023	1.26	0.76	0.74	0.02	30.19	1.96	0.00	4.73	0.01
2024	1.26	0.76	0.74	0.02	30.19	1.96	0.00	4.73	0.01
2025	1.26	0.76	0.74	0.02	30.19	1.96	0.00	4.73	0.01
2026	1.26	0.76	0.74	0.02	30.19	1.96	0.00	4.73	0.01
2027	1.26	0.76	0.74	0.02	30.19	1.96	0.00	4.73	0.01
2028	1.26	0.76	0.74	0.02	30.19	1.96	0.00	4.73	0.01
2029	1.26	0.76	0.74	0.02	30.19	1.96	0.00	4.73	0.01
2030	1.26	0.76	0.74	0.02	30.19	1.96	0.00	4.73	0.01
Allowable	459.54			459.54	459.54	459.54		19561.33	

ENTERPRISE 205
DAILY FUEL USAGE

DATE JUNE 2018	BBLS USED	ACCUMULATED TOTAL
6/1/2018	41	41
6/2/2018	20	61
6/3/2018	23	84
6/4/2018	39	123
6/5/2018	43	166
6/6/2018	26	192
6/7/2018	25	217
6/8/2018	29	246
6/9/2018	29	275
6/10/2018	38	313
6/11/2018	36	349
6/12/2018	28	377
6/13/2018	26	403
6/14/2018	27	430
6/15/2018	35	465
6/16/2018	25	490
6/17/2018	26	516
6/18/2018	27	543
6/19/2018	28	571
6/20/2018	35	606
6/20/2018	63	669
6/21/2018	36	705
6/22/2018	39	744
6/23/2018	34	778
6/24/2018	23	801
6/25/2018	34	835
6/26/2018	28	863
6/27/2018	37	900
6/28/2018	32	932
6/29/2018	30	962
		962

DATE JULY 2018	BBLS USED	ACCUMULATED TOTAL
7/1/2018	34	34
7/2/2018	34	68
7/3/2018	37	105
7/4/2018	32	137
7/5/2018	29	166
7/6/2018	22	188
7/7/2018	24	212
7/8/2018	34	246
7/9/2018	39	285
7/10/2018	31	316
7/11/2018	27	343
7/12/2018	36	379
7/13/2018	42	421
7/14/2018	44	465
7/15/2018	46	511
7/16/2018	48	559
7/17/2018	40	599
7/18/2018	32	631
7/19/2018	36	667
7/20/2018	46	713
7/21/2018	40	753
7/22/2018	39	792
7/23/2018	48	840
7/24/2018	31	871
7/25/2018	21	892
7/26/2018	21	913
7/27/2018	37	950
7/28/2018	23	973
7/29/2018	45	1018
7/30/2018	37	1055
7/31/2018	23	1078
		1078

DATE AUGUST 2018	BBLS USED	ACCUMULATED TOTAL
8/1/2018	32	32
8/2/2018	29	61
8/3/2018	19	80
8/4/2018	18	98
8/5/2018	20	118
8/6/2018	22	140
8/7/2018	22	162
8/8/2018	24	186
8/9/2018	38	224
8/10/2018	38	262
8/11/2018	33	295
8/12/2018	34	329
8/13/2018	33	362
8/14/2018	31	393
8/15/2018	33	426
8/16/2018	28	454
8/17/2018	27	481
8/18/2018	27	508
8/19/2018	36	544
8/20/2018	36	580
8/21/2018	27	607
8/22/2018	18	625
8/23/2018	36	661
8/24/2018	28	689
8/25/2018	27	716
8/26/2018	44	760
8/27/2018	18	778
8/28/2018	59	837
8/29/2018	32	869
8/30/2018	27	896
8/31/2018	28	924
		924

DATE SEPT 2018	BBLS USED	ACCUMULATED TOTAL
9/1/2018	32	32
9/2/2018	32	64
9/3/2018	32	96
9/4/2018	33	129
9/5/2018	32	161
9/6/2018	32	193
9/7/2018	31	224
9/8/2018	31	255
9/9/2018	32	287
9/10/2018	32	319
9/11/2018	32	351
9/12/2018	32	383
9/13/2018	55	438
9/14/2018	31	469
9/15/2018	83	552
9/16/2018	27	579
9/17/2018	18	597
9/18/2018	39	636
9/19/2018	29	665
9/20/2018	37	702
9/21/2018	27	729
9/22/2018	32	761
9/23/2018	41	802
9/24/2018	35	837
9/25/2018	33	870
9/26/2018	32	902
9/27/2018	32	934
9/28/2018	32	966
9/29/2018	32	998
9/30/2018	44	1042
		1042

DATE OCT 2018	BBLS USED	ACCUMULATED TOTAL
10/1/2018	58	58
10/2/2018	52	110
10/3/2018	62	172
10/4/2018	52	224
10/5/2018	54	278
10/6/2018	55	333
10/7/2018	52	385
10/8/2018	55	440
10/9/2018	38	478
10/10/2018	48	526
10/11/2018	55	581
10/12/2018	54	635
10/13/2018	55	690
10/14/2018	55	745
10/15/2018	39	784
10/16/2018	35	819
10/17/2018	40	859
10/18/2018	40	899
10/19/2018	40	939
10/20/2018	43	982
10/21/2018	37	1019
10/22/2018	32	1051
10/23/2018	32	1083
10/24/2018	36	1119
10/25/2018	23	1142
10/26/2018	22	1164
10/27/2018	53	1217
10/28/2018	22	1239
10/29/2018	23	1262
10/30/2018	22	1284
10/31/2018	22	**1306**

SECTION 9
OIL SPILL INFORMATION

9.1 OIL SPILL RESPONSE PLANNING

All the proposed activities and facilities in this DOCD will be covered by the Oil Spill Response Plan (OSRP) filed by Cantium, LLC (Company No. 03481) dated September 2019 and last approved on March 27, 2020 (OSRP Control No. O-1011). A revision will be submitted April 2021 to replace the current production volume of 5,164 with the new volume of 10,078.3.

9.2 SPILL RESPONSE SITES

Primary Response Equipment Location	Preplanned Staging Location
Houma, LA	Houma, LA
Venice, LA	Venice, LA
Harvey, LA	Harvey, LA

9.3 OSRO INFORMATION

Cantium's primary equipment provider is Clean Gulf Associates. Clean Gulf Associates Services, LLC will provide closest available personnel, as well as a supervisor to operate the equipment.

9.4 WORST-CASE DISCHARGE SCENARIO DETERMINATION

Category	Drilling		Production	
	Regional OSRP WCD	DOCD WCD	Regional OSRP WCD	DOCD WCD
Type of Activity	>10 Miles Drilling	>10 Miles Drilling	>10 Miles Production	>10 Miles Production
Facility location (Area/Block)	MP37	MP37	MP58	MP38
Facility designation	006	006	AA	A
Distance to nearest shoreline (miles)	11.1	11.1	10.5	13.8
Storage tanks & flowlines (bbl)	0	0	5	279.3
Lease term pipelines (bbl)	0	0	69	4,086
Uncontrolled blowout (bbl)	69,811	69,811	5,090	5,713
Total Volume (bbl)	**69,811**	**69,811**	**5,164**	**10,078.3**
Type of oil(s) (crude, condensate, diesel)	Crude	Crude	Crude	Crude
API gravity	30°	30°	30°	32°

The Regional OSRP drilling and production WCD calculations were accepted on March 27, 2020.

The DOCD Drilling WCD calculations were previously accepted under Plan Control No. R-6939 approved July 2, 2020.

Cantium has determined that the production worst-case scenario from the activities proposed in this DOCD does supersede the production worst-case scenario from our approved Regional OSRP.

Cantium, LLC will submit a revised OSRP to replace the current production volume of 5,164 with the new volume of 10,078.3.

9.5 OIL SPILL RESPONSE DISCUSSION

The Oil Spill Response Discussion is included as **Attachment 9-A.**

9.6 MODELING REPORT

Modeling reports are not required for the activities proposed in this plan.

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 69,811 barrels of crude oil per day 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 Mexico available on the BOEM website. The results are shown in **Figure 1.** The BOEM OSRAM identifies the highest probability of impact to the shorelines of Plaquemines Parish, Louisiana within 3, 10, and 30 days. Plaquemines Parish includes Barataria Bay, the Mississippi River Delta, Breton Sound and the affiliated islands and bays. This region is an extremely sensitive habitat and serves as a migratory, breeding, feeding and nursery habitat for numerous species of wildlife. Beaches in this area vary in grain particle size and can be classified as fine sand, shell or perched shell beaches. Sandy and muddy tidal flats are also abundant.

Response

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

Using the estimated chemical and physical characteristics of crude oil, an ADIOS weathering model was run on a similar product from the ADIOS oil database. The results indicate 15% or approximately 10,472 barrels of crude oil would be evaporated/dispersed within 24 hours, with approximately 59,339 barrels remaining.

Natural Weathering Data: MP 37, Well No. 006	**Barrels of Oil**
WCD Volume (24 hrs)	69,811
Less 15% natural evaporation/dispersion	10,472
Remaining volume	59,339

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.

Cantium's Oil Spill Response Plan includes alternative response technologies such as dispersants and in-situ burn. Strategies will be decided by Unified Command based on an operations safety analysis, the size of the spill, weather and potential impacts. If aerial dispersants are utilized, 8

sorties (9,600 gallons) from two of the DC-3 aircrafts and 4 sorties (8,000 gallons) from the Basler aircraft would provide a daily dispersant capability of 7,540 barrels. If the conditions are favorable for in-situ burning, the proper approvals have been obtained and the proper planning is in place, in-situ burning of oil may be attempted. Slick containment boom would be immediately called out and on-scene as soon as possible. Offshore response strategies may include attempting to skim utilizing CGA spill response equipment, with a total derated skimming capacity of 250,730 barrels. Temporary storage associated with skimming equipment equals 10,796 barrels. If additional storage is needed, various storage barges with a total capacity 249,000+ bbls may be mobilized and centrally located to provide temporary storage and minimize off-loading time. **Safety is first priority. Air monitoring will be accomplished and operations deemed safe prior to any containment/skimming attempts.**

If the spill went unabated, shoreline impact in 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 totaled derated skimming capacity of 132,658 barrels. Temporary storage associated with skimming equipment equals 1,780 barrels. If additional storage is needed, various storage barges with a total capacity 132,000 bbls 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. Letters of Intent from AMPOL and OMI Environmental will ensure access to 155,350 feet of 18" shoreline protection boom. **Figure 2** outlines individual times needed for procurement, load out, travel time to the site and deployment. Strategies would be based upon surveillance and real time trajectories that depict areas of potential impact given actual sea and weather conditions. Applicable Area Contingency Plans (ACPs), Geographic Response Plans (GRPs), and Unified Command (UC) will be consulted to ensure that environmental and special economic resources are correctly identified and prioritized to ensure optimal protection. Shoreline protection strategies depict the protection response modes applicable for oil spill clean-up operations. As a secondary resource, the State of Louisiana Initial Oil Spill Response Plan will be consulted as appropriate to provide detailed shoreline protection strategies and describe necessary action to keep the oil spill from entering Louisiana's coastal wetlands. The UC should take into consideration all appropriate items detailed in Tactics discussion of this Appendix. The UC and their personnel have the option to modify the deployment and operation of equipment to allow for a more effective response to site-specific circumstances. Cantium's contract Incident Management Team has access to the applicable ACP(s) and GRP(s).

Based on the anticipated worst case discharge scenario, Cantium can be onsite with contracted oil spill recovery equipment with adequate response capacity to contain and recover surface hydrocarbons, and prevent land impact, to the maximum extent practicable, within an estimated 60 hours (based on the equipment's Effective Daily Recovery Capacity (EDRC)).

Initial Response Considerations

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

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

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

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

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

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

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

Offshore Response Actions

Equipment Deployment

Surveillance

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

Dispersant application assets

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

Containment boom

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

Oceangoing Boom Barge

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

In-situ Burn assets

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

Dedicated off-shore skimming systems
General

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

CGA HOSS Barge

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

CGA 95' Fast Response Vessels (FRVs)

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

CGA FRUs

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

T&T Koseq Skimming Systems

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

Storage Vessels

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

Vessels of Opportunity (VOO)

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

Adverse Weather Operations:

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

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

Maximization of skimmer-oil encounter rate

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

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

Maximize skimmer system efficiency

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

Recovered Oil Storage

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

Command, Control, and Communications (C^3)

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

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

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

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

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

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

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

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

Initial set-up and potential actions:

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

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

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

TF 1

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

TF 2

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

TF 3

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

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

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

TF 4

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

TF 5

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

TF 6

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

TF 7

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

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

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

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

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

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

Tactical Overview

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

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

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

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

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

Tactical Overview

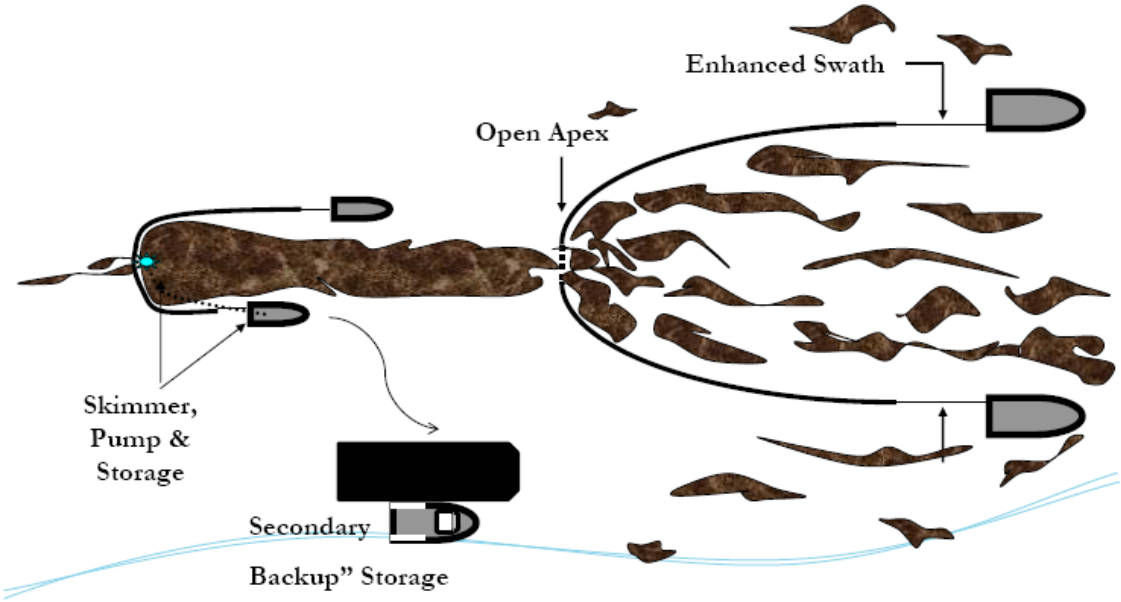
Mechanical Recovery – Deployed on large vessels of opportunity (VOO) the Koseq Rigid Sweeping Arms are high volume surge capacity deployed to increase recovery capacity at the source of a large oil spill in the offshore and outer nearshore environment of the Gulf of Mexico. They are highly mobile and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

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

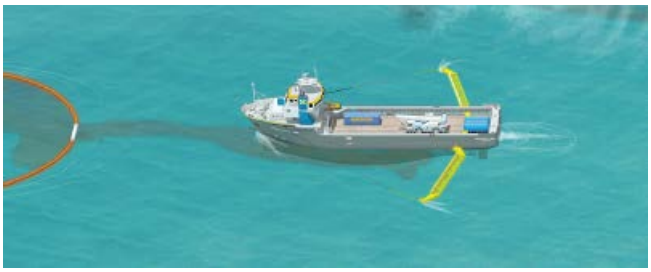
Command and Control – The large OSVs in many cases have state of the art communication and electronic systems, as well as the accommodations to support the function of directing all skimming operations offshore and reporting back to the command post.

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

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



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



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

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

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

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

Near Shore Response Actions

Timing

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

Considerations

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

Surveillance

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

Dispersant Use

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

Dedicated Near Shore skimming systems

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

VOO

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

Shoreline Protection Operations

Response Planning Considerations

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

Placement of boom

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

Beach Preparation - Considerations and Actions

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

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

Inland and Coastal Marsh Protection and Response Considerations and Actions

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

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

Decanting Strategy

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

CGA Equipment Limitations

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

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

Environmental Conditions in the GOM

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

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

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

FIGURE 1
TRAJECTORY BY LAND SEGMENT

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

Area/Block	OCS-G	Launch Area	Land Segment and/or Resource	Conditional Probability (%)
Drill and complete six wells, install three lease term pipelines, install a 12-slot four pile platform, and place six wells on production **MP 37, Well No. 006** *11.1 miles from shore*	G01623	C53		*3 day*
			Plaquemines, LA	**11**
			St. Bernard, LA	2
				10 day
			Lafourche, LA	1
			Plaquemines, LA	**25**
			St. Bernard, LA	9
			Hancock & Harrison, MS	1
			Jackson, MS	2
			Mobile, AL	2
			Baldwin, AL	2
			Escambia, FL	1
				30 day
			Terrebonne, LA	1
			Lafourche, LA	1
			Plaquemines, LA	**31**
			St. Bernard, LA	12
			Hancock & Harrison, MS	2
			Jackson, MS	4
			Mobile, AL	3
			Baldwin, AL	3
			Escambia, FL	3
			Okaloosa, FL	1
			Walton, FL	1
			Bay, FL	1
			Gulf, FL	1

WCD Scenario– <u>BASED ON WELL BLOWOUT DURING DRILLING OPERATIONS</u> (11.1 miles from shore)
59,339 bbls of crude oil (24 hour volume considering natural weathering)
API Gravity 30°

FIGURE 2 – Equipment Response Time to MP 37, Well No. 006

Dispersants/Surveillance

Dispersant/Surveillance	Dispersant Capacity (gal)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to site	Total Hrs
ASI							
Basler 67T	2000	2	Houma	2	2	0.6	4.6
DC 3	1200	2	Houma	2	2	0.7	4.7
DC 3	1200	2	Houma	2	2	0.7	4.7
Aero Commander	NA	2	Houma	2	2	0.6	4.6

Offshore Response

Offshore Equipment Pre-Determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
HOSS Barge	76285	4000	3 Tugs	12	Harvey	6	0	12	7.5	2	27.5
95' FRV	22885	249	NA	6	Leeville	2	0	2	5.5	1	10.5
95' FRV	22885	249	NA	6	Galveston	2	0	2	19	1	24
95' FRV	22885	249	NA	6	Venice	2	0	3	3	1	9
95' FRV	22885	249	NA	6	Vermilion	2	0	3	9	1	15
Boom Barge (CGA-300) 42" Auto Boom (25000')	NA	NA	1 Tug 50 Crew	4 (Barge) 2 (Per Crew)	Leeville	8	0	4	15	2	29
Kirby Offshore (available through contract with CGA)											
RO Barge	NA	80000+	1 Tug	6	Venice	47	0	4	8	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	47	0	4	8	1	60
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 2607	NA	23000	1 Tug	6	Amelia	18.5	0	6	22.5	1	48
CTCo 2608	NA	23000	1 Tug	6	Amelia	18.5	0	6	22.5	1	48
CTCo 2609	NA	23000	1 Tug	6	Amelia	18.5	0	6	22.5	1	48

Staging Area: Venice

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
T&T Marine (available through direct contract with CGA)											
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Galveston	4	12	13	5	2	36
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Harvey	4	12	2	5	2	25
CGA											
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Vermilion	2	6	7	5	1	21
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Galveston	2	6	13	5	1	27
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Aransas Pass	2	6	18	5	1	32
FRU (3) + 100 bbl Tank (6)	12753	600	3 Utility	18	Leeville	2	6	4.5	5	1	18.5
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Venice	2	6	2	5	1	16
Hydro-Fire Boom	NA	NA	8 Utility	40	Harvey	0	24	2	5	6	37

Nearshore Response

Nearshore Equipment Pre-determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
Mid-Ship SWS	22885	249	NA	4	Leeville	2	0	N/A	48	1	51
Mid-Ship SWS	22885	249	NA	4	Venice	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Leeville	2	0	N/A	48	1	51
46' FRV	15257	65	NA	4	Leeville	2	0	2	2	1	7
46' FRV	15257	65	NA	4	Vermilion	2	0	2	10	1	15
46' FRV	15257	65	NA	4	Venice	2	0	2	2	1	7
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 2603	NA	25000	1 Tug	6	Amelia	25	0	6	16	1	48
CTCo 2604	NA	20000	1 Tug	6	Amelia	25	0	6	16	1	48
CTCo 2605	NA	20000	1 Tug	6	Amelia	25	0	6	16	1	48
CTCo 2606	NA	20000	1 Tug	6	Amelia	25	0	6	16	1	48
CTCo 5001	NA	47000	1 Tug	6	Amelia	25	0	6	16	1	48

Staging Area: Venice

Nearshore Equipment With Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Load Out	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
SWS Egmopol	1810	100	NA	3	Galveston	2	2	13	2	1	20
SWS Egmopol	1810	100	NA	3	Leeville	2	2	4.5	2	1	11.5
SWS Marco	3588	20	NA	3	Vermilion	2	2	8	2	1	15
SWS Marco	3588	34	NA	3	Leeville	2	2	4.5	2	1	11.5
SWS Marco	3588	34	NA	3	Venice	2	2	2	2	1	7
Foilex Skim Package (TDS 150)	1131	50	1 Utility	3	Vermilion	4	12	8	2	2	28
Foilex Skim Package (TDS 150)	1131	50	1 Utility	3	Galveston	4	12	13	2	2	33
Foilex Skim Package (TDS 150)	1131	50	1 Utility	3	Harvey	4	12	2	2	2	22
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Vermilion	2	2	8	2	1	15
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Harvey	2	2	2	2	1	9
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Vermilion	2	2	8	2	1	15
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Harvey	2	2	2	2	1	9

Staging Area: Venice

Shoreline Protection Boom	VOO	Persons Req.	Storage/Warehouse Location	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment Site	Hrs to Deploy	Total Hrs
AMPOL (available through Letter of Intent)									
34,050’ 18” Boom	13 Crew	26	New Iberia, LA	2	2	6	2	12	24
12,850’ 18” Boom	7 Crew	14	Chalmette, LA	2	2	2.5	2	6	14.5
900’ 18” Boom	1 Crew	2	Morgan City, LA	2	2	4.5	2	2	12.5
3,200’ 18” Boom	2 Crew	4	Venice, LA	2	2	0	2	2	8
12,750’ 18” Boom	7 Crew	14	Port Arthur, TX	2	2	10	2	6	22
OMI Environmental (available through Letter of Intent)									
14,000’ 18” Boom	6 Crew	12	Belle Chasse, LA	1	1	2	2	3	9
2,000’ 18” Boom	1 Crew	2	Galliano, LA	1	1	4	2	3	11
1,800’ 18” Boom	1 Crew	2	Gonzalez, LA	1	1	4	2	3	11
11,800’ 18” Boom	5 Crew	10	Harvey, LA	1	1	2	2	3	9
2,000’ 18” Boom	2 Crew	4	Houma, LA	1	1	4	2	3	11
2,400’ 18” Boom	2 Crew	4	Morgan City, LA	1	1	5	2	3	12
3,800’ 18” Boom	2 Crew	4	New Iberia, LA	1	1	6	2	3	13
2,300’ 18” Boom	2 Crew	4	Port Allen, LA	1	1	5	2	3	12
1,500’ 18” Boom	1 Crew	2	Venice, LA	1	1	0	2	3	7
19,000’ 18” Boom	6 Crew	12	Deer Park, TX	1	1	12	2	3	19
11,000’ 18” Boom	5 Crew	10	La Marque, TX	1	1	13	2	3	20
20,000’ 18” Boom	6 Crew	12	Port Arthur, TX	1	1	10	2	3	17

Wildlife Response	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
					CGA						
Wildlife Support Trailer	NA	NA	NA	2	Harvey	2	2	2	1	2	9
Bird Scare Guns (24)	NA	NA	NA	2	Harvey	2	2	2	1	2	9
Bird Scare Guns (12)	NA	NA	NA	2	Galveston	2	2	13	1	2	20
Bird Scare Guns (12)	NA	NA	NA	2	Aransas Pass	2	2	18	1	2	25
Bird Scare Guns (48)	NA	NA	NA	2	Vermilion	2	2	8	1	2	15
Bird Scare Guns (24)	NA	NA	NA	2	Leeville	2	2	4.4	1	2	11.4

Response Asset	Total
Offshore EDRC	250,730
Offshore Recovered Oil Capacity	259,796+
Nearshore / Shallow Water EDRC	132,658
Nearshore / Shallow Water Recovered Oil Capacity	133,780

SECTION 10
ENVIRONMENTAL MONITORING INFORMATION

10.1 MONITORING SYSTEMS

Cantium will utilize a mat style Jack-up rig to drill the wells associated with this plan and it's very atypical for marine life to become entangled or entrapped in this style of structure. As a precaution, lines extending into the water will be minimized. Any hoses extending to the water's surface will be configured to minimize the chances of entanglement by marine life. As part of daily pollutions observations, our HSE representative will be trained to look for entangled marine life and take appropriate action.

Cantium will monitor beyond the 157m zone noted in the 2020 Biological Opinion for marine life both before and during the proposed pile driving operations, if applicable; however, Cantium is only expecting to monitor within the 157m zone for pile driving activities. The peak sound level during pile-driving will be below the limit for temporary and permanent hearing loss noted in Table 72 of the 2020 Biological Opinion. Cantium will utilize soft start techniques when initiating pile driving.

10.2 INCIDENTAL TAKES

There is no reason to believe that any of the endangered species or marine mammals as listed in the Endangered Species Act (ESA) will be "taken" as a result of the operations proposed under this plan.

It has been documented that the use of explosives and/or seismic devices can affect marine life. Operations proposed in this plan will not be utilizing either of these devices.

Cantium will adhere to the requirements as set forth in the following documents, as applicable, to avoid or minimize impacts to any of the species listed in the ESA as a result of the operations conducted herein:

- Appendices to the Biological Opinion on the Federally Regulated Oil and Gas Program in the Gulf of Mexico issued on March 13, 2020
  - Appendix A: "Seismic Survey Mitigation and Protected Species Observer Protocols"
  - Appendix B: "Marine Trash and Debris Awareness and Elimination Survey Protocols"
  - Appendix C: "Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols"
  - Appendix J: "Sea Turtle Handling and Resuscitation Guidelines"

10.3 FLOWER GARDEN BANKS NATIONAL MARINE SANCTUARY

Main Pass Block 38 is not located in the Flower Garden Banks National Marine Sanctuary; therefore, relevant information is not required in this DOCD.

SECTION 11
LEASE STIPULATIONS INFORMATION

Development activities are subject to the following stipulations attached to Lease OCS-G 01623, Main Pass Block 38.

11.1 MARINE PROTECTED SPECIES

In accordance with the Federal Endangered Species Act and the Marine Mammal Protection Act, Cantium will:

(a) Collect and remove flotsam resulting from activities related to exploration, development, and production of this lease;

(b) Post signs in prominent places on all vessels and platforms used as a result of activities related to exploration, development, and production of this lease detailing the reasons (legal and ecological) why release of debris must be eliminated;

(c) Observe for marine mammals and sea turtles while on vessels, reduce vessel speed to 10 knots or less when assemblages of cetaceans are observed, and maintain a distance of 90 meters or greater from whales, and a distance of 45 meters or greater from small cetaceans and sea turtles;

(d) Employ mitigation measures prescribed by BOEM/BSEE or the National Marine Fisheries Service (NMFS) for all seismic surveys, including the use of an “exclusion zone” based upon the appropriate water depth, ramp-up and shutdown procedures, visual monitoring, and reporting;

(e) Identify important habitats, including designated critical habitat, used by listed species (e.g., sea turtle nesting beaches, piping plover critical habitat), in oil spill contingency planning and require the strategic placement of spill cleanup equipment to be used only by personnel trained in less-intrusive cleanup techniques on beaches and bay shores; and

(f) Immediately report all sightings and locations of injured or dead protected species (e.g., marine mammals and sea turtles) to the appropriate stranding network. If oil and gas industry activity is responsible for the injured or dead animal (e.g., because of a vessel strike), the responsible parties should remain available to assist the stranding network. If the injury or death was caused by a collision with the lessee’s vessel, the lessee must notify BOEM within 24 hours of the strike.

BOEM and BSEE issue Notices to Lessees (NTLs), which more fully describe measures implemented in support of the above-mentioned implementing statutes and regulations, as well as measures identified by the U.S. Fish and Wildlife Service and NMFS arising from, among others, conservation recommendations, rulemakings pursuant to the MMPA, or consultation. The lessee and its operators, personnel, and subcontractors, while undertaking activities authorized under this lease, must implement and comply with the specific mitigation measures

outlined in NTL No. 2016-BOEM-G01, “Vessel Strike Avoidance and Injured/Dead Protected Species Reporting;” NTL No. 2016-BOEM-G02, “Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program;” and NTL No. 2015-BSEE-G03, “Marine Trash and Debris Awareness and Elimination.” At the lessee’s option, the lessee, its operators, personnel, and contractors may comply with the most current measures to protect species in place at the time an activity is undertaken under this lease, including but not limited to new or updated versions of the NTLs identified in this paragraph. The lessee and its operators, personnel, and subcontractors will be required to comply with the mitigation measures, identified in the above referenced NTLs, and additional measures in the conditions of approvals for their plans or permits.

SECTION 12
ENVIRONMENTAL MITIGATION MEASURES INFORMATION

12.1 MEASURES TAKEN TO AVOID, MINIMIZE, AND MITIGATE IMPACTS

Cantium will adhere to the requirements as set forth in the following documents, as applicable, to avoid or minimize impacts to any marine and coastal environments and habitats, biota, and threatened and endangered species:

- Appendices to the Biological Opinion on the Federally Regulated Oil and Gas Program in the Gulf of Mexico issued on March 13, 2020
  - Appendix A: "Seismic Survey Mitigation and Protected Species Observer Protocols"
  - Appendix B: "Marine Trash and Debris Awareness and Elimination Survey Protocols"
  - Appendix C: "Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols"
  - Appendix J: "Sea Turtle Handling and Resuscitation Guidelines"

Cantium will utilize a mat style Jack-up rig to drill the wells associated with this plan and it's very atypical for marine life to become entangled or entrapped in this style of structure. As a precaution, lines extending into the water will be minimized. Any hoses extending to the water's surface will be configured to minimize the chances of entanglement by marine life. As part of daily pollutions observations, our HSE representative will be trained to look for entangled marine life and take appropriate action.

Cantium will monitor beyond the 157m zone noted in the 2020 Biological Opinion for marine life both before and during the proposed pile driving operations, if applicable; however, Cantium is only expecting to monitor within the 157m zone for pile driving activities. The peak sound level during pile-driving will be below the limit for temporary and permanent hearing loss noted in Table 72 of the 2020 Biological Opinion. Cantium will utilize soft start techniques when initiating pile driving.

12.2 INCIDENTAL TAKES

Cantium will adhere to the requirements set forth in the following documents, as applicable, to avoid or minimize impacts to any of the species listed in the Endangered Species Act (ESA) as a result of the operations conducted herein:

- Appendices to the Biological Opinion on the Federally Regulated Oil and Gas Program in the Gulf of Mexico issued on March 13, 2020
  - Appendix A: "Seismic Survey Mitigation and Protected Species Observer Protocols"
  - Appendix B: "Marine Trash and Debris Awareness and Elimination Survey Protocols"
  - Appendix C: "Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols"
  - Appendix J: "Sea Turtle Handling and Resuscitation Guidelines"

See **Section 6.7** for a list of Threatened and Endangered Species, Critical Habitat and Marine Mammal Information.

SECTION 13
RELATED FACILITIES AND OPERATIONS INFORMATION

13.1 RELATED OCS FACILITIES AND OPERATIONS

Main Pass 41 “B” is the nearest “hub” processing facility to the new MP 38 “A” proposed location. MP 38 A will be connected to MP 41 B with three pipelines (one 8.625” pipeline 46,045’ in length and two 6.625” pipelines each 46,045’ in length) carrying bulk fluid (oil and water) and high pressure gas. Once MP 38 A production is tied into MP 41 B, it enters the existing Main Pass 41 field production / processing system. Gas volumes estimated at a maximum of 10 MMSCFD would flow to MP 41 B and be dehydrated, metered, and exported from MP 41 B.

Main Pass 42 “D/L” is the final liquids processing facility. Bulk fluid would flow from MP 38 A to MP 41 B, and then across to MP 42 D/L. At MP 42 D/L the liquids will be separated, the water cleaned and discharged, and the oil will be treated, metered, and exported. Peak fluid rates are estimated at 8,000 BFPD.

13.2 TRANSPORTATION SYSTEM

Hydrocarbon production will be transported as described above.

13.3 PRODUCED LIQUID HYDROCARBONS TRANSPORTATION VESSELS

There will not be any transfers of liquid hydrocarbons other than via pipeline.

SECTION 14
SUPPORT VESSELS AND AIRCRAFT INFORMATION

14.1 GENERAL

The most practical, direct route from the shorebase as permitted by weather and traffic conditions will be utilized. The drilling unit, vessels, crew boats and supply boats associated with the operations proposed in this plan will not transit the Bryde's whale area. Information regarding the vessels and aircraft to be used to support the proposed activities is provided in the table below.

Type	Maximum Fuel Tank Capacity	Maximum Number in Area at Any Time (drlg / prod)	Trip Frequency or Duration (drlg / prod)
Tug boat	59,548 gal	2 / 0	4 total / 0
Supply boat	7,240 gal	3 / 0	7 per week / 0
Crew boat	5,400 gal	1 / 0	7 per week / 0
Service Boat	7,240 gal	0 / 3	0 / 7 per week
Helicopter	560 gal	As Required	As Required

14.2 DIESEL OIL SUPPLY VESSELS

Information regarding vessels to be used to supply diesel oil for fuel and other purposes is provided in the table below.

Size of Fuel Supply Vessel (ft)	Capacity of Fuel Supply Vessel	Frequency of Fuel Transfers	Route Fuel Supply Vessel Will Take
180'	1,500 gal	Weekly	Shortest route from Shorebase to block

14.3 DRILLING FLUID TRANSPORTATION

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

14.4 SOLID AND LIQUID WASTE TRANSPORTATION

A table, "Wastes You Will Transport and/or Dispose of Onshore," is included as **Attachment 14-A.**

14.5 VICINITY MAP

A vicinity map 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 routes of the support vessels and aircraft that will be used when traveling between the onshore support facilities and the drilling unit is included as **Attachment 14-B.**

Attachment 14-A WASTE AND SURPLUS ESTIMATED TO BE TRANSPORTED AND/OR DISPOSED OF ONSHORE

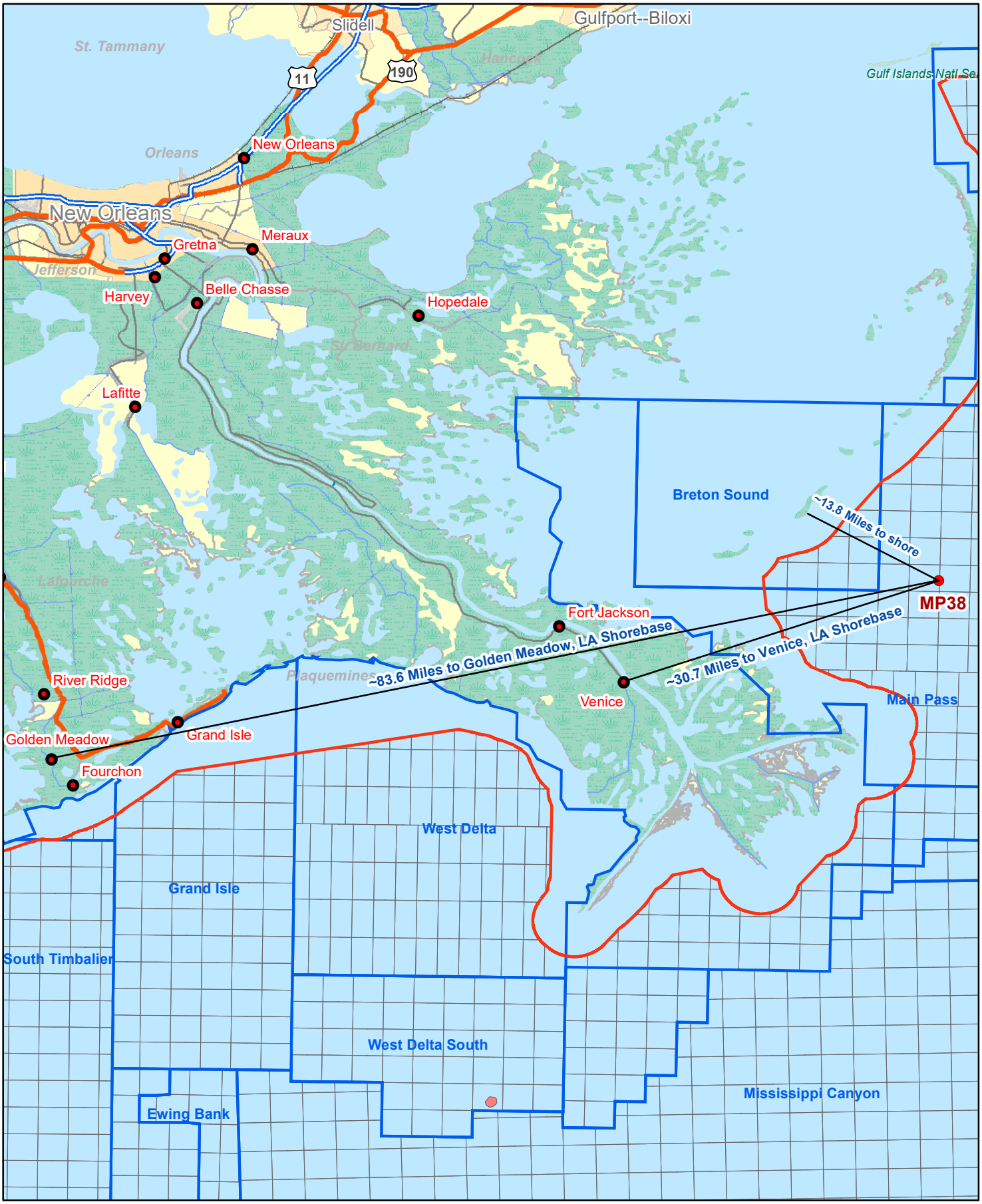
please specify whether the amount reported is a total or per well

	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.						
Water-based drilling fluid or mud	NA		NA	NA	NA	NA
Synthetic-based drilling fluid or mud	NA		NA	NA	NA	NA
Oil-based drilling fluid or mud	NA		Below deck storage tanks on offshore support vessels	R360 Environmental, Venice	5,000 bbls/well	Land Farming
Cuttings wetted with water-based fluid	NA		NA	NA	NA	NA
Cuttings wetted with synthetic-based fluid	NA		NA	NA	NA	NA
Cuttings wetted with oil-based fluids			Tote tanks on offshore support vessels	R360 Environmental, Venice	3,000 bbls/well	Land Farming
Will you produce hydrocarbons? If yes fill in for produced sand.						
Produced sand	NA		NA	NA	NA	NA
Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.						
Trash and debris	Plastic, paper, aluminum		barged in a storage bin	Total Waste Solutions, Venice	7,500 lbs/well	Recycled or Land fill
Used oil	Oil		barged in 55 gal drums	R360 Environmental, Venice	15 drums/well	Recycled
Wash water	Water		Below deck storage tanks on offshore support vessels	R360 Environmental, Venice	1,250 bbls/well	Disposal
Chemical product wastes	Misc.		barged in a storage bin	R360 Environmental, Venice	500 lbs/well	Disposal
NOTE: If you will not have a type of waste, enter NA in the row.						

ATTACHMENT 14-B

Cantium, LLC

Vicinity Map
Main Pass 38



SECTION 15
ONSHORE SUPPORT FACILITIES INFORMATION

15.1 GENERAL

The onshore facilities to be used to provide supply and service support for the proposed activities are provided in the table below.

Name	Location	Existing/New/Modified
EPS	Venice, Louisiana	Existing
Bristow Helicopters	Golden Meadow, Louisiana	Existing

15.2 SUPPORT BASE CONSTRUCTION OR EXPANSION

There will be no new construction of an onshore support base, nor will Cantium expand the existing shorebase as a result of the operations proposed in this DOCD.

15.3 SUPPORT BASE CONSTRUCTION OR EXPANSION TIMETABLE

A support base construction or expansion timetable is not required for the activities proposed in this plan.

15.4 WASTE DISPOSAL

A table, “Wastes You Will Transport and/or Dispose of Onshore,” is included as **Attachment 14-A.**

SECTION 16
COASTAL ZONE MANAGEMENT (CZM) INFORMATION

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

Measures will be taken to avoid or mitigate the probable impacts. Cantium will operate in compliance with existing federal and state laws, regulations, and resultant enforceable program policies in Louisiana's and Mississippi's Coastal Zone Management Programs.

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

Relevant enforceable policies were considered in certifying consistency for Louisiana. A certificate of Coastal Zone Management Consistency for the state of Louisiana is included with **Attachment 16-A.**

The policies and corresponding sections within this Development Operations Coordination Document identified by the State of Mississippi Coastal Program (MCP) as being related to OCS Plans are provided in the table below.

Enforceable Program Policies of the Mississippi Coastal Program (MCP)

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

Goal 1 is addressed in Section 15. The proposed activities provide no industrial expansion in the coastal area of Mississippi; therefore, Mississippi coastal areas will be conserved for water dependent industry.

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

Goal 2 is addressed in Section 17. All proposed activities shall avoid to the maximum extent practicable significant impact to Mississippi's coastal wetlands and ecosystems.

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

Goal 3 is addressed in Section 17. All proposed activities shall avoid to the maximum extent practicable significant impact to Mississippi's seafood industry.

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

Goal 4 is addressed in Sections 2, 8 and 17. All proposed activities shall avoid to the maximum extent practicable significant impact to Mississippi's seafood industry.

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

The proposed activities are supported by a shorebase located in Louisiana and shall avoid to the maximum extent practicable significant impact to Mississippi's water resources.

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

Goal 6 is addressed in Sections 2 and 17. All proposed activities shall avoid to the maximum extent practicable significant impact to Mississippi's historical and archaeological resources.

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

Goal 7 is addressed in Sections 7, 8, 9 and 17. All proposed activities shall avoid to the maximum extent practicable significant impact to Mississippi's natural scenic qualities in the coastal area.

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

All proposed activities are supported by a shorebase in Louisiana and shall avoid to the maximum extent practicable significant impact to Mississippi's local governments.

A certificate of Coastal Zone Management Consistency for the state of Mississippi is included with **Attachment 16-A.**

ATTACHMENT 16-A

COASTAL ZONE MANAGEMENT CONSISTENCY CERTIFICATION
INITIAL DEVELOPMENT OPERATIONS COORDINATION DOCUMENT
MAIN PASS BLOCK 38
OCS-G 01623

The proposed activities comply with the enforceable policies of the Louisiana approved management program and will be conducted in a manner consistent with such program.

Cantium, LLC

Lessee or Operator

Meaghan Anderson
General Counsel, Land

Meaghan Anderson

Certifying Official

16 April 2021

Date

COASTAL ZONE MANAGEMENT CONSISTENCY CERTIFICATION

INITIAL DEVELOPMENT OPERATIONS COORDINATION DOCUMENT

MAIN PASS BLOCK 38

OCS-G 01623

The proposed activities comply with the enforceable policies of the Mississippi approved management program and will be conducted in a manner consistent with such program.

Cantium, LLC

Lessee or Operator

Meaghan Anderson
General Counsel, Land

Certifying Official

16 April 2021

Date

SECTION 17
ENVIRONMENTAL IMPACT ANALYSIS (EIA)

The Environmental Impact Analysis is included as **Attachment 17-A.**

Cantium, LLC (Cantium)
Initial Development Operations Coordination Document
Main Pass Block 38
OCS-G 01623

(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		X	
Fisheries		X	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		X(6)	
Marine and pelagic birds	X				X	X
Public health and safety					(5)	
Coastal and Onshore						
Beaches					X(6)	X
Wetlands					X(6)	
Shore birds and coastal nesting birds					X(6)	X
Coastal wildlife refuges					X	
Wilderness areas					X	

Footnotes for Environmental Impact Analysis Matrix

1) Activities that may affect a marine sanctuary or topographic feature. Specifically, if the well or platform site or any anchors will be on the seafloor within the:
   - 4-mile zone of the Flower Garden Banks, or the 3-mile zone of Stetson Bank;
   - 1000-meter, 1-mile or 3-mile zone of any topographic feature (submarine bank) protected by the Topographic Features Stipulation attached to an OCS lease;
   - Essential Fish Habitat (EFH) criteria of 500 feet. from any no-activity zone; or
   - Proximity of any submarine bank (500 foot buffer zone) with relief greater than two meters that is not protected by the Topographic Features Stipulation attached to an OCS lease.
2) Activities with any bottom disturbance within an OCS lease block protected through the Live Bottom (Pinnacle Trend) Stipulation attached to an OCS lease.
3) Activities within any Eastern Gulf OCS block where seafloor habitats are protected by the Live Bottom (Low-Relief) Stipulation attached to an OCS lease.
4) Activities on blocks designated by the BOEM as being in water depths 300 meters or greater.
5) Exploration or production activities where H_2S concentrations greater than 500 ppm might be encountered.
6) All activities that could result in an accidental spill of produced liquid hydrocarbons or diesel fuel that you determine would impact these environmental resources. If the proposed action is located a sufficient distance from a resource that no impact would occur, the EIA can note that in a sentence or two.
7) All activities that involve seafloor disturbances, including anchor emplacements, in any OCS block designated by the BOEM as having high-probability for the occurrence of shipwrecks or prehistoric sites, including such blocks that will be affected that are adjacent to the lease block in which your planned activity will occur. If the proposed activities are located a sufficient distance from a shipwreck or a prehistoric site that no impact would occur, the EIA can note that in a sentence or two.
8) All activities that you determine might have an adverse effect on endangered or threatened marine mammals or sea turtles or their critical habitats.
9) Production activities that involve transportation of produced fluids to shore using shuttle tankers or barges.

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

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

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in the Gulf of Mexico	Gulf of Mexico Range
			Lease Area	Coastal		
Marine Mammals						
Manatee, West Indian	*Trichechus manatus latirostris*	T	--	X	Florida (peninsular)	Coastal Louisiana, Mississippi, Alabama, and Florida
Whale, Blue	*Balaenoptera masculus*	E	X*	--	None	GOM
Whale, Bryde's	*Balaenoptera edeni*	E	X	--	None	Eastern GOM
Whale, Fin	*Balaenoptera physalus*	E	X*	--	None	GOM
Whale, Humpback	*Megaptera novaeangliae*	E	X*	--	None	GOM
Whale, North Atlantic Right	*Eubalaena glacialis*	E	X*	--	None	GOM
Whale, Sei	*Balaenopiera borealis*	E	X*	--	None	GOM
Whale, Sperm	*Physeter catodon (=macrocephalus)*	E	X	--	None	GOM
Terrestrial Mammals						
Mouse, Beach (Alabama, Choctawatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus*	E	-	X	Alabama, Florida (panhandle) beaches	Alabama, Florida (panhandle) beaches
Birds						
Plover, Piping	*Charadrius melodus*	T	-	X	Coastal Texas, Louisiana, Mississippi, Alabama and Florida (panhandle)	Coastal GOM
Crane, Whooping	*Grus Americana*	E	-	X	Coastal Texas	Coastal Texas and Louisiana
Crane, Mississippi sandhill	*Grus canadensis pulla*	E	-	X	Coastal Mississippi	Coastal Mississippi
Curlew, Eskimo	*Numenius borealis*	E	-	X	none	Coastal Texas
Falcon, Northern Aplomado	*Falco femoralis septentrionalis*	E	-	X	none	Coastal Texas
Knot, Red	*Calidris canutus rufa*	T	-	X	None	Coastal GOM
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		
Reptiles						
Sea Turtle, Green	*Chelonia mydas*	T/E***	X	X	None	GOM
Sea Turtle, Hawksbill	*Eretmochelys imbricata*	E	X	X	None	GOM
Sea Turtle, Kemp's Ridley	*Lepidochelys kempli*	E	X	X	None	GOM
Sea Turtle, Leatherback	*Dermochelys coriacea*	E	X	X	None	GOM
Sea Turtle, Loggerhead	*Caretta caretta*	T	X	X	Texas, Louisiana, Mississippi, Alabama, Florida	GOM
Fish						
Sturgeon, Gulf	*Acipenser oxyrinchus (=oxyrhynchus) desotoi*	T	X	X	Coastal Louisiana, Mississippi, Alabama and Florida (panhandle)	Coastal Louisiana, Mississippi, Alabama and Florida (panhandle)
Shark, Oceanic Whitetip	Carcharhinus longimanus	E	X	_	None	GOM
Sawfish, Smalltooth	Pristis pectinata	E	-	X	None	Florida
Grouper, Nassau	Epinephelus striatus	T	-	X	None	Florida
Ray, Giant Manta	Manta birostris	E	X	--	None	GOM
Corals						
Coral, Elkhorn	*Acopora palmate*	T	X**	X	Florida Keys and Dry Tortugas	Flower Garden Banks, Florida, and the Caribbean
Coral, Staghorn	*Acopora cervicornis*	T	X	X	Florida	Flower Garden Banks, Florida, and the Caribbean
Coral, Boulder Star	*Orbicella franksi*	T	X	X	none	Flower Garden Banks and Florida
Coral, Lobed Star	*Orbicella annularis*	T	X	X	None	Flower Garden Banks and Caribbean
Coral, Mountainous Star	*Orbicella faveolata*	T	X	X	None	Flower Garden Banks and Gulf of Mexico
Coral, Rough Cactus	*Mycetophyllia ferox*	T	-	X	None	Florida and Southern Gulf of Mexico

Abbreviations: E = Endangered; T = Threatened

* 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.

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

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

(B) ANALYSIS

Site-Specific at Main Pass Block 38

Proposed operations consist of the drilling, completion, testing, and commencement of production of six wells (A1-A6), installation of Platform A (12 well-slot, four pile platform), and installation of three lease term pipelines.

Operations will be conducted with a Jack-up (Enterprise 205 or similar).

There are no seismic surveys or pipelines making landfall associated with the operations covered by this Plan. Cantium will drive four 48" piles with a hydraulic hammer as recommended by the installation contractor. These will be installed sequentially and is expected to take approximately 48 hours per pile for a total of eight days. Piles will be driven through layers of primarily sand and clay.

1. Designated Topographic Features

Potential IPFs on topographic features include physical disturbances to the seafloor, effluents, and accidents.

Physical disturbances to the seafloor: Main Pass Block 38 is 67.1 miles from the closest designated Topographic Features Stipulation Block (Sackett Bank); therefore, no adverse impacts are expected.

Effluents: Main Pass Block 38 is 67.1 miles from the closest designated Topographic Features Stipulation Block (Sackett Bank); therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills cause damage to benthic organisms only if the oil contacts the organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 meter depth. At this depth, the oil is found only at concentrations several orders of magnitude lower than the amount shown to have an effect on corals. Because the crests of topographic features in the Northern Gulf of Mexico are found below 10 meters, oil from a surface spill is not expected to reach their sessile biota. Oil from a subsurface spill is not applicable due to the distance of these blocks from a topographic area. The activities proposed in this plan will be covered by Cantium's Regional OSRP (refer to information submitted in **Section 9**).

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

007). Lubchenco et al. (2010) report that most chemically dispersed surface oil from the Deepwater Horizon explosion and oil spill remained in the top six meters of the water column where it mixed with surrounding waters and biodegraded (BOEM 2017-007). None of the topographic features or potentially sensitive biological features in the GOM are shallower than 10 meters (33 feet), and only the Flower Garden Banks are shallower than 20 meters (66 feet).

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

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

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

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

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

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

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

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

Due to the distance of these blocks from a topographic area and the coverage of the activities proposed in this plan by Cantium's Regional OSRP (refer to information submitted in **Section 9**), impacts to topographic features from surface or sub-surface oil spills are not expected.

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

2. Pinnacle Trend Area Live Bottoms

Potential IPFs on 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: Main Pass Block 38 is 27.1 miles from the closest live bottom (pinnacle trend) area; therefore, no adverse impacts are expected.

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, Main Pass Block 38 is 27.1X miles from the closest live bottom (pinnacle trend) area; therefore, no adverse impacts are expected.

Effluents: Main Pass Block 38 is 27.1 miles from the closest live bottom (pinnacle trend) area; therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills have the potential to foul benthic communities and cause lethal and sublethal effects on live bottom organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 meter depth. At this depth, the oil is found only at concentrations several orders of magnitude lower than the amount shown to have an effect on marine organisms. Oil from a subsurface spill is not expected to impact pinnacle trend area live bottoms due to the distance of these blocks from a live bottom (pinnacle trend) area and the coverage of the. activities proposed in this plan by Cantium's Regional OSRP (refer to information submitted in **Section 9**).

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

There are no other IPFs (including wastes sent to shore for treatment or disposal) from the proposed operations that are likely to impact 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: Main Pass Block 38 is not located in an area characterized by the existence of live bottoms, and this lease does not contain a Live-Bottom Stipulation requiring a photo documentation survey and survey report.

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, Main Pass Block 38 is not located in an area characterized by the existence of live bottoms; therefore, no adverse impacts are expected.

Effluents: Main Pass Block 38 is not located in an area characterized by the existence of live bottoms; therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills cause damage to live bottom organisms only if the oil contacts the organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 meter depth. At this depth, the oil is found only at concentrations several orders of magnitude lower than the amount shown to have an effect on marine invertebrates. Oil from a subsurface spill is not expected to impact Eastern Gulf live bottoms due to the distance of these blocks from a live bottom area and coverage of the activities proposed in this plan by Cantium's Regional OSRP (refer to information submitted in **Section 9**).

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

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

4. Deepwater Benthic Communities

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

Operations proposed in this plan are in water depths of 46 feet. High-density deepwater benthic communities are found only in water depths greater than 984 feet (300 meters); therefore, Cantium's proposed operations in Main Pass Block 38 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 Main Pass Block 38 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.

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: Impact-producing factors related to OCS oil- and gas-related accidental events primarily involve drilling fluid spills, chemical spills, and oil spills.

Drilling Fluid Spills

Water-based fluid (WBF) and Synthetic-based fluid (SBF) spills may result in elevated turbidity, which would be short term, localized, and reversible. The WBF is normally discharged to the seafloor during riserless drilling, which is allowable due to its low toxicity. For the same reasons, a spill of WBF would have negligible impacts. The SBF has low toxicity, and the discharge of SBF is allowed to the extent that it adheres onto drill cuttings. Both USEPA Regions 4 and 6 permit the discharge of cuttings wetted with SBF as long as the retained SBF amount is below a prescribed percent, meets biodegradation and toxicity requirements, and is not contaminated with the formation oil or PAH. A spill of SBF may cause a temporary increase in biological oxygen demand and locally result in lowered dissolved oxygen in the water column. Also, a spill of SBF may release an oil sheen if formation oil is present in the fluid. Therefore, impacts from a release of SBF are considered to be minor. Spills of SBF typically do not require mitigation because

SBF sinks in water and naturally biodegrades, seafloor cleanup is technically difficult, and SBF has low toxicity. (BOEM 2017-009)

Chemical Spills

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

Oil Spills

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

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

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

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

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

Oil that is chemically dispersed at the surface move into the top six meters (20 feet) 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 a 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 activities proposed in this plan will be covered by Cantium's Regional Oil Spill Response Plan, which discusses potential response actions in more detail (refer to information submitted in **Section 9**).

There are no other IPFs (including emissions, physical disturbances to the seafloor, and wastes sent to shore for treatment or disposal) from the proposed activities 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 that could cause impacts to fisheries as a result of the proposed operations in Main Pass Block 38 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.

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.

Impact pile-driving during OCS construction and on-lease seismic activity are both temporally and spatially limited activities. The effects of these sound-producing activities would extend only to communities of fishes and invertebrates within a relatively small area. Benthic fishes and invertebrates could receive sound waves propagated through the water and sound waves propagated through the substrate. However, Wardle et al. (2001) found that, although fishes and invertebrates associated with a reef exhibited a brief startle response when exposed to pulsed low-frequency signals, disruption of diurnal patterns was not observed. Fishes disturbed by the noise were observed to resume their previous activity within 1-2 seconds and only exhibited flight response if the airguns were visible when discharged (Wardle et al., 2001). Other studies of fishes exposed to pulsed anthropogenic sound signals in natural environments have produced a wide range of results suggesting that species, experience, and motivation are very important factors, and indicating that habituation may occur (Engås et al., 1996; Løkkeborg et al., 2012; Popper et al., 2014). Organisms in close proximity to a pulsed sound source are at increased risk of barotrauma. A signal with a very rapid rise and peak pressures that vary substantially from the static pressure at the receiver's location can cause physiological injury or mortality (Popper et al., 2014). However, the range at which physiological injury may occur is short (<10 meters; <33 feet) and, given fish avoidance behavior, the potential for widespread impacts to populations as a result of physiological injury is negligible.

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

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

Pile-Driving
The proposed operations will utilize hydraulic hammer operations (pile-driving) to set four 48-inch piles. Cantium anticipates that it will take approximately 48 hours per pile for a total of eight days to drive the piles through layers of primarily sand and clay.

Cantium will monitor for marine life both before and during the proposed pile driving operations from a vantage point which will allow Cantium to monitor according to the 157-meter range noted in the National Marine Fisheries Service "Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico" (NMFS 2020), *Table 94, Additional distance over which the daily cumulative exposure to pile-driving sound can affect the hearing of sea turtles and sperm whales* (refer to information submitted in **Section A**).

Cantium will also adhere to requirements as set forth in Notices to Lessees and guidelines listed in **Section F**, **Section I**, and **Section L** of the Revised Development Operations Coordination Document, as applicable, to avoid or minimize impacts to any of the species listed in the ESA as a result of these operations.

Effluents: Effluents such as drilling fluids and cuttings discharges contain components and properties which are detrimental to fishery resources. Moderate petroleum and metal contamination of sediments and the water column can occur out to several hundred meters down-current from the discharge point. Offshore discharges are expected to disperse and dilute to very near background levels in the water column or on the seafloor within 3,000 meters of the discharge point and are expected to have negligible effect on fisheries. Additionally, an analysis of the best available information from the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico (NMFS, 2020) concludes that exposures to toxicants in discharges from oil and gas activities are not likely to adversely affect ESA-listed species.

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

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

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

An accidental oil spill has the potential to cause some detrimental effects on fisheries; however, it is unlikely that such an event would occur from the proposed activities (refer to **Item 5**, Water Quality). The effects of oil on mobile adult finfish or shellfish would likely be sublethal and the extent of damage would be reduced to the capacity of adult fish and shellfish to avoid the spill, to metabolize hydrocarbons, and to excrete both metabolites and parent compounds. The activities proposed in this plan will be covered by Cantium's Regional OSRP (refer to information submitted in **Section 9**).

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

7. Marine Mammals

The latest population estimates for the Gulf of Mexico revealed that cetaceans of the continental shelf and shelf-edge were almost exclusively bottlenose dolphin and Atlantic spotted dolphin. Squid eaters, including dwarf and pygmy killer whale, Risso's dolphin, rough-toothed dolphin, and Cuvier's beaked whale, occurred most frequently along the upper slope in areas outside of anticyclones. The Bryde's whale is the only commonly occurring baleen whale in the northern Gulf of Mexico and has been sighted off western Florida and in the De Soto Canyon region. Florida manatees have been sighted along the entire northern GOM but are mainly found in the shallow coastal waters of Florida, which are unassociated with the proposed actions. A complete list of all endangered and threatened marine mammals in the GOM may be found in **Table 1** at the beginning of this Environmental Impact Assessment. More information regarding the endangered Gulf of Mexico Bryde's whale can be found in **Item 20.1** below. Potential IPFs that could cause impacts to marine mammals as a result of the proposed operations in Main Pass Block 38 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 Bryde's whales. Therefore, we find that any disturbance that may result from aircraft associated with the proposed action is not likely to adversely affect ESA-listed whales.

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

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 marine mammals being subject to the increased noise level of a service vessel in very close proximity.

Pile-Driving

The proposed operations will utilize hydraulic hammer operations (pile-driving) to set four 48-inch piles. Cantium anticipates that it will take approximately 48 hours per pile for a total of eight days to drive the piles through layers of primarily sand and clay.

Exposure to sound from pile driving activities may result in temporary hearing loss or other behavioral responses in sperm whales, including some local displacement from the area for as long as the pile driving activity is occurring. An analysis of the best available information from the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion concludes that the potential impacts of this exposure are not anticipated to have adverse effects because sperm whales are expected to be moving and less likely to remain stationary during pile driving activities.

Cantium will monitor for marine life both before and during the proposed pile driving operations from a vantage point which will allow Cantium to monitor according to the 157-meter range noted in the National Marine Fisheries Service "Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico" (NMFS 2020), *Table 94, Additional distance over which the daily cumulative exposure to pile-driving sound can affect the hearing of sea turtles and sperm whales* (refer to information submitted in **Section A**).

Mid-frequency cetaceans (i.e. sperm whales) sound exposure thresholds in the "Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico" (NMFS 2020), *Table 61. Impulsive acoustic permanent threshold shift and temporary threshold shift onset criteria [to] the species groups considered in this consultation.,* show permanent hearing loss at 230 dB and temporary hearing loss at 224 dB. According to *Table 92, Sound source levels for different steel pile sizes used for offshore construction,* the peak sound level when driving 24-inch piles (the nearest available size comparison for these operations) is approximately 213 dB, which is below the limit for permanent hearing loss and temporary hearing loss.

Cantium will also adhere to requirements as set forth in Notices to Lessees and guidelines listed in **Section F**, **Section I**, and **Section L** of the Revised Development Operations Coordination Document, as applicable, to avoid or minimize impacts to any of the species listed in the ESA as a result of these operations.

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

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

Cantium 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. Cantium 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 Cantium management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

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

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

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

These proposed operations will not utilize moon pools to conduct activities.

Oil spills have the potential to cause sublethal oil-related injuries and spill-related deaths to marine mammals. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Oil spill response activities may increase vessel traffic in the area, which could impact cetacean behavior and/or distribution, thereby causing additional stress to the animals. The effect of oil dispersants on cetaceans is not known. Removing oil from the surface would reduce the likelihood of oil adhering to marine mammals. Laboratory experiments have shown that the dispersants used during the Deepwater Horizon response are cytotoxic to sperm whale cells; however, it is difficult to determine actual exposure levels in the GOM. Therefore, dispersants will only be used if approved by the Regional Response Team in coordination with the RRT Dispersant Plan and RRT Biological Assessment for Dispersants. The acute toxicity of oil dispersant chemicals included in Cantium'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 Cantium's OSRP (refer to information submitted in accordance with **Section 9**).

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

NMFS Protected Resources Contacts for the Gulf of Mexico:

- Marine mammals – Southeast emergency stranding hotline 1-877-433-8299

- Other endangered or threatened species – ESA section 7 consulting biologist: nmfs.ser.emergency.consult@noaa.gov

There are no other IPFs (including physical disturbances to the seafloor) from the proposed activities 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 that could cause impacts to sea turtles as a result of the proposed operations include emissions (noise / sound), effluents, discarded trash and debris, and accidents.

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

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

Pile-Driving
The proposed operations will utilize hydraulic hammer operations (pile-driving) to set four 48-inch piles. Cantium anticipates that it will take approximately 48 hours per pile for a total of eight days to drive the piles through layers of primarily sand and clay.

Cantium will monitor for marine life both before and during the proposed pile driving operations from a vantage point which will allow Cantium to monitor according to the 157-meter range noted in the National Marine Fisheries Service "Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico" (NMFS 2020), *Table 94, Additional distance over which the daily cumulative exposure to pile-driving sound can affect the hearing of sea turtles and sperm whales* (refer to information submitted in **Section A**).

Sea turtle sound exposure thresholds in the "Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico" (NMFS 2020), *Table 72. Sea turtle sound exposure thresholds,* show permanent hearing loss at 232 dB and temporary hearing loss at 226 dB. According to *Table 92, Sound source levels for different steel pile sizes used for offshore construction,* the peak sound level when driving 24-inch piles (the nearest available size comparison for these operations) is approximately 213 dB, which is below the limit for permanent hearing loss and temporary hearing loss.

Cantium will also adhere to requirements as set forth in Notices to Lessees and guidelines listed in **Section F**, **Section I**, and **Section L** of the Revised Development Operations Coordination Document, as applicable, to avoid or minimize impacts to any of the species listed in the ESA as a result of these operations.

Exposure to sound from pile driving activities may result in hearing loss and temporary loss of available habitat for sea turtles, including some local displacement from the area for as long as the pile driving activity is occurring. An analysis of the best available information from the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion concludes that the impact of this exposure is not anticipated to be significant for adult sea turtles because the continuous "banging" of a pile should provide ample warning to avoid the immediate pile-driving area. Juvenile sea turtles may be motivated to remain in *Sargassum* habitat and may not leave the area, which could cause hearing loss; the juveniles that do leave the area may be adversely affected by being displaced from *Sargassum* habitat. The annual number of predicted disturbances of oceanic juveniles is relatively low.

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

Discarded trash and debris: Both entanglement in, and ingestion of, debris have caused the death or serious injury of sea turtles (Balazs, 1985). The limited amount of marine debris, if any,

resulting from the proposed activities is not expected to substantially harm sea turtles. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies, including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

Cantium 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. Cantium 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 Cantium 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 will not utilize moon pools to conduct activities.

All sea turtle species and their life stages are vulnerable to the harmful effects of oil through direct contact or by fouling of their food. Exposure to oil can be fatal, particularly to juveniles and hatchlings. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Oil spill response activities may increase vessel traffic in the area, which could add to the possibility of collisions with sea turtles. The activities proposed in this plan will be covered by Cantium's Regional Oil Spill Response Plan (refer to information submitted in accordance with **Section 9**).

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

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

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

9. Air Quality

Potential IPFs that could cause impacts to air quality as a result of the proposed operations include accidents.

Main Pass Block 38 is located 14.2 miles from the Breton Wilderness Area and 13.8 miles from shore. Applicable emissions data is included in **Section 8** of the Plan.

There would be a limited degree of air quality degradation in the immediate vicinity of the proposed activities. Plan Emissions for the proposed activities do not exceed the annual exemption levels as set forth by BOEM. Accidents and blowouts can release hydrocarbons or chemicals, which could cause the emission of air pollutants. However, these releases would not impact onshore air quality because of the prevailing atmospheric conditions, emission height, emission rates, and the distance of Main Pass Block 38 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 activities that are likely to impact air quality.

10. Shipwreck Sites (known or potential)

In accordance with BOEM NTL 2005-G07, Cantium will submit an archaeological resource report per 30 CFR 550.194 if directed to do so by the Regional Director. Main Pass Block 38 is located in an area where historic shipwrecks may exist. An archaeological report was prepared by Gulf Ocean Services, Inc. and it was determined that there are no known historic shipwrecks located in the block. An archaeological report for Main Pass Block 38 was previously submitted and approved on February 14, 2020, EP (Control No. N-10097).

Potential IPFs that could cause impacts to known or unknown shipwreck sites as a result of the proposed operations in Main Pass Block 38 are disturbances to the seafloor and accidents. Should Cantium discover any evidence of a shipwreck, they will immediately halt operations within a 1000-foot radius, report to BOEM within 48 hours, and make every reasonable effort to preserve and protect that cultural resource.

Physical Disturbances to the seafloor: Main Pass Block 38 is located within the area designated by BOEM as high probability for occurrence of shipwrecks. Cantium will report to BOEM the discovery of any evidence of a shipwreck 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 activities (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by Cantium's Regional Oil Spill Response Plan (refer to information submitted in accordance with **Section 9**).

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

11. Prehistoric Archaeological Sites

In accordance with BOEM NTL 2005-G07, Cantium will submit an archaeological resource report per 30 CFR 550.194 if directed to do so by the Regional Director. An archaeological report for Main Pass Block 38 was previously submitted and approved on February 14, 2020, EP (Control No. N-10097).

Potential IPFs which could impact prehistoric archaeological sites as a result of the proposed operations in Main Pass Block 38 include physical disturbances to the seafloor and accidents. Main Pass Block 38 is located outside the Archaeological Prehistoric high probability line; therefore, no adverse impacts are expected. Should Cantium 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: Main Pass Block 38 is not located in or adjacent to an OCS block designated by BOEM as having a high probability for occurrence of archaeological sites; therefore, no adverse impacts are expected.

Accidents: An accidental oil spill has the potential to cause some detrimental effects to prehistoric archaeological sites if the release were to occur subsea. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by Cantium's Regional Oil Spill Response Plan (refer to information submitted in accordance with **Section 9**).

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

Vicinity of Offshore Location

12. Essential Fish Habitat (EFH)

Potential IPFs that could cause impacts to EFH as a result of the proposed operations in Main Pass Block 38 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. Therefore, the bottom disturbing activities from the proposed operations would have a negligible impact on EFH.

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

Accidents: An accidental oil spill has the potential to cause some detrimental effects on EFH. Oil spills that contact coastal bays and estuaries, as well as OCS waters when pelagic eggs and larvae are present, have the greatest potential to affect fisheries. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by Cantium's Regional OSRP (refer to information submitted in **Section 9**).

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

13. Marine and Pelagic Birds

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

Emissions:

Air Emissions

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

Noise / Sound Emissions

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

The use of explosives for decommissioning activities may potentially kill one or more birds from barotrauma if a bird (or several birds because birds may occur in a flock) is present at the location of the severance. For the impact of underwater sound, a threshold of 202 dB sound exposure level (SEL) for injury and 208 dB SEL for barotrauma was recommended for the Brahyramphus marmoratus, a diving seabird (USDOI, FWS, 2011). However, the use of explosive severance of facilities for decommissioning are not included in these proposed operations, therefore these impacts are not expected.

Accidents: An oil spill would cause localized, low-level petroleum hydrocarbon contamination. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Marine and pelagic birds feeding at the spill location may experience chronic, nonfatal, physiological stress. It is expected that few, if any, coastal and marine birds would

actually be affected to that extent. The activities proposed in this plan will be covered by Cantium's Regional OSRP (refer to information submitted in **Section 9**).

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

Cantium 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. Cantium 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 Cantium management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE. Debris, if any, from these proposed activities will seldom interact with marine and pelagic birds; therefore, the effects will be negligible.

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

There are no other IPFs (including effluents, physical disturbances to the seafloor, and wastes sent to shore for treatment or disposal) from the proposed activities 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 releases) from the proposed activities which could cause impacts to public health and safety. In accordance with

NTL No.'s 2008-G04, 2009-G27, and 2009-G31, sufficient information is included in **Section 4** to justify our request that our proposed activities be classified by BSEE as H_2S absent.

Coastal and Onshore

15. Beaches

Potential IPFs from the proposed activities that could cause impacts to beaches 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 response capabilities that would be implemented, no significant adverse impacts are expected. The activities proposed in this plan will be covered by Cantium's Regional OSRP (refer to information submitted in **Section 9**).

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

Cantium 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. Cantium 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 Cantium 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 activities that are likely to impact beaches.

16. Wetlands

Salt marshes and seagrass beds fringe the coastal areas of the Gulf of Mexico. Due to the distance from shore (13.8 miles), accidents and discarded trash and debris represent IPFs which could impact these resources.

Accidents: Level of impact from an oil spill will depend on oil concentrations contacting vegetation, type of oil spilled, types of vegetation affected, season of the year, pre-existing stress level of the vegetation, soil types, and numerous other factors. Light-oiling impacts will cause plant die-back with recovery within two growing seasons without artificial replanting. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water quality). If a spill were to occur, response capabilities as outlined in Cantium's Regional OSRP (refer to information submitted in **Section 9**) would be implemented.

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

Cantium 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. Cantium 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 Cantium 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 activities that are likely to impact wetlands.

17. Shore Birds and Coastal Nesting Birds

Breton National Wildlife Refuge (14.2 miles from Main Pass Block 38) is a highly productive habitat for wildlife. Thousands of shore birds use the refuge as a wintering area. Also, wading birds nest on the refuge. The NWR provides habitat for colonies of nesting wading birds and seabirds as well as wintering shorebirds and waterfowl. The most abundant nesters are brown pelicans, laughing gulls, and royal, Caspian, and sandwich terns. Potential IPFs from the proposed activities that could cause impacts to shore birds and coastal nesting birds include accidents and discarded trash and debris.

Accidents: Oil spills could cause impacts to shore birds and coastal nesting birds. The birds most vulnerable to direct effects of oiling include those species that spend most of their time swimming on and under the sea surface, and often aggregate in dense flocks (Piatt et al., 1990; Vauk et al., 1989). Coastal birds, including shorebirds, waders, marsh birds, and certain waterfowl, may be the hardest hit indirectly through destruction of their feeding habitat and/or food source (Hansen, 198l; Vermeer and Vermeer, 1975). Direct oiling of coastal birds and certain seabirds is usually minor; many of these birds are merely stained as a result of their foraging behaviors. Birds can ingest oil when feeding on contaminated food items or drinking contaminated water.

Oil-spill cleanup operations will result in additional disturbance of coastal birds after a spill. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water quality). Due to the distance from shore (13.8 miles), Cantium would immediately implement the response capabilities outlined in their Regional OSRP (refer to information submitted in **Section 9**).

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).

Cantium 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. Cantium 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 Cantium 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 activities that are likely to impact shore birds and coastal nesting birds.

18. Coastal Wildlife Refuges

Main Pass Block 38 is approximately 14.2 miles from the Breton National Wildlife Refuge. Management goals of the NWR are waterfowl habitat management, marsh restoration, providing sanctuary for nesting and wintering seabirds, and providing sandy beach habitat for a variety of wildlife species. Potential IPFs from the proposed activities that could cause impacts to this coastal wildlife refuge are accidents and discarded trash and debris.

Impacts to shore birds and coastal nesting birds and to the beach are discussed in **Items 15 and 17**. Other wildlife species found on the refuges include nutria, rabbits, raccoons, alligators, and loggerhead turtles. Impacts to loggerhead turtles are discussed in **Item 20.5**.

Accidents: It is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water quality). Due to the response capabilities that would be implemented, no impacts are expected. The activities proposed in this plan will be covered by Cantium's Regional OSRP (refer to information submitted in **Section 9**).

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

Cantium 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. Cantium 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 Cantium 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 activities that are likely to impact coastal wildlife refuges.

19. Wilderness Areas

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

Accidents: An accidental oil spill from the proposed activities could cause impacts to wilderness areas. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Due to the distance from the nearest designated Wilderness Area (14.2 miles) and the response capabilities that would be implemented, no significant adverse impacts are expected. The activities proposed in this plan will be covered by Cantium's Regional OSRP (refer to information submitted in **Section 9).**

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

Cantium 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. Cantium 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 Cantium 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 activities that are likely to impact wilderness areas.

20. Other Environmental Resources Identified

20.1 – Bryde's Whale

The 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 Bryde's whale area is over 41 miles from the proposed operations. Additionally, vessel traffic associated with the proposed operations will not flow through the Bryde's whale area. Therefore, there are no IPFs from the proposed activities that are likely to impact the Bryde'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 from the proposed activities that could cause impacts to the Gulf sturgeon include accidents, emissions (noise / sound), and discarded trash and debris. Additional information on ESA-listed fish may be found in **Item 6**.

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

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

Should an ESA-listed fish (e.g. giant manta ray, oceanic whitetip shark, or Gulf sturgeon) be entrapped, entangled, or injured, personnel should contact the ESA Section 7 biologist at (301) 427-8413 (nmfs.psoreview@noaa.gov) and report all incidents to takereport.nmfsser@noaa.gov. After making the appropriate notifications, Cantium 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 (50 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 activities proposed in this plan will be covered by Cantium's Regional OSRP (refer to information submitted in **Section 9)**.

Emissions (noise / sound): All routine OCS oil-and gas-related activities have some element of sound generation. Common sound sources include propeller cavitation, rotating machinery, and reciprocating machinery, which are associated with routine OCS oil-and gas-related activities such as vessel traffic, drilling, construction, and oil and gas production, processing, and transport. Sound introduced into the marine environment as a result of human activities has the potential to affect marine organisms**.** The National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion found that construction and operational sounds other than pile driving will have insignificant effects on Gulf sturgeon (NMFS, 2020). Although pile driving operations will be conducted as previously noted, due to the distance from the nearest identified Gulf sturgeon critical habitat (50 miles, using the closest area / block location as a measuring point; Main Pass Block 38) sound emissions from pile driving are not expected to impact Gulf sturgeons.

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

Cantium 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. Cantium 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 Cantium 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 activities 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. IPFs that could cause impacts to

oceanic whitetip sharks as a result of the proposed operations in Main Pass Block 38 include accidents. Additional information on ESA-listed fish may be found in **Item 6**.

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

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

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

There is little information available on the impacts of oil spills or dispersants on oceanic whitetip sharks. It is expected that exposure of oil or dispersants to oceanic whitetip sharks would likely result in effects similar to other marine species, including fitness reduction and the possibility of mortality (NMFS, 2020). Due to the sparse population in the Gulf of Mexico, it is possible that a small number of oceanic whitetip sharks could be impacted by an oil spill. However, it is unlikely that such an event would occur from the proposed activities (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by Cantium's Regional OSRP (refer to information submitted in **Section 9**).

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

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

Cantium 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. Cantium 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 Cantium 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 activities 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. IPFs that could cause impacts to giant manta rays as a result of the proposed operations in Main Pass Block 38 include accidents. Additional information on ESA-listed fish may be found in **Item 6**.

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

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

Should an ESA-listed fish (e.g. giant manta ray, oceanic whitetip shark, or Gulf sturgeon) be entrapped, entangled, or injured, personnel should contact the ESA Section 7 biologist at (301) 427-8413 (nmfs.psoreview@noaa.gov) and report all incidents to takereport.nmfsser@noaa.gov. After making the appropriate notifications, Cantium 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 (208.1 miles), the low population dispersed throughout the Gulf of Mexico, and the response capabilities that would be implemented during a spill, no significant adverse impacts are

expected to impact giant manta rays. Additionally, it is unlikely that such an event would occur from the proposed activities (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by Cantium's Regional OSRP (refer to information submitted in **Section 9**).

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

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

Cantium 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. Cantium 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 Cantium 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 activities that are likely to impact giant manta rays.

20.5 – Loggerhead Sea Turtle

The loggerhead sea turtles are large sea turtles that inhabit continental shelf and estuarine environments throughout the temperate and tropical regions of the Atlantic Ocean, with nesting

beaches along the northern and western Gulf of Mexico. NMFS issued a Final Rule in 2014 (79 FR 39855) designating a critical habitat including 38 marine areas within the Northwest Atlantic Ocean, with seven of those areas residing within the Gulf of Mexico. These areas contain one or a combination of habitat types: nearshore reproductive habitats, winter areas, breeding areas, constricted migratory corridors, and/or *Sargassum* habitats.

There are multiple IPFs that may impact loggerhead sea turtles (see **Item 8**). However, the closest loggerhead critical habitat is located 56.4 miles from Main Pass Block 38; therefore, no adverse impacts are expected to the critical habitat. Additionally, considering the information from the National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Biological Opinion, we do not expect proposed operations to affect the ability of *Sargassum* to support adequate prey abundance and cover for loggerhead turtles.

20.6 - Protected Corals

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

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills cause damage to corals only if the oil contacts the organisms. Due to the distance from the Flower Garden Banks (208.1 miles) and other critical coral habitats, no adverse impacts are expected. The activities proposed in this plan will be covered by Cantium's Regional OSRP (refer to information submitted in **Section 9**).

There are no other IPFs (including emissions, effluents, physical disturbances to the seafloor, and wastes sent to shore for treatment or disposal) from the proposed activities 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 Main Pass Block 38 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 activities proposed in this plan.

(C) IMPACTS ON PROPOSED ACTIVITIES

The site–specific environmental conditions have been taken into account for the proposed activities. No impacts are expected on the proposed activities from site-specific environmental conditions.

(D) ENVIRONMENTAL HAZARDS

During the hurricane season, June through November, the Gulf of Mexico is impacted by an average of ten tropical storms (39-73 mph winds), of which six become hurricanes (> 74 mph winds). Due to its location in the Gulf, Main Pass Block 38 may experience hurricane and tropical storm force winds and related sea currents. These factors can adversely impact the integrity of the operations covered by this plan. A significant storm may present physical hazards to operators and vessels, damage exploration or production equipment, or result in the release of hazardous materials (including hydrocarbons). Additionally, the displacement of equipment may disrupt the local benthic habitat and pose a threat to local species.

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

1. Drilling & completion
    a. Secure well
    b. Secure rig / platform
    c. Evacuate personnel

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

2. Platform / Structure Installation

    Operator will not conduct platform / structure installation operations during Tropical Storm or Hurricane threat.

3. Pipeline Installation

Operator will not conduct pipeline installation operations during Tropical Storm or Hurricane threat.

(E) ALTERNATIVES

No alternatives to the proposed activities 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 activities. Therefore, a list of such entities has not been provided.

(H) PREPARER(S)

Jami Christley
J. Connor Consulting, Inc.
19219 Katy Freeway, Suite 200
Houston, Texas 77094
281-578-3388
jami.christley@jccteam.com

(I) REFERENCES

Authors:

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.

GOM Central and Western Planning Areas Sales 166 and 168 Final Environmental Impact Statement. BOEM 96-0058.

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)

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 northen 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 18
ADMINISTRATIVE INFORMATION

18.1 EXEMPTED INFORMATION DESCRIPTION

The proposed bottomhole locations of the planned wells have been removed from the Public Information copy of the DOCD as well as any discussions of the target objectives, geologic or geophysical data, and interpreted geology.

18.2 BIBLIOGRAPHY

1. Initial Exploration Plan (Control No. N-10097).
2. Revised Development Operations Coordination Document (Control No. R-6939)
3. Gulf Ocean Services, Inc., Archaeological and Hazard Report, Shallow Hazard Survey, Main Pass Area, Block 38, OCS-G 01623, #19-1104