United States Government Memorandum February 2, 2021

To: Public Information

From: Plan Coordinator, OLP, Plans Section (GM235D)

Subject: Public Information Copy of Plan

Control# - N-10139

Type - Initial Exploration Plan

Lease(s) - OCS-G 35308 Block - 36 Mississippi Canyon Area
OCS-G 35309 Block - 37 Mississippi Canyon Area
OCS-G 35311 Block - 80 Mississippi Canyon Area

Operator - Anadarko Petroleum Corporation

Description - Wells CA, C-AA, C-AAA, C-AAAA, C-B, C-BB, C-C, C-CC, C-D, C-DD, C-DDD, C-DDDD, C-E, C-EE, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, G-HH, C-I, C-II, C-J, C-JJ, P-A, P-AA, PB, P-BB, P-C, P-CC, P-D, P-DD, PE, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH, P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, PLL, P-M, P-MM

Attached is a copy of the subject plan for public comments on issues that should be addressed in an Environmental Assessment.

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

Nicole Martinez

Plan Coordinator

PUBLIC

INITIAL EXPLORATION PLAN

MISSISSIPPI CANYON BLOCKS 36, 37 and 80
OCS-G35308, G35309 and G35311

OFFSHORE, ALABAMA

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, Texas 77380
Contact: Bridget O'Farrell
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(832) 636-1694

1 – Hard Copy Confidential
1 – CD Confidential
1 – Hard Copy Public Information
1 – CDs Public Information

December 2020

INITIAL EXPLORATION PLAN
LEASE OCS-G35308, G35309 and G35311
MISSISSIPPI CANYON BLOCKS 36, 37 and 80

SECTION A
PLAN CONTENTS

(a) Plan Information Form

Under this Initial Exploration Plan (EP), Anadarko Petroleum Corporation (Anadarko) proposes to drill and complete 52 wells total:

- **Mississippi Canyon (MC) 36:** C-A*, C-AA*, C-B, C-BB, C-C, C-CC, C-D*, C-DDD, C-DDDD, C-E, C-EE (Cactus Bowl); P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH (Peach Bowl)
  * MC 37 surface location
- Mississippi Canyon (MC) 37: C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J, C-JJ (Cactus Bowl)
- Mississippi Canyon (MC) 80: P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM (Peach Bowl)

The wells will be drilled using either a Dynamically Positioned (DP) Drillship or DP Semisubmersible drilling rig. Drilling and completion operations for the proposed well locations will utilize a Subsea BOP stack.

There will be no pipe driving activities or new pipelines expected to make landfall under this Initial EP.

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

(b) Location

Enclosed as **Attachment A-2** is a well location plat at a scale of 1" = 2,000' that depicts the surface location and water depth of the proposed wells.

(c) Safety and Pollution Prevention Features

Safety features on the drilling unit will include well control, pollution prevention, safe welding procedures, and blowout prevention equipment as described in Title 30 CFR Part 250, Subparts C, D, E, G and O; and as further clarified by BOEM Notices to Lessees, and applicable regulations of the Environmental Protection Agency and the U.S. Coast Guard. The appropriate life rafts, life jackets, ring buoys, etc., as prescribed by the U.S. Coast Guard, will be maintained on the facility at all times.

(d) Storage Tanks and Production Vessels

The proposed wells will be drilled with either a DP drillship or DP semisubmersible unit. The storage tanks represented below reflect the largest tank capacities from MODU's under contract. Another MODU or vessel may be utilized during operations, but will have a total storage tank capacity equal to or less than the following:

Type of Facility	Type of Storage Tank	Tank Capacity	Number of Tanks	Total Capacity	Fluid Gravity (API)	Total Capacity of all Tanks for Rig Type
Drillship	Hydrocarbons/Fuel Oil Storage Tank	5,514 bbls	2	11,028 bbls	No. 2 Diesel/ varies	**12 tanks total= 62,874 bbls**
	Hydrocarbons/Fuel Oil Storage Tank	12,458 bbls	2	24,916 bbls	No. 2 Diesel/ varies	
	Hydrocarbons/Fuel Oil Storage Tank	12,065 bbls	2	24,130 bbls	No. 2 Diesel/ varies	
	Fuel Oil Settling Tanks	640 bbls	2	1,280 bbls	No. 2 Diesel	
	Fuel Oil Service Tanks	480 bbls	3	1,440 bbls	No. 2 Diesel	
	Fuel Oil Emergency Generator Tank	80 bbls	1	80 bbls	No. 2 Diesel	
DP Semi	Hydrocarbon/Fuel Oil Hull Tanks	4,541 bbls	2	9,082 bbls	No. 2 Diesel/ varies	**7 tanks total= 16,689 bbls**
	Hydrocarbon/Fuel Oil Hull Tanks	3,392 bbls	2	6,784 bbls	No. 2 Diesel/ varies	
	Fuel Oil Deck Day Tank	629 bbls	1	629 bbls	No. 2 Diesel	
	Fuel Oil Deck Settling Tank	164 bbls	1	164 bbls	No. 2 Diesel	
	Fuel Oil Emergency Generator	30 bbls	1	30 bbls	No. 2 Diesel	

(e) Pollution Prevention Measures

The drilling rig utilized for these operations will comply with all applicable regulations regarding pollution prevention and control. The rig has a Shipboard Oil Pollution Emergency Plan (SOPEP), which is reviewed and approved annually by the American Bureau of Shipping (ABS). The SOPEP is provided to assist employees in dealing with an unexpected discharge of oil. Its primary purpose is to set in motion the necessary actions to stop or minimize the discharge of oil and to mitigate its effects. Effective planning ensures that the necessary actions are taken in a structured, logical and timely manner.

Pollution prevention measures include installation of curbs, gutters, drip pans, and drains on deck areas to collect all contaminants and debris. Most deck drains and some of the joints at the edge of the rig floor go overboard or into the moonpool, respectively. To prevent ocean discharge from the drains there is a dedicated drip pan under the rotary table. The pipe racks, mud pump room, sack store, and drill floor drains go to a holding tank, which is served by a dedicated oily water separator. The well test area, engine room, and other major machinery spaces drains all go to slops tanks, which are served by a large general-service, oily water separator. The containment devices are temporary. They are not meant for permanent storage of waste. On the rare occasion that they contain wastes, they are pumped, mopped, or cleaned within a short period of time. The chances of damage to a containment structure during such time as it contains wastes are exceedingly small.

(f) Additional Pollution Prevention Measures

No additional measures are proposed under this Initial EP. The activities proposed in this Initial EP are not located offshore Florida.

(g) Description of Previously Approved Lease Activities

MC 36:
Anadarko has no previously approved well locations in MC 36.

MC 37:
Anadarko has no previously approved well locations in MC 37.

MC 80:
Anadarko previously obtained approval for the following well locations under an Initial EP that includes MC 80 (Plan Control No.: N-10117):

Well Location	Status of Well Location	Potential Future Operations
A	Approved well location for future utility	Future drill location
AA	Approved well location for future utility	Future drill location
B	Approved well location for future utility	Future drill location
BB	Approved well location for future utility	Future drill location
C	Approved well location for future utility	Future drill location
CC	Approved well location for future utility	Future drill location
D	Approved well location for future utility	Future drill location
DD	Approved well location for future utility	Future drill location
E	Approved well location for future utility	Future drill location
EE	Approved well location for future utility	Future drill location
F	Approved well location for future utility	Future drill location
FF	Approved well location for future utility	Future drill location

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

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

OCS PLAN INFORMATION FORM

General Information

Type of OCS Plan:	X	Exploration Plan (EP)	Development Operations Coordination Document (DOCD)	
Company Name: Anadarko Petroleum Corporation			BOEM Operator Number: 00981	
Address:			Contact Person: Bridget O'Farrell	
1201 Lake Robbins Drive			Phone Number: 832-636-1694	
The Woodlands, TX 77380			E-Mail Address: Bridget_OFarrell-Villarreal@oxy.com	
If a service fee is required under 30 CFR 550.125(a), provide the	Amount paid	See Pay.gov Receipts (6)	Receipt No. *6 receipts total*	26QHDJFR,26QJUVAE,26QKNNER,26QKI715,26QKNNH5, 26QGFEA5

Project and Worst Case Discharge (WCD) Information

Lease(s): G35308,G35309,G35311	Area: MC	Block: 36,37,80	Project Name (If Applicable): Cactus Bowl/Peach Bowl
Objective(s): X Oil, X Gas, Sulphur, Salt			Onshore Support Base(s): Fourchon, Broussard, Houma, Lake Charles LA; Galveston TX
Platform/Well Name: MC 126 Y	Total Volume of WCD: 371,735 bopd		API Gravity: 33.1
Distance to Closest Land (Miles): 51.6 (MC 36/37);53 (MC 80 & N-10029)	Volume from uncontrolled blowout: 33,827,885 bbls		

Question		Yes		No
Have you previously provided information to verify the calculations and assumptions for your WCD?	X	Yes		No
If so, provide the Control Number of the EP or DOCD with which this information was provided	N-10029, MC 126 highest WCD for area			
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
See attached activity schedule			

Description of Drilling Rig

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

Drilling Rig Name (If Known):

Description of Structure

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

Description of Lease Term Pipelines

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

Attachment A-1
Cactus Bowl/Peach Bowl Initial EP Proposed Activity Schedule MC 36, 37, 80

Surface Location MC 36	Start Date	End Date	No. of Days
Drill, Complete & Conduct Flowtest Well Location MC 36 C-B	6/20/2021	9/3/2021	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-A	10/1/2021	12/15/2021	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 C-C	5/1/2022	7/15/2022	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-AA	10/15/2022	12/29/2022	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-B	5/1/2023	7/15/2023	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 C-BB	10/15/2023	12/29/2023	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-BB	5/1/2024	7/15/2024	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-C	10/15/2024	12/29/2024	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 C-CC	5/1/2025	7/15/2025	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-CC	10/15/2025	12/29/2025	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-D	5/1/2026	7/15/2026	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 C-DDD	10/15/2026	12/29/2026	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-DD	5/1/2027	7/15/2027	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 C-DDDD	10/15/2027	12/29/2027	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-E	5/1/2028	7/15/2028	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 C-E	10/15/2028	12/29/2028	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-EE	5/1/2029	7/15/2029	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 C-EE	10/15/2029	12/29/2029	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-F	5/1/2030	7/15/2030	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-FF	10/15/2030	12/29/2030	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-G	5/1/2031	7/15/2031	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-GG	10/15/2031	12/29/2031	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-H	5/1/2032	7/15/2032	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 P-HH	10/15/2032	12/29/2032	75 days

Surface Location MC 37	Start Date	End Date	No. of Days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-AAA	3/24/2021	6/7/2021	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 C-A **MC 37 surface*	8/1/2021	10/15/2021	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-DD	1/1/2022	3/17/2022	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-EEE	7/20/2022	10/3/2022	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-EEEE	1/1/2023	3/17/2023	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-F	7/20/2023	10/3/2023	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-FF	1/1/2024	3/17/2024	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-G	7/20/2024	10/3/2024	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-GG	1/1/2025	3/17/2025	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-H	7/20/2025	10/3/2025	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-HH	1/1/2026	3/17/2026	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-I	7/20/2026	10/3/2026	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-II	1/1/2027	3/17/2027	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-J	7/20/2027	10/3/2027	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-JJ	1/1/2028	3/17/2028	75 days
Drill, Complete & Conduct Flowtest Well Location MC 37 C-AAAA	7/20/2028	10/3/2028	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 C-AA **MC 37 surface*	7/20/2029	10/3/2029	75 days
Drill, Complete & Conduct Flowtest Well Location MC 36 C-D ** MC 37 surface*	7/20/2030	10/3/2030	75 days

Surface Location MC 80	Start Date	End Date	No. of Days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-I	4/1/2021	6/15/2021	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-II	4/1/2022	6/15/2022	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-J	4/1/2023	6/15/2023	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-JJ	4/1/2024	6/15/2024	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-K	4/1/2025	6/15/2025	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-KK	4/1/2026	6/15/2026	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-L	4/1/2027	6/15/2027	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-LL	4/1/2028	6/15/2028	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-M	4/1/2029	6/15/2029	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-MM	4/1/2030	6/15/2030	75 days

Attachment A-1

Cactus Bowl

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

<table>
<tr><th colspan="6">Proposed Well/Structure Location</th></tr>
<tr><td colspan="2">Well or Structure Name/Number (If renaming well or structure, reference previous name): MC 36 C-A</td><td colspan="2">Previously reviewed under an approved EP or DOCD?</td><td>Yes</td><td>X No</td></tr>
<tr><td colspan="2">Is this an existing well or structure? Yes ; No X</td><td colspan="2">If this is an existing well or structure, list the Complex ID or API No.</td><td colspan="2">N/A</td></tr>
<tr><td colspan="4">Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?</td><td>X Yes</td><td>No</td></tr>
<tr><td>WCD info</td><td>For wells, volume of uncontrolled blowout (Bbls/day): N/A</td><td colspan="2">For structures, volume of all storage and pipelines (Bbls): N/A</td><td>API Gravity of fluid</td><td>N/A</td></tr>
<tr><td></td><td>Surface Location</td><td colspan="2">Bottom-Hole Location (For Wells)</td><td colspan="2">Completion (For multiple completions, enter separate lines)</td></tr>
<tr><td>Lease No.</td><td>OCS G35309</td><td colspan="2">OCS</td><td colspan="2">OCS
OCS</td></tr>
<tr><td>Area Name</td><td>MC</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Block No.</td><td>37</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td rowspan="2">Blockline Departures (in feet)</td><td>N/S Departure: F____ L
2,260 FNL</td><td colspan="2">N/S Departure: F____ L</td><td colspan="2">N/S Departure: F____ L
N/S Departure: F____ L
N/S Departure: F____ L</td></tr>
<tr><td>E/W Departure: F____ L
3,480 FWL</td><td colspan="2">E/W Departure: F____ L</td><td colspan="2">E/W Departure: F____ L
E/W Departure: F____ L
E/W Departure: F____ L</td></tr>
<tr><td rowspan="2">Lambert X-Y coordinates</td><td>X:
1,270,680.00</td><td colspan="2">X:</td><td colspan="2">X:
X:
X:</td></tr>
<tr><td>Y:
10,515,500.00</td><td colspan="2">Y:</td><td colspan="2">Y:
Y:
Y:</td></tr>
<tr><td rowspan="2">Latitude/ Longitude</td><td>Latitude
28.97084601</td><td colspan="2">Latitude</td><td colspan="2">Latitude
Latitude
Latitude</td></tr>
<tr><td>Longitude
-88.15665440</td><td colspan="2">Longitude</td><td colspan="2">Longitude
Longitude
Longitude</td></tr>
<tr><td colspan="2">Water Depth (Feet):
3,686</td><td>MD (Feet):</td><td>TVD (Feet):</td><td rowspan="2">MD (Feet):
MD (Feet):
MD (Feet):</td><td rowspan="2">TVD (Feet):
TVD (Feet):
TVD (Feet):</td></tr>
<tr><td colspan="3">Anchor Radius (if applicable) in feet:</td><td>N/A-DP Drillship or DP Semi</td></tr>
</table>

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): MC 36 C-AA		Previously reviewed under an approved EP or DOCD?			Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?				X	Yes		No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid	N/A	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35309	OCS	OCS OCS
Area Name	MC		
Block No.	37		
Blockline Departures (in feet)	N/S Departure: F____ L 2,310 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 3,480 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,270,680	X:	X: X: X:
	Y: 10,515,450	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.97070848	Latitude	Latitude Latitude Latitude
	Longitude -88.15665287	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,688	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 C-B	Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No. N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No	

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 4,040 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 375 FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,266,825	X:	X: X: X:
	Y: 10,513,720	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.96584559	Latitude	Latitude Latitude Latitude
	Longitude -88.16865700	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,429	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 C-BB	Previously reviewed under an approved EP or DOCD?		Yes	X	No

Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No		

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 324,049	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	40.0

	Surface Location	Bottom-Hole Location (For Wells)	Completion (For multiple completions, enter separate lines)
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 4,090 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 375 FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,266,825	X:	X: X: X:
	Y: 10,513,670	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.96570806	Latitude	Latitude Latitude Latitude
	Longitude -88.16865546	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,431	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 C-C			Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A		
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?					X	Yes	No

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location		**Bottom-Hole Location (For Wells)**		**Completion (For multiple completions, enter separate lines)**	
Lease No.	OCS G35308		OCS		OCS OCS	
Area Name	MC					
Block No.	36					
Blockline Departures (in feet)	N/S Departure: F____ L 4,822 FNL		N/S Departure: F____ L		N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L	
	E/W Departure: F____ L 200 FEL		E/W Departure: F____ L		E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L	
Lambert X-Y coordinates	X: 1,267,000		X:		X: X: X:	
	Y: 10,512,938		Y:		Y: Y: Y:	
Latitude/ Longitude	Latitude 28.96369924		Latitude		Latitude Latitude Latitude	
	Longitude -88.16808552		Longitude		Longitude Longitude Longitude	
Water Depth (Feet): 3,463			MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:		N/A-DP Drillship or DP Semi				

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): MC 36 C-CC		Previously reviewed under an approved EP or DOCD?			Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?					X	Yes	No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid	N/A	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 4,772 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 200 FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,267,000	X:	X: X: X:
	Y: 10,512,988	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.96383686	Latitude	Latitude Latitude Latitude
	Longitude -88.16808706	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,462	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 C-D			Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A		
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?				X	Yes		No

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35309	OCS	OCS OCS
Area Name	MC		
Block No.	37		
Blockline Departures (in feet)	N/S Departure: F____ L 6,823 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 100 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,267,300	X:	X: X: X:
	Y: 10,510,937	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.95820339	Latitude	Latitude Latitude Latitude
	Longitude -88.16708551	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,508	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 C-DDD	Previously reviewed under an approved EP or DOCD?		Yes	X	No

Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A

Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 6,873 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 200 FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,267,000	X:	X: X: X:
	Y: 10,510,887	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.95805771	Latitude	Latitude Latitude Latitude
	Longitude -88.16802219	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,495	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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

<table>
<tr><th colspan="9">Proposed Well/Structure Location</th></tr>
<tr><td colspan="4">Well or Structure Name/Number (If renaming well or structure, reference previous name): MC 36 C-DDDD</td><td colspan="2">Previously reviewed under an approved EP or DOCD?</td><td>Yes</td><td>X</td><td>No</td></tr>
<tr><td>Is this an existing well or structure?</td><td></td><td>Yes</td><td>No X</td><td colspan="2">If this is an existing well or structure, list the Complex ID or API No.</td><td colspan="3">N/A</td></tr>
<tr><td colspan="6">Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?</td><td>X</td><td>Yes</td><td>No</td></tr>
<tr><td>WCD info</td><td colspan="2">For wells, volume of uncontrolled blowout (Bbls/day): N/A</td><td colspan="2">For structures, volume of all storage and pipelines (Bbls): N/A</td><td colspan="2">API Gravity of fluid</td><td colspan="2">N/A</td></tr>
<tr><td></td><td colspan="2">Surface Location</td><td colspan="3">Bottom-Hole Location (For Wells)</td><td colspan="3">Completion (For multiple completions, enter separate lines)</td></tr>
<tr><td>Lease No.</td><td colspan="2">OCS
G35308</td><td colspan="3">OCS</td><td colspan="3">OCS
OCS</td></tr>
<tr><td>Area Name</td><td colspan="2">MC</td><td colspan="3"></td><td colspan="3"></td></tr>
<tr><td>Block No.</td><td colspan="2">36</td><td colspan="3"></td><td colspan="3"></td></tr>
<tr><td rowspan="2">Blockline Departures (in feet)</td><td colspan="2">N/S Departure: F____ L
6,923 FNL</td><td colspan="3">N/S Departure: F____ L</td><td colspan="3">N/S Departure: F____ L
N/S Departure: F____ L
N/S Departure: F____ L</td></tr>
<tr><td colspan="2">E/W Departure: F____ L
200 FEL</td><td colspan="3">E/W Departure: F____ L</td><td colspan="3">E/W Departure: F____ L
E/W Departure: F____ L
E/W Departure: F____ L</td></tr>
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X:
X:</td></tr>
<tr><td colspan="2">Y:
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Y:
Y:</td></tr>
<tr><td rowspan="2">Latitude/ Longitude</td><td colspan="2">Latitude
28.95792018</td><td colspan="3">Latitude</td><td colspan="3">Latitude
Latitude
Latitude</td></tr>
<tr><td colspan="2">Longitude
-88.16802065</td><td colspan="3">Longitude</td><td colspan="3">Longitude
Longitude
Longitude</td></tr>
<tr><td colspan="3">Water Depth (Feet):
3,496</td><td>MD (Feet):</td><td colspan="2">TVD (Feet):</td><td rowspan="2" colspan="2">MD (Feet):
MD (Feet):
MD (Feet):</td><td rowspan="2">TVD (Feet):
TVD (Feet):
TVD (Feet):</td></tr>
<tr><td colspan="4">Anchor Radius (if applicable) in feet:</td><td colspan="2">N/A-DP Drillship or DP Semi</td></tr>
</table>

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): MC 36 C-E			Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A		
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?				X	Yes		No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid	N/A	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 7,030 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 100 FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,267,100	X:	X: X: X:
	Y: 10,508,950	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.95273238	Latitude	Latitude Latitude Latitude
	Longitude -88.16764968	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,509	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 C-EE		Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?				X	Yes	No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid	N/A	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 6,980 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 100 FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,267,100	X:	X: X: X:
	Y: 10,508,900	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.95259484	Latitude	Latitude Latitude Latitude
	Longitude -88.16764813	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,509	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 37 C-AAA		Previously reviewed under an approved EP or DOCD?			Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.		N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?				X	Yes		No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid		N/A

	Surface Location		**Bottom-Hole Location (For Wells)**		**Completion (For multiple completions, enter separate lines)**	
Lease No.	OCS G35309		OCS		OCS OCS	
Area Name	MC					
Block No.	37					
Blockline Departures (in feet)	N/S Departure: F____ L 2,360 FNL		N/S Departure: F____ L		N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L	
	E/W Departure: F____ L 3,480 FWL		E/W Departure: F____ L		E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L	
Lambert X-Y coordinates	X: 1,270,680		X:		X: X: X:	
	Y: 10,515,400		Y:		Y: Y: Y:	
Latitude/ Longitude	Latitude 28.97057094		Latitude		Latitude Latitude Latitude	
	Longitude -88.15665134		Longitude		Longitude Longitude Longitude	
Water Depth (Feet): 3,690			MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:			N/A-DP Drillship or DP Semi			

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): MC 37 C-AAAA	Previously reviewed under an approved EP or DOCD?		Yes	X	No

Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A

Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35309	OCS	OCS OCS
Area Name	MC		
Block No.	37		
Blockline Departures (in feet)	N/S Departure: F____ L 2,410 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 3,480 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,270,680	X:	X: X: X:
	Y: 10,515,350	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.97043341	Latitude	Latitude Latitude Latitude
	Longitude -88.15664981	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,692	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 37 C-DD		Previously reviewed under an approved EP or DOCD?		Yes	X	No	
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?				X	Yes		No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid	N/A	

	Surface Location		**Bottom-Hole Location (For Wells)**		**Completion (For multiple completions, enter separate lines)**	
Lease No.	OCS G35309		OCS		OCS OCS	
Area Name	MC					
Block No.	36					
Blockline Departures (in feet)	N/S Departure: 6,873 FNL	F____ L	N/S Departure:	F____ L	N/S Departure: N/S Departure: N/S Departure:	F____ L F____ L F____ L
	E/W Departure: 100 FWL	F____ L	E/W Departure:	F____ L	E/W Departure: E/W Departure: E/W Departure:	F____ L F____ L F____ L
Lambert X-Y coordinates	X: 1,267,300		X:		X: X: X:	
	Y: 10,510,887		Y:		Y: Y: Y:	
Latitude/ Longitude	Latitude 28.95806585		Latitude		Latitude Latitude Latitude	
	Longitude -88.16708397		Longitude		Longitude Longitude Longitude	
Water Depth (Feet): 3,509			MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:			N/A-DP Drillship or DP Semi			

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): MC 37 C-EEE			Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?				X	Yes		No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid	N/A	

	Surface Location	Bottom-Hole Location (For Wells)	Completion (For multiple completions, enter separate lines)
Lease No.	OCS G35309	OCS	OCS OCS
Area Name	MC		
Block No.	37		
Blockline Departures (in feet)	N/S Departure: F____ L 7,030 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 100 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,267,300	X:	X: X: X:
	Y: 10,508,950	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.95273780	Latitude	Latitude Latitude Latitude
	Longitude -88.16702423	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,515	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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

<table>
<tr><th colspan="6">Proposed Well/Structure Location</th></tr>
<tr><td colspan="2">Well or Structure Name/Number (If renaming well or structure, reference previous name): MC 37 C-EEEE</td><td>Previously reviewed under an approved EP or DOCD?</td><td>Yes</td><td>X</td><td>No</td></tr>
<tr><td colspan="2">Is this an existing well or structure? Yes | No X</td><td>If this is an existing well or structure, list the Complex ID or API No.</td><td colspan="3">N/A</td></tr>
<tr><td colspan="3">Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?</td><td>X</td><td>Yes</td><td>No</td></tr>
<tr><td>WCD info</td><td>For wells, volume of uncontrolled blowout (Bbls/day): N/A</td><td>For structures, volume of all storage and pipelines (Bbls): N/A</td><td colspan="2">API Gravity of fluid</td><td>N/A</td></tr>
<tr><td></td><td>Surface Location</td><td>Bottom-Hole Location (For Wells)</td><td colspan="3">Completion (For multiple completions, enter separate lines)</td></tr>
<tr><td>Lease No.</td><td>OCS
G35309</td><td>OCS</td><td colspan="3">OCS
OCS</td></tr>
<tr><td>Area Name</td><td>MC</td><td></td><td colspan="3"></td></tr>
<tr><td>Block No.</td><td>37</td><td></td><td colspan="3"></td></tr>
<tr><td rowspan="2">Blockline Departures (in feet)</td><td>N/S Departure: F____ L
6,980 FSL</td><td>N/S Departure: F____ L</td><td colspan="3">N/S Departure: F____ L
N/S Departure: F____ L
N/S Departure: F____ L</td></tr>
<tr><td>E/W Departure: F____ L
100 FWL</td><td>E/W Departure: F____ L</td><td colspan="3">E/W Departure: F____ L
E/W Departure: F____ L
E/W Departure: F____ L</td></tr>
<tr><td rowspan="2">Lambert X-Y coordinates</td><td>X:
1,267,300</td><td>X:</td><td colspan="3">X:
X:
X:</td></tr>
<tr><td>Y:
10,508,900</td><td>Y:</td><td colspan="3">Y:
Y:
Y:</td></tr>
<tr><td rowspan="2">Latitude/ Longitude</td><td>Latitude
28.95260027</td><td>Latitude</td><td colspan="3">Latitude
Latitude
Latitude</td></tr>
<tr><td>Longitude
-88.16702269</td><td>Longitude</td><td colspan="3">Longitude
Longitude
Longitude</td></tr>
<tr><td colspan="2">Water Depth (Feet):
3,515</td><td>MD (Feet): | TVD (Feet):</td><td colspan="2" rowspan="2">MD (Feet):
MD (Feet):
MD (Feet):</td><td rowspan="2">TVD (Feet):
TVD (Feet):
TVD (Feet):</td></tr>
<tr><td colspan="2">Anchor Radius (if applicable) in feet:</td><td>N/A-DP Drillship or DP Semi</td></tr>
</table>

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): MC 37 C-F		Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?				X	Yes	No

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35309	OCS	OCS OCS
Area Name	MC		
Block No.	37		
Blockline Departures (in feet)	N/S Departure: F____ L 5,015 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 1,300 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,268,500	X:	X: X: X:
	Y: 10,506,935	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.94722769	Latitude	Latitude Latitude Latitude
	Longitude -88.16320961	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,558	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 37 C-FF	Previously reviewed under an approved EP or DOCD?		Yes	X	No

Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A

Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location		**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35309		OCS	OCS OCS
Area Name	MC			
Block No.	37			
Blockline Departures (in feet)	N/S Departure: F____ L 5,068 FSL		N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 1,300 FWL		E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,268,500		X:	X: X: X:
	Y: 10,506,985		Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.94736522		Latitude	Latitude Latitude Latitude
	Longitude -88.16321114		Longitude	Longitude Longitude Longitude
Water Depth (Feet): 3,558			MD (Feet): / TVD (Feet):	MD (Feet): TVD (Feet): MD (Feet): TVD (Feet): MD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:		N/A-DP Drillship or DP Semi		

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): MC 37 C-G		Previously reviewed under an approved EP or DOCD?			Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?				X	Yes		No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid	N/A	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35309	OCS	OCS OCS
Area Name	MC		
Block No.	37		
Blockline Departures (in feet)	N/S Departure: F____ L 3,016 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 1,800 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,269,000	X:	X: X: X:
	Y: 10,504,936	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.94174259	Latitude	Latitude Latitude Latitude
	Longitude -88.16158473	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,595		MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi				

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): MC 37 C-GG	Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No. N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No	

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 339,604	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	40.0

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35309	OCS	OCS OCS
Area Name	MC		
Block No.	37		
Blockline Departures (in feet)	N/S Departure: F____ L 3,066 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 1,800 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,269,000	X:	X: X: X:
	Y: 10,504,986	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.94188012	Latitude	Latitude Latitude Latitude
	Longitude -88.16158626	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,593	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 37 C-H	Previously reviewed under an approved EP or DOCD?		Yes	X	No

Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A

Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35309	OCS	OCS OCS
Area Name	MC		
Block No.	37		
Blockline Departures (in feet)	N/S Departure: F____ L 830 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 4,431 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,271,631	X:	X: X: X:
	Y: 10,516,930	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.97480613	Latitude	Latitude Latitude Latitude
	Longitude -88.15372351	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,854	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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

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<tr><th colspan="12">Proposed Well/Structure Location</th></tr>
<tr><td colspan="4">Well or Structure Name/Number (If renaming well or structure, reference previous name): MC 37 C-HH</td><td colspan="3">Previously reviewed under an approved EP or DOCD?</td><td></td><td>Yes</td><td>X</td><td colspan="2">No</td></tr>
<tr><td>Is this an existing well or structure?</td><td></td><td>Yes</td><td></td><td>No X</td><td colspan="3">If this is an existing well or structure, list the Complex ID or API No.</td><td colspan="4">N/A</td></tr>
<tr><td colspan="7">Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?</td><td>X</td><td>Yes</td><td></td><td colspan="2">No</td></tr>
<tr><td>WCD info</td><td colspan="3">For wells, volume of uncontrolled blowout (Bbls/day): N/A</td><td colspan="3">For structures, volume of all storage and pipelines (Bbls): N/A</td><td colspan="2">API Gravity of fluid</td><td colspan="3">N/A</td></tr>
<tr><td></td><td colspan="3">Surface Location</td><td colspan="4">Bottom-Hole Location (For Wells)</td><td colspan="4">Completion (For multiple completions, enter separate lines)</td></tr>
<tr><td>Lease No.</td><td colspan="3">OCS
G35309</td><td colspan="4">OCS</td><td colspan="4">OCS
OCS</td></tr>
<tr><td>Area Name</td><td colspan="3">MC</td><td colspan="4"></td><td colspan="4"></td></tr>
<tr><td>Block No.</td><td colspan="3">37</td><td colspan="4"></td><td colspan="4"></td></tr>
<tr><td rowspan="2">Blockline Departures (in feet)</td><td colspan="3">N/S Departure: F____ L
880 FNL</td><td colspan="4">N/S Departure: F____ L</td><td colspan="4">N/S Departure: F____ L
N/S Departure: F____ L
N/S Departure: F____ L</td></tr>
<tr><td colspan="3">E/W Departure: F____ L
4,431 FWL</td><td colspan="4">E/W Departure: F____ L</td><td colspan="4">E/W Departure: F____ L
E/W Departure: F____ L
E/W Departure: F____ L</td></tr>
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X:
X:</td></tr>
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10,516,880</td><td colspan="4">Y:</td><td colspan="4">Y:
Y:
Y:</td></tr>
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Latitude
Latitude</td></tr>
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-88.15372199</td><td colspan="4">Longitude</td><td colspan="4">Longitude
Longitude
Longitude</td></tr>
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MD (Feet):
MD (Feet):</td><td colspan="2" rowspan="2">TVD (Feet):
TVD (Feet):
TVD (Feet):</td></tr>
<tr><td colspan="5">Anchor Radius (if applicable) in feet:</td><td colspan="3">N/A-DP Drillship or DP Semi</td></tr>
</table>

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 =	

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

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): MC 37 C-I	Previously reviewed under an approved EP or DOCD?		Yes	X	No

Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A

Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35309	OCS	OCS OCS
Area Name	MC		
Block No.	37		
Blockline Departures (in feet)	N/S Departure: F____ L 2,249 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 6,034 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,273,234	X:	X: X: X:
	Y: 10,515,511	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.97094584	Latitude	Latitude Latitude Latitude
	Longitude -88.14866604	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,894	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 37 C-II	Previously reviewed under an approved EP or DOCD?		Yes	X	No	
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No		
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A		

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35309	OCS	OCS OCS
Area Name	MC		
Block No.	37		
Blockline Departures (in feet)	N/S Departure: F____ L 2,299 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 6,034 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,273,234	X:	X: X: X:
	Y: 10,515,461	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.97080830	Latitude	Latitude Latitude Latitude
	Longitude -88.14866452	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,891	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 37 C-J	Previously reviewed under an approved EP or DOCD?		Yes	X	No	
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No		

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35309	OCS	OCS OCS
Area Name	MC		
Block No.	37		
Blockline Departures (in feet)	N/S Departure: F____ L 1,309 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 7,709 FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,275,331	X:	X: X: X:
	Y: 10,516,451	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.97358706	Latitude	Latitude Latitude Latitude
	Longitude -88.14213698	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 4,171	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 37 C-JJ	Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?	Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No	

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35309	OCS	OCS OCS
Area Name	MC		
Block No.	37		
Blockline Departures (in feet)	N/S Departure: F____ L 1,359 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 7,709 FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,275,331	X:	X: X: X:
	Y: 10,516,401	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.97344952	Latitude	Latitude Latitude Latitude
	Longitude -88.14213546	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 4,167	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 P-A	Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No. N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No	

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 817.00 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 4,140.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,255,500.00	X:	X: X: X:
	Y: 10,516,943.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9743985	Latitude	Latitude Latitude Latitude
	Longitude -88.2041798	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,546	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 P-AA	Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No	

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 767.00 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 4,140.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,255,500	X:	X: X: X:
	Y: 10,516,993	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9745360	Latitude	Latitude Latitude Latitude
	Longitude -88.2041814	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,546	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 P-B	Previously reviewed under an approved EP or DOCD?		Yes	X	No

Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A

Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 2,819.00 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 3,940.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,255,300	X:	X: X: X:
	Y: 10,514,941	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9688861	Latitude	Latitude Latitude Latitude
	Longitude -88.2047415	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,575	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 P-BB		Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?			X	Yes		No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 2,769.00 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 3,940.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,255,300	X:	X: X: X:
	Y: 10,514,991	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9690236	Latitude	Latitude Latitude Latitude
	Longitude -88.2047431	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,575	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:		N/A-DP Drillship or DP Semi		

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): MC 36 P-C			Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?					X	Yes	No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid	N/A	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 4,817.00 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 3,540.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,254,900	X:	X: X: X:
	Y: 10,512,943	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9633791	Latitude	Latitude Latitude Latitude
	Longitude -88.2059289	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,598	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 P-CC	Previously reviewed under an approved EP or DOCD?		Yes	X	No	
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No		
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A		

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 4,767.00 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 3,540.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,254,900	X:	X: X: X:
	Y: 10,512,993	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9635167	Latitude	Latitude Latitude Latitude
	Longitude -88.2059305	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 3,598		MD (Feet): / TVD (Feet):	MD (Feet): TVD (Feet): MD (Feet): TVD (Feet): MD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi		

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): MC 36 P-D		Previously reviewed under an approved EP or DOCD?			Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.		N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?				X	Yes		No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid		N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 6,819.00 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 4,340.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,255,700	X:	X: X: X:
	Y: 10,510,941	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9578948	Latitude	Latitude Latitude Latitude
	Longitude -88.2033632	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,598	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 P-DD		Previously reviewed under an approved EP or DOCD?			Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?					X	Yes	No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid	N/A	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 6,769.00 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 4,340.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,255,700	X:	X: X: X:
	Y: 10,510,991	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9580323	Latitude	Latitude Latitude Latitude
	Longitude -88.2033648	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,598	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 P-E		Previously reviewed under an approved EP or DOCD?			Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?					X	Yes	No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid	N/A	

	Surface Location	**Bottom-Hole Location (For Wells)**		**Completion (For multiple completions, enter separate lines)**	
Lease No.	OCS G35308	OCS		OCS OCS	
Area Name	MC				
Block No.	36				
Blockline Departures (in feet)	N/S Departure: F____ L 7,023.00 FSL	N/S Departure: F____ L		N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L	
	E/W Departure: F____ L 3,340.00 FWL	E/W Departure: F____ L		E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L	
Lambert X-Y coordinates	X: 1,254,700	X:		X: X: X:	
	Y: 10,508,943	Y:		Y: Y: Y:	
Latitude/ Longitude	Latitude 28.9523710	Latitude		Latitude Latitude Latitude	
	Longitude -88.2064269	Longitude		Longitude Longitude Longitude	
Water Depth (Feet): 3,645		MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:		N/A-DP Drillship or DP Semi			

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): MC 36 P-EE	Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No	
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A	

	Surface Location	Bottom-Hole Location (For Wells)	Completion (For multiple completions, enter separate lines)
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 7,073.00 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 3,340.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,254,700	X:	X: X: X:
	Y: 10,508,993	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9525085	Latitude	Latitude Latitude Latitude
	Longitude -88.2064284	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,645	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 P-F	Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No	
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 5,021.20 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 1,040.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,252,400	X:	X: X: X:
	Y: 10,506,941	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9468001	Latitude	Latitude Latitude Latitude
	Longitude -88.2135552	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,729	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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

<table>
<tr><th colspan="8">Proposed Well/Structure Location</th></tr>
<tr><td colspan="3">Well or Structure Name/Number (If renaming well or structure, reference previous name): MC 36 P-FF</td><td colspan="2">Previously reviewed under an approved EP or DOCD?</td><td>Yes</td><td>X</td><td>No</td></tr>
<tr><td>Is this an existing well or structure?</td><td>Yes</td><td>No X</td><td colspan="2">If this is an existing well or structure, list the Complex ID or API No.</td><td colspan="3">N/A</td></tr>
<tr><td colspan="5">Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?</td><td>X</td><td>Yes</td><td>No</td></tr>
<tr><td>WCD info</td><td colspan="2">For wells, volume of uncontrolled blowout (Bbls/day): N/A</td><td colspan="2">For structures, volume of all storage and pipelines (Bbls): N/A</td><td colspan="2">API Gravity of fluid</td><td>N/A</td></tr>
<tr><td></td><td colspan="2">Surface Location</td><td colspan="2">Bottom-Hole Location (For Wells)</td><td colspan="3">Completion (For multiple completions, enter separate lines)</td></tr>
<tr><td>Lease No.</td><td colspan="2">OCS G35308</td><td colspan="2">OCS</td><td colspan="3">OCS
OCS</td></tr>
<tr><td>Area Name</td><td colspan="2">MC</td><td colspan="2"></td><td colspan="3"></td></tr>
<tr><td>Block No.</td><td colspan="2">36</td><td colspan="2"></td><td colspan="3"></td></tr>
<tr><td rowspan="2">Blockline Departures (in feet)</td><td colspan="2">N/S Departure: F____ L
5,071.20 FSL</td><td colspan="2">N/S Departure: F____ L</td><td colspan="3">N/S Departure: F____ L
N/S Departure: F____ L
N/S Departure: F____ L</td></tr>
<tr><td colspan="2">E/W Departure: F____ L
1,040.00 FWL</td><td colspan="2">E/W Departure: F____ L</td><td colspan="3">E/W Departure: F____ L
E/W Departure: F____ L
E/W Departure: F____ L</td></tr>
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1,252,400</td><td colspan="2">X:</td><td colspan="3">X:
X:
X:</td></tr>
<tr><td colspan="2">Y:
10,506,991</td><td colspan="2">Y:</td><td colspan="3">Y:
Y:
Y:</td></tr>
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28.9469376</td><td colspan="2">Latitude</td><td colspan="3">Latitude
Latitude
Latitude</td></tr>
<tr><td colspan="2">Longitude
-88.2135568</td><td colspan="2">Longitude</td><td colspan="3">Longitude
Longitude
Longitude</td></tr>
<tr><td colspan="3">Water Depth (Feet):
3,729</td><td>MD (Feet):</td><td>TVD (Feet):</td><td colspan="2" rowspan="2">MD (Feet):
MD (Feet):
MD (Feet):</td><td rowspan="2">TVD (Feet):
TVD (Feet):
TVD (Feet):</td></tr>
<tr><td colspan="3">Anchor Radius (if applicable) in feet:</td><td colspan="2">N/A-DP Drillship or DP Semi</td></tr>
</table>

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): MC 36 P-G		Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?			X	Yes		No

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid: N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 3,023.00 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 240.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,251,600	X:	X: X: X:
	Y: 10,504,943	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9412812	Latitude	Latitude Latitude Latitude
	Longitude -88.2159926	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,785	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 P-GG			Previously reviewed under an approved EP or DOCD?			Yes	X	No
Is this an existing well or structure?	Yes	No X	If this is an existing well or structure, list the Complex ID or API No.		N/A			
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?					X	Yes		No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid	N/A		

	Surface Location	**Bottom-Hole Location (For Wells)**		**Completion (For multiple completions, enter separate lines)**	
Lease No.	OCS G35308	OCS		OCS OCS	
Area Name	MC				
Block No.	36				
Blockline Departures (in feet)	N/S Departure: F____ L 3,073.00 FSL	N/S Departure: F____ L		N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L	
	E/W Departure: F____ L 240.00 FWL	E/W Departure: F____ L		E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L	
Lambert X-Y coordinates	X: 1,251,600	X:		X: X: X:	
	Y: 10,504,993	Y:		Y: Y: Y:	
Latitude/ Longitude	Latitude 28.9414188	Latitude		Latitude Latitude Latitude	
	Longitude -88.2159942	Longitude		Longitude Longitude Longitude	
Water Depth (Feet): 3,785		MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:		N/A-DP Drillship or DP Semi			

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): MC 36 P-H	Previously reviewed under an approved EP or DOCD?		Yes	X	No

Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A

Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 1,021.00 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 140.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,251,500	X:	X: X: X:
	Y: 10,502,941	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9357716	Latitude	Latitude Latitude Latitude
	Longitude -88.2162410	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,830	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 36 P-HH			Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?	Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A			
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?				X	Yes		No

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35308	OCS	OCS OCS
Area Name	MC		
Block No.	36		
Blockline Departures (in feet)	N/S Departure: F____ L 1,071.00 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 140.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,251,500	X:	X: X: X:
	Y: 10,502,991	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9359092	Latitude	Latitude Latitude Latitude
	Longitude -88.2162426	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,830	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 80 P-I	Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No	

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35311	OCS	OCS OCS
Area Name	MC		
Block No.	80		
Blockline Departures (in feet)	N/S Departure: F____ L 975.00 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 640.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,252,000	X:	X: X: X:
	Y: 10,500,945	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9302955	Latitude	Latitude Latitude Latitude
	Longitude -88.2146136	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,863	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 80 P-II		Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?			X	Yes		No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A		API Gravity of fluid	N/A

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35311	OCS	OCS OCS
Area Name	MC		
Block No.	80		
Blockline Departures (in feet)	N/S Departure: F____ L 925.00 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 640.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,252,000	X:	X: X: X:
	Y: 10,500,995	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9304330	Latitude	Latitude Latitude Latitude
	Longitude -88.2146152	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,863	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 80 P-J	Previously reviewed under an approved EP or DOCD?		Yes	X	No	
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No		
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A		

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35311	OCS	OCS OCS
Area Name	MC		
Block No.	80		
Blockline Departures (in feet)	N/S Departure: F____ L 1,976.00 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 540.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,251,900	X:	X: X: X:
	Y: 10,499,944	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9275393	Latitude	Latitude Latitude Latitude
	Longitude -88.2148942	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,898	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 80 P-JJ	Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No	
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35311	OCS	OCS OCS
Area Name	MC		
Block No.	80		
Blockline Departures (in feet)	N/S Departure: F____ L 1,926.00 FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 540.00 FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,251,900	X:	X: X: X:
	Y: 10,499,994	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9276768	Latitude	Latitude Latitude Latitude
	Longitude -88.2148958	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,898	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 80 P-K	Previously reviewed under an approved EP or DOCD?		Yes	X	No	
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No		
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A		

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35311	OCS	OCS OCS
Area Name	MC		
Block No.	80		
Blockline Departures (in feet)	N/S Departure: F____ L 6,657.00 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 1,550.00 FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,265,650	X:	X: X: X:
	Y: 10,492,737	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9080962	Latitude	Latitude Latitude Latitude
	Longitude -88.1716825	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,809	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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

<table>
<tr><th colspan="10">Proposed Well/Structure Location</th></tr>
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<tr><td>Is this an existing well or structure?</td><td></td><td>Yes</td><td></td><td>No X</td><td colspan="2">If this is an existing well or structure, list the Complex ID or API No.</td><td colspan="3">N/A</td></tr>
<tr><td colspan="6">Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?</td><td>X</td><td>Yes</td><td></td><td>No</td></tr>
<tr><td>WCD info</td><td colspan="3">For wells, volume of uncontrolled blowout (Bbls/day): N/A</td><td colspan="2">For structures, volume of all storage and pipelines (Bbls): N/A</td><td colspan="2">API Gravity of fluid</td><td colspan="2">N/A</td></tr>
<tr><td></td><td colspan="3">Surface Location</td><td colspan="2">Bottom-Hole Location (For Wells)</td><td colspan="4">Completion (For multiple completions, enter separate lines)</td></tr>
<tr><td>Lease No.</td><td colspan="3">OCS
G35311</td><td colspan="2">OCS</td><td colspan="4">OCS
OCS</td></tr>
<tr><td>Area Name</td><td colspan="3">MC</td><td colspan="2"></td><td colspan="4"></td></tr>
<tr><td>Block No.</td><td colspan="3">80</td><td colspan="2"></td><td colspan="4"></td></tr>
<tr><td rowspan="2">Blockline Departures (in feet)</td><td colspan="3">N/S Departure: F____ L
6,657.00 FSL</td><td colspan="2">N/S Departure: F____ L</td><td colspan="4">N/S Departure: F____ L
N/S Departure: F____ L
N/S Departure: F____ L</td></tr>
<tr><td colspan="3">E/W Departure: F____ L
1,500.00 FEL</td><td colspan="2">E/W Departure: F____ L</td><td colspan="4">E/W Departure: F____ L
E/W Departure: F____ L
E/W Departure: F____ L</td></tr>
<tr><td>Lambert X-Y coordinates</td><td colspan="3">X:
1,265,700</td><td colspan="2">X:</td><td colspan="4">X:
X:
X:</td></tr>
<tr><td></td><td colspan="3">Y:
10,492,737</td><td colspan="2">Y:</td><td colspan="4">Y:
Y:
Y:</td></tr>
<tr><td rowspan="2">Latitude/ Longitude</td><td colspan="3">Latitude
28.9080976</td><td colspan="2">Latitude</td><td colspan="4">Latitude
Latitude
Latitude</td></tr>
<tr><td colspan="3">Longitude
-88.1715262</td><td colspan="2">Longitude</td><td colspan="4">Longitude
Longitude
Longitude</td></tr>
<tr><td colspan="4">Water Depth (Feet):
3,809</td><td>MD (Feet):</td><td>TVD (Feet):</td><td colspan="2" rowspan="2">MD (Feet):
MD (Feet):
MD (Feet):</td><td colspan="2" rowspan="2">TVD (Feet):
TVD (Feet):
TVD (Feet):</td></tr>
<tr><td colspan="4">Anchor Radius (if applicable) in feet:</td><td colspan="2">N/A-DP Drillship or DP Semi</td></tr>
</table>

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): MC 80 P-L	Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No	
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35311	OCS	OCS OCS
Area Name	MC		
Block No.	80		
Blockline Departures (in feet)	N/S Departure: F____ L 6,607.00 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 1,550.00 FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,265,650	X:	X: X: X:
	Y: 10,492,687	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9079587	Latitude	Latitude Latitude Latitude
	Longitude -88.1716810	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,809	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 80 P-LL		Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	No X	If this is an existing well or structure, list the Complex ID or API No.	N/A	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?			X	Yes		No
WCD info	For wells, volume of uncontrolled blowout (Bbls/day): N/A		For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	N/A	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35311	OCS	OCS OCS
Area Name	MC		
Block No.	80		
Blockline Departures (in feet)	N/S Departure: F____ L 6,607.00 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 1,500.00 FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,265,700	X:	X: X: X:
	Y: 10,492,687	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9079601	Latitude	Latitude Latitude Latitude
	Longitude -88.1715247	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,809	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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): MC 80 P-M	Previously reviewed under an approved EP or DOCD?		Yes	X	No	
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No		

WCD info	For wells, volume of uncontrolled blowout (Bbls/day): 268,262	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	40.0

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G35311	OCS	OCS OCS
Area Name	MC		
Block No.	80		
Blockline Departures (in feet)	N/S Departure: F____ L 6,557.00 FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F____ L 1,550.00 FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 1,265,650	X:	X: X: X:
	Y: 10,492,637	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 28.9078212	Latitude	Latitude Latitude Latitude
	Longitude -88.1716794	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 3,808	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A-DP Drillship or DP Semi			

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

<table>
<tr><th colspan="8">Proposed Well/Structure Location</th></tr>
<tr><td colspan="3">Well or Structure Name/Number (If renaming well or structure, reference previous name): MC 80 P-MM</td><td colspan="2">Previously reviewed under an approved EP or DOCD?</td><td></td><td>Yes</td><td>X No</td></tr>
<tr><td>Is this an existing well or structure?</td><td></td><td>Yes</td><td>No X</td><td colspan="2">If this is an existing well or structure, list the Complex ID or API No.</td><td colspan="2">N/A</td></tr>
<tr><td colspan="5">Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?</td><td>X</td><td>Yes</td><td>No</td></tr>
<tr><td>WCD info</td><td colspan="2">For wells, volume of uncontrolled blowout (Bbls/day): N/A</td><td colspan="2">For structures, volume of all storage and pipelines (Bbls): N/A</td><td>API Gravity of fluid</td><td colspan="2">N/A</td></tr>
<tr><td></td><td colspan="2">Surface Location</td><td colspan="2">Bottom-Hole Location (For Wells)</td><td colspan="3">Completion (For multiple completions, enter separate lines)</td></tr>
<tr><td>Lease No.</td><td colspan="2">OCS G35311</td><td colspan="2">OCS</td><td colspan="3">OCS
OCS</td></tr>
<tr><td>Area Name</td><td colspan="2">MC</td><td colspan="2"></td><td colspan="3"></td></tr>
<tr><td>Block No.</td><td colspan="2">80</td><td colspan="2"></td><td colspan="3"></td></tr>
<tr><td rowspan="2">Blockline Departures (in feet)</td><td colspan="2">N/S Departure: F____ L
6,557.00 FSL</td><td colspan="2">N/S Departure: F____ L</td><td colspan="3">N/S Departure: F____ L
N/S Departure: F____ L
N/S Departure: F____ L</td></tr>
<tr><td colspan="2">E/W Departure: F____ L
1,500.00 FEL</td><td colspan="2">E/W Departure: F____ L</td><td colspan="3">E/W Departure: F____ L
E/W Departure: F____ L
E/W Departure: F____ L</td></tr>
<tr><td rowspan="2">Lambert X-Y coordinates</td><td colspan="2">X:
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X:</td></tr>
<tr><td colspan="2">Y:
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Y:
Y:</td></tr>
<tr><td rowspan="2">Latitude/ Longitude</td><td colspan="2">Latitude
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<tr><td colspan="2">Longitude
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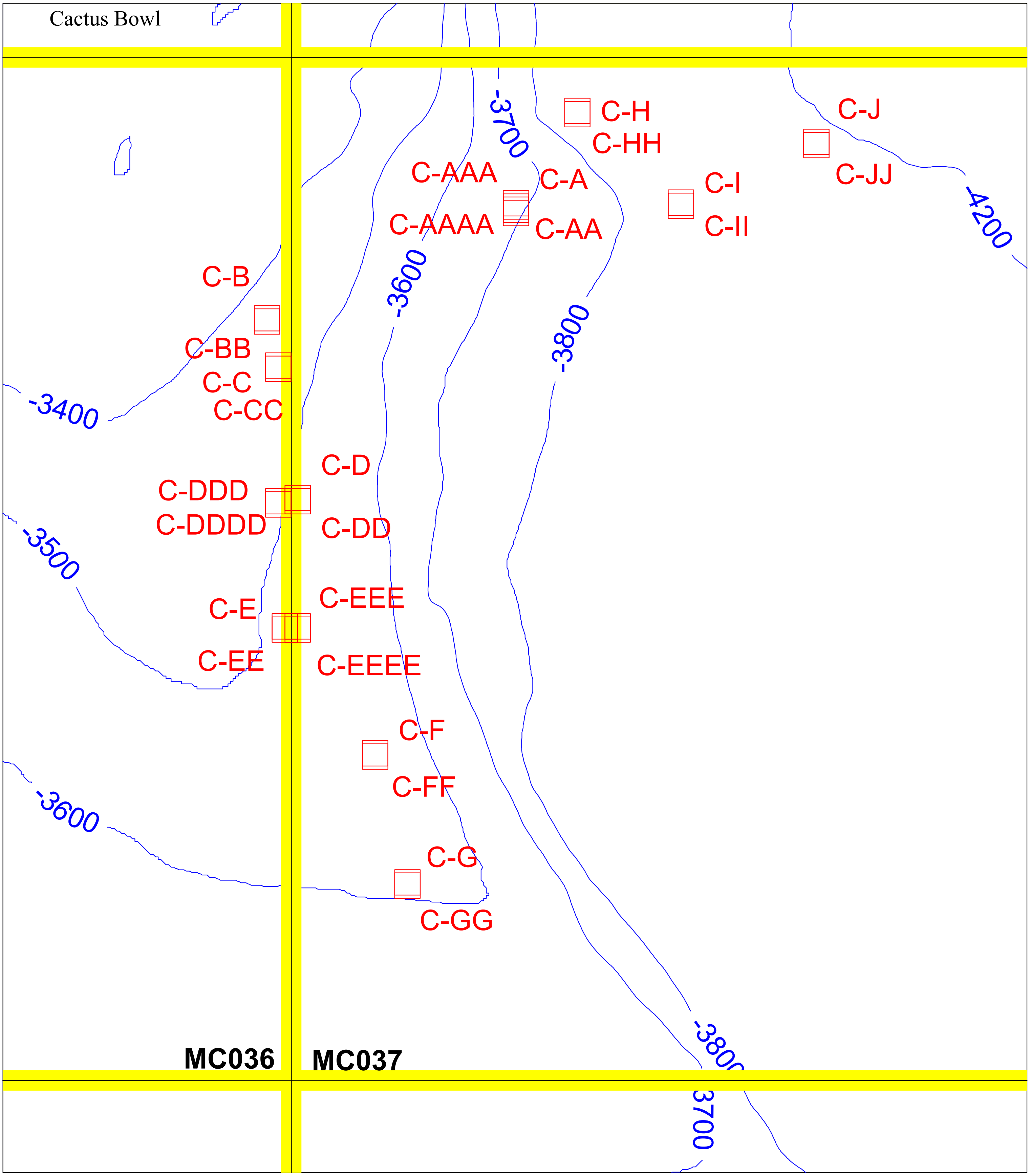
Longitude</td></tr>
<tr><td colspan="3">Water Depth (Feet):
3,808</td><td>MD (Feet):</td><td>TVD (Feet):</td><td rowspan="2">MD (Feet):
MD (Feet):
MD (Feet):</td><td colspan="2" rowspan="2">TVD (Feet):
TVD (Feet):
TVD (Feet):</td></tr>
<tr><td colspan="3">Anchor Radius (if applicable) in feet:</td><td colspan="2">N/A-DP Drillship or DP Semi</td></tr>
</table>

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

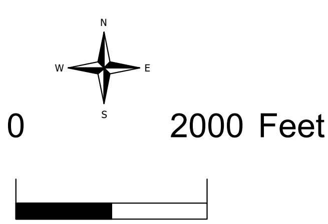
Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	

Attachment A-2

Cactus Bowl



Surface Location Information



Anadarko Petroleum Corporation

MC036 OCS-G35308 MC037 OCS-G35309

Public Location and Bathymetry Map

Author : FLG, ALS

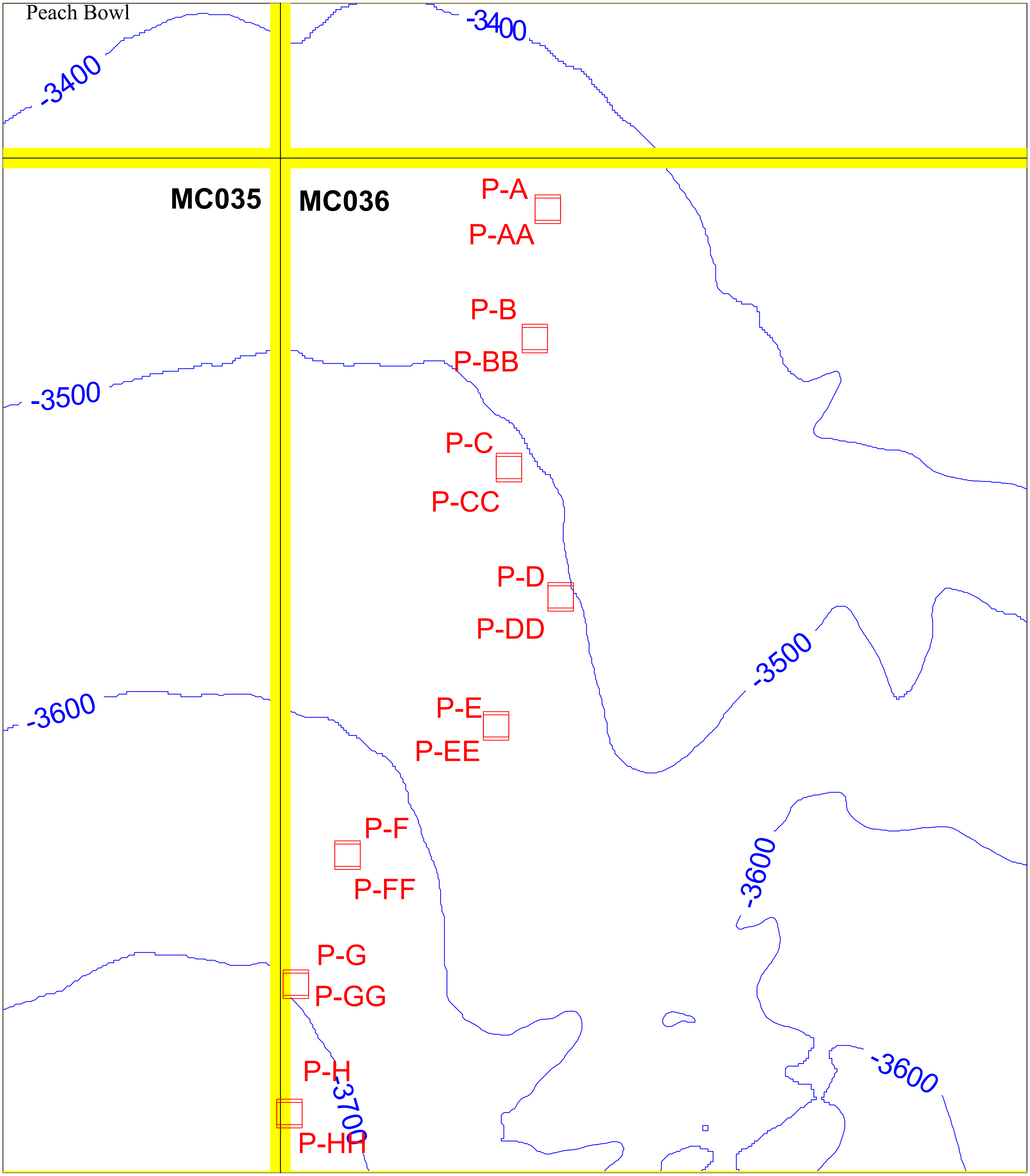
Date : September 17, 2020

Scale : 1:24000

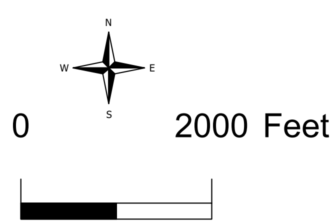
MC036 and MC037
Public Bathymetry Map

Well NAME	Location	Corner Calls		X	Y	LAT	LONG	WD
MC36 C A (MC37 Surface)	SL	2260 FNL	3480 FWL	1270680.00	10515500.00	28.97084601	-88.15665440	3686
MC36 C AA (MC37 Surface)	SL	2310 FNL	3480 FWL	1270680.00	10515450.00	28.97070848	-88.15665287	3688
MC37 C AAA	SL	2360 FNL	3480 FWL	1270680.00	10515400.00	28.97057094	-88.15665134	3690
MC37 C AAAA	SL	2410 FNL	3480 FWL	1270680.00	10515350.00	28.97043341	-88.15664981	3692
MC36 C B	SL	4040 FNL	375 FEL	1266825.00	10513720.00	28.96584559	-88.16865700	3429
MC36 C BB	SL	4090 FNL	375 FEL	1266825.00	10513670.00	28.96570806	-88.16865546	3431
MC36 C C	SL	4822 FNL	200 FEL	1267000.00	10512937.97	28.96369924	-88.16808552	3463
MC36 C CC	SL	4772 FNL	200 FEL	1267000.00	10512988.00	28.96383686	-88.16808706	3462
MC36 C D (MC37 Surface)	SL	6823 FNL	100 FWL	1267300.00	10510937.00	28.95820339	-88.16708551	3508
MC37 C DD	SL	6873 FNL	100 FWL	1267300.00	10510887.00	28.95806585	-88.16708397	3509
MC36 C DDD	SL	6873 FNL	200 FEL	1267000.00	10510887.00	28.95805771	-88.16802219	3495
MC36 C DDDD	SL	6923 FNL	200 FEL	1267000.00	10510837.00	28.95792018	-88.16802065	3496
MC36 C E	SL	7030 FSL	100 FEL	1267100.00	10508950.00	28.95273238	-88.16764968	3509
MC36 C EE	SL	6980 FSL	100 FEL	1267100.00	10508900.00	28.95259484	-88.16764813	3509
MC37 C EEE	SL	7030 FSL	100 FWL	1267300.00	10508950.00	28.95273780	-88.16702423	3515
MC37 C EEEE	SL	6980 FSL	100 FWL	1267300.00	10508900.00	28.95260027	-88.16702269	3515
MC37 C F	SL	5015 FSL	1300 FWL	1268500.00	10506935.00	28.94722769	-88.16320961	3558
MC37 C FF	SL	5068 FSL	1300 FWL	1268500.00	10506985.00	28.94736522	-88.16321114	3558
MC37 C G	SL	3016 FSL	1800 FWL	1269000.00	10504936.00	28.94174259	-88.16158473	3595
MC37 C GG	SL	3066 FSL	1800 FWL	1269000.00	10504986.00	28.94188012	-88.16158626	3593
MC37 C H	SL	830 FNL	4431 FWL	1271631.00	10516930.40	28.97480613	-88.15372351	3854
MC37 C HH	SL	880 FNL	4431 FWL	1271631.00	10516880.40	28.97466859	-88.15372199	3850
MC37 C I	SL	2249 FNL	6034 FWL	1273234.10	10515511.40	28.97094584	-88.14866604	3894
MC37 C II	SL	2299 FNL	6034 FWL	1273234.10	10515461.40	28.97080830	-88.14866452	3891
MC37 C J	SL	1309 FNL	7709 FEL	1275330.60	10516451.30	28.97358706	-88.14213698	4171
MC37 C JJ	SL	1359 FNL	7709 FEL	1275330.60	10516401.30	28.97344952	-88.14213546	4167

Attachment A-2



Surface Location Information



Anadarko Petroleum Corporation

MC 036 OCS - G35308

Public Location and Bathymetry Map

Author : FLG, ALS

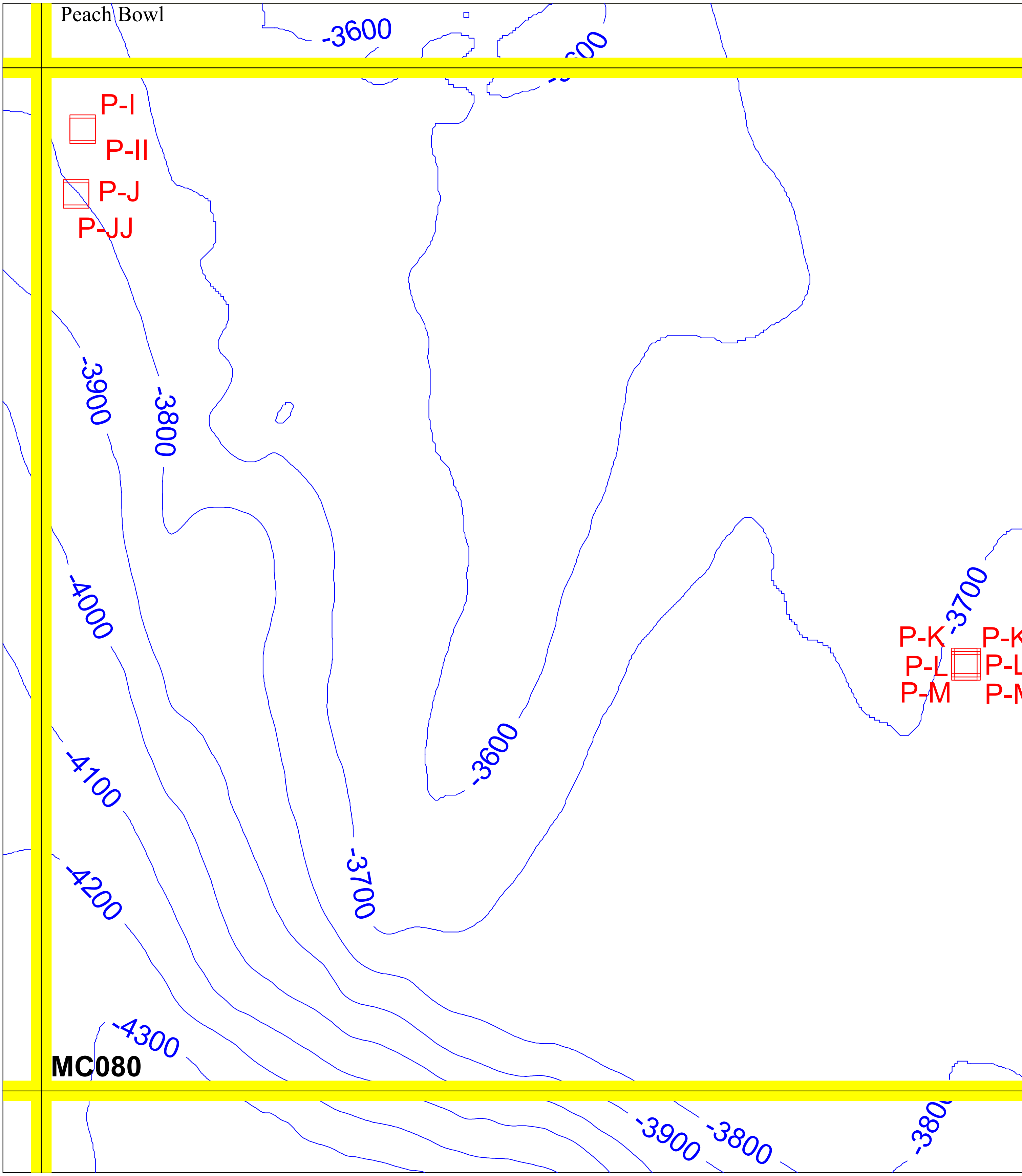
Date : September 17, 2020 | Scale : 1:24000

For internal information only. Depicted information is subjective and its accuracy has not been verified. Printed or saved versions may be outdated. Depictions and information are intended to be confidential, and may be subject to legal restrictions or protections. For questions regarding appropriate use contact BITS E&P Systems, Mike Seeber, or Tim Donovan.

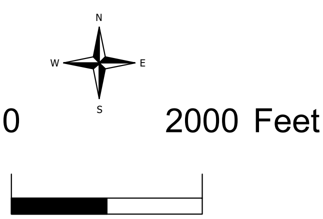
MC036 Public Bathymetry Map

Well NAME	Location	Corner Calls		X	Y	LAT	LONG	WD
MC36 P A	SL	817.00 FNL	4140.00 FWL	1255500.00	10516943.00	28.97439845	-88.20417976	3546
MC36 P AA	SL	767.00 FNL	4140.00 FWL	1255500.00	10516993.00	28.97453598	-88.20418135	3546
MC36 P B	SL	2819.00 FNL	3940.00 FWL	1255300.00	10514941.00	28.96888609	-88.20474154	3575
MC36 P BB	SL	2769.00 FNL	3940.00 FWL	1255300.00	10514991.00	28.96902362	-88.20474313	3575
MC36 P C	SL	4817.00 FNL	3540.00 FWL	1254900.00	10512943.00	28.96337913	-88.20592890	3598
MC36 P CC	SL	4767.00 FNL	3540.00 FWL	1254900.00	10512993.00	28.96351666	-88.20593050	3598
MC36 P D	SL	6819.00 FNL	4340.00 FWL	1255700.00	10510941.00	28.95789477	-88.20336321	3598
MC36 P DD	SL	6769.00 FNL	4340.00 FWL	1255700.00	10510991.00	28.95803230	-88.20336480	3598
MC36 P E	SL	7023.00 FSL	3340.00 FWL	1254700.00	10508943.00	28.95237100	-88.20642685	3645
MC36 P EE	SL	7073.00 FSL	3340.00 FWL	1254700.00	10508993.00	28.95250853	-88.20642844	3645
MC36 P F	SL	5021.20 FSL	1040.00 FWL	1252400.00	10506941.20	28.94680011	-88.21355517	3729
MC36 P FF	SL	5071.20 FSL	1040.00 FWL	1252400.00	10506991.20	28.94693764	-88.21355677	3729
MC36 P G	SL	3023.00 FSL	240.00 FWL	1251600.00	10504943.00	28.94128122	-88.21599258	3785
MC36 P GG	SL	3073.00 FSL	240.00 FWL	1251600.00	10504993.00	28.94141876	-88.21599419	3785
MC36 P H	SL	1021.00 FSL	140.00 FWL	1251500.00	10502941.00	28.93577164	-88.21624096	3830
MC36 P HH	SL	1071.00 FSL	140.00 FWL	1251500.00	10502991.00	28.93590917	-88.21624257	3830

Attachment A-2



Surface Location Information



Anadarko Petroleum Corporation

MC 080 OCS - G35311

Public Location and Bathymetry Map

Author : FLG, ALS	
Date : September 17, 2020	Scale : 1:24000

MC080 Public Bathymetry Map

Well NAME	Location	Corner Calls		X	Y	LAT	LONG	WD
MC80 P I	SL	975.00 FNL	640.00 FWL	1252000.00	10500945.00	28.93029550	-88.21461361	3863
MC80 P II	SL	925.00 FNL	640.00 FWL	1252000.00	10500995.00	28.93043303	-88.21461521	3863
MC80 P J	SL	1976.00 FNL	540.00 FWL	1251900.00	10499944.00	28.92753930	-88.21489415	3898
MC80 P JJ	SL	1926.00 FNL	540.00 FWL	1251900.00	10499994.00	28.92767683	-88.21489576	3898
MC80 P K	SL	6657.00 FSL	1550.00 FEL	1265650.00	10492737.00	28.90809625	-88.17168253	3809
MC80 P KK	SL	6657.00 FSL	1500.00 FEL	1265700.00	10492737.00	28.90809761	-88.17152623	3809
MC80 P L	SL	6607.00 FSL	1500.00 FEL	1265650.00	10492687.00	28.90795871	-88.17168098	3809
MC80 P LL	SL	6607.00 FSL	1550.00 FEL	1265700.00	10492687.00	28.90796007	-88.17152469	3809
MC80 P M	SL	6557.00 FSL	1550.00 FEL	1265650.00	10492637.00	28.90782118	-88.17167944	3808
MC80 P MM	SL	6557.00 FSL	1500.00 FEL	1265700.00	10492637.00	28.90782254	-88.17152314	3808

SECTION B
GENERAL INFORMATION

(a) Applications and Permits

Prior to beginning exploration operations, the following application(s) will be submitted for approval:

Application/Permit	Issuing Agency	Status
Permits to Drill	BSEE Bureau of Safety and Environmental Enforcement (BSEE)	To be submitted

(b) Drilling Fluids

Type of Drilling Fluid	Estimated Volume Per Well
Water-based (NaCl saturated, seawater, freshwater, barite) for Pump and Dump	18,000 bbls per well*
Synthetic-based (internal olefin, ester)	14,000 bbls per well
Oil-based	N/A

******The actual volume of water-based drilling fluid ordered out will be an estimated 20,000 bbls/well of mud. Once on location this volume will be cut back and mixed with seawater to different desired mud weights which will increase the volume that is discharged at the seafloor. The estimated volume that will be discharged at the seafloor will be approximately 36,000 bbls/well (Note: There will be 52 potential wells drilled, for a total of 1,872,000 bbls bbls.)*

(c) New or Unusual Technology

Anadarko does not propose to use any new or unusual technology to drill the well proposed in this Initial EP.

(d) Bonding Statement

The bond requirements for the activities and facilities proposed in this Initial EP are satisfied by an area-wide bond furnished and maintained according to 30 CFR part 256, subpart I; NTL No. 2015-N04, "General Financial Assurance," and National NTL No. 2016-N01 "Requiring Additional Security".

(e) Oil Spill Financial Responsibility (OSFR)

Anadarko Petroleum Corporation (Company Number 00981) has demonstrated oil spill financial responsibility for the facilities proposed in this Initial EP according to 30 CFR Part 253, and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities".

(f) Deepwater Well Control Statement

Anadarko Petroleum Corporation (Company Number 00981) has the financial capability to drill a relief well and conduct other emergency well control operations if required.

(g) Blowout Scenario

Anadarko prepared this blowout scenario pursuant to guidance provided in NTL No. 2015-N01.

Purpose

This information provides a generic blowout scenario, additional information regarding any potential oil spill, the measures Anadarko will take to prevent a blowout, and if necessary, promptly respond to manage a blowout scenario if one occurs. The following information is pursuant with 30 CFR 550.213(g), 550.219, 550.250 and NTL No. 2015-N01.

Background

Anadarko prepared this blowout scenario pursuant to guidance provided in NTL No. 2015-N01. **The MC 126 Y, from the previously approved Initial EP (Plan Control No.: N-10029), is addressed in this blowout scenario since it is the proposed location with the highest potential WCD in the area. A similar approach would be taken in the event of a blowout from the wells proposed in MC 36, 37, and 80. Based on NTL No. 2015-N01 guidance, the maximum hydrocarbon discharge from MC 126 Y was calculated to be 371,735 bopd (Plan Control No.: N-10029 and referenced in Plan Control No.: N-10117).**

Information Requirements

Blowout Scenario-Plan Control No.: N-10029 (and N-10117)

The objective(s) are drilled utilizing a MODU rig with a marine riser and subsea BOP. A typical sub-sea wellhead system, conductor, surface and intermediate casing program will be used. A hydrocarbon influx occurs, followed by a well control event from the objective sands. The subsea BOP and marine riser fail and a blow-out at the seabed occurs. The WCD scenario assumes 12-1/4" open hole to a 9-7/8" casing point (but casing is not set). Exposed sand(s) in the primary objective are the WCD scenario.

Estimated Flow Rate of the Potential Blowout

Category	Initial EP
Type of Activity	Drilling
Facility Location (area/block)	MC 126 Y (N-10029)
Facility Designation	MODU
Distance to Nearest Shoreline (miles)	53 miles
Uncontrolled Blowout (volume per day)	371,735 bopd
Type of Fluid(s)	Crude Oil

a) Potential for the well to bridge over:

Formation collapse and bridging is expected in a blowout scenario, sanding would occur.

Mechanical collapse of the reservoirs in the open-hole section of the wellbore was not considered in determining WCD. During a WCD event, the open hole portion of the well will be exposed to a substantial underbalance condition. Due to the unconsolidated nature of the formations contributing flow and the relatively weak remaining exposed sediments, a significant quantity sand and heaving shale will enter the flowstream. The presence of sediments in the flowstream are excluded from Anadarko's discharge calculations and assumes no bridging will occur, however, bridging is likely to occur.

b) Likelihood and measures taken for surface and/or sub-sea intervention to stop the blowout:

The likelihood of surface intervention to stop a blowout is high. In addition to the surface intervention equipment the contracted MODU will have the equipment/ability to perform the following:

<u>ROV Secondary BOP Control System</u>: The BOP is confirmed to have a ROV Intervention Panel and circuits that have the following attributes:

- ROV Intervention is capable of Opening and Closing each Shear Ram, Ram Locks, One Pipe Ram and Disconnect the LMRP, all under MASP conditions.
- ROV Intervention is to be tested during the initial stump test and during the initial BOP latch up.
- BOP panels also can be operated by an ROV from an independent supply boat in the event of a loss-of-rig scenario.

<u>Deadman/Autoshear Function</u>: The rig is equipped with an automated sequence that closes the blind shear rams in the event of any of the following scenarios:

- Inadvertent disconnect of the LMRP
- Loss of both hydraulic pressure and electrical supply from the surface BOP control system
- No human interface is required once these systems are armed.

c) Availability of a rig to drill a relief well:

Per the preliminary Mutual Aid agreements that are being worked between E&P Operators in the Gulf of Mexico, Anadarko will select from the best rig option available in the Gulf of Mexico fleet if and when it is required for relief well work. A rig that could be used to drill a relief well is the *Diamond Ocean BlackHawk* drillship, which is a drillship capable of drilling in 12,000' of water without any constraints. The rig is currently under contract to Anadarko.

There are no nearby platforms from which to drill a relief well. It is not feasible to drill a relief well from land.

d) Rig constraints:

The minimum capability for a drilling rig, is to be able to drill in 5,000' of water, to a depth of greater than 15,000' TVD, and a 15k BOP Stack to drill a relief well. The *Diamond Ocean BlackHawk* drillship meets these requirements.

e) Time taken to mobilize a rig and drill a relief well:

An estimate of 7-21 days is required to suspend operations on a deepwater GOM well and begin drilling the relief well. This assumes 0-14 days to suspend current operations on an existing well and 7 days to mobilize and be ready to spud the relief well. The estimated time to drill the relief well to a blowout originating from the target zone is 60-70 days, for a total estimated time of 67-91 days from time of blowout to finishing the relief well.

f) Assumptions and calculations used in Initial EP (Plan Control No.: N-10029):

- The maximum total volume during a blowout could potentially be **33,827,885 bbls** assuming 91 days for the maximum duration of a blowout, multiplied by the WCD daily uncontrolled blowout volume of **371,735 bopd.**

g) Measures taken to enhance ability to prevent a blowout:

- **Well Design**: Anadarko utilizes a systematic well design process for the planning and construction of a well operation. This process taps into the vast depth of experience Anadarko possesses in the deep water drilling arena and involves a multi-team peer review of the well design, shallow hazards, and formation pressure hazards expected during drilling. This process minimizes the potential for an unplanned well control event that could lead to a blowout. This process will also include a Registered Professional Engineer review and approval of the final casing design and cementing program.

A detailed pre-drill assessment of formation pressure provided by Anadarko's Geological and Geophysical team, along with third-party consultants, allows for a mud program that provides an overbalanced mud weight for the safe drilling of the well. For an exploration well, this may also include taking formation pressures to confirm the actual formation pressure during the well construction process to minimize the risk of an unplanned well control event. The pore pressure environment is understood due to the nearby offset wells.

The well construction process also requires a systematic review and management acceptance of the start-up preparation work for the rig and crews and the third-party technical audit work on the rig and the rig's well control equipment. This measures the rig's ability to handle an unplanned well control event and provide assurance that the rig can successfully mitigate a loss of well control event and prevent it from becoming a blowout scenario.

- **Barrier Philosophy**: For all well designs, Anadarko requires and uses a redundant barrier philosophy—that being two independent tested barriers including one mechanical barrier—across each flow path during well operations.

For the final casing string (or liner if it is the final string), there shall be two mechanical barriers in addition to cement inside the wellbore.

It is also standard practice to conduct pressure testing, in accordance with the law, to confirm integrity on all relevant barriers.

In addition, all intermediate and production casings returned to the wellhead will be locked down before subsequent wellbore construction is proceeded.

- **BOP and Well Control Equipment**: The rig will have an 18-3/4" 15k psi BOP with primary and secondary BOP control systems. The BOP will have been completely recertified compliant to OEM specifications by a qualified third-party. Prior to commencement of operations, independent third-party verification will be obtained that the sub-sea BOP is designed for the specific equipment on the rig and this specific well design. 250.731(c) and (d).

- **BOP and Well Control Equipment Testing**: To ensure effectiveness of the BOP and well control equipment, a testing program will be conducted prior to running the BOP and then during the well operations. This testing program will provide compliance with current federal regulations for pressure and function testing and will also provide periodic assurance on the performance of both primary and secondary BOP control systems including actual interface operations with the ROV and the ROV panel.

- **Well Control Training and Drills**: Anadarko requires that key nominated onshore and offshore positions, including rig contractor personnel, hold a WellCAP or equivalent well control training certificate, renewable every two years for the type of floating drilling operation being conducted. Anadarko also monitors compliance for its personnel with the federal regulations and Sub-Part O for well control training.

A comprehensive program of well control drills will be conducted offshore to ensure readiness to identify and then manage a well control situation and thereby minimize the potential for a well control event to lead to a blowout scenario.

h) Arrangements for drilling a relief well:

- Anadarko maintains a master agreement with Wild Well Control, Inc. for advice, management, engineering, well kick pre- and post-modeling, and resource support for an unplanned loss-of-well-control event. If any well control event occurs, Wild Well Control, Inc. would be contacted and mobilized if required to support Anadarko's operational team, both in the onshore and offshore locations.

- The conceptual relief well design is similar to the design of the MC 126 Y well, in that casing weights, grades, and setting points would be very similar. Site clearance letters for surface locations will be completed and deemed acceptable for drilling prior to any drilling operations. Depending on the nature of the blowout scenario, well geometry, and total depth required to intersect the blowout, previously submitted surface locations and/or additional surface locations would be submitted and all reviewed for best suitability for the location of the relief well if needed. The conceptual well design is not anticipated to take over two days to finalize upon initialization.
- Anadarko's philosophy is to carry adequate inventory in stock to drill a complete well(s) from surface to TD. Back-up long-lead equipment equivalent to the original well design will be carried in stock to allow a rapid response. This includes a spare deepwater sub-sea wellhead system and the large OD casing and connectors required. Smaller OD casing is considered widely available on the ground in the GOM and would be resourced out of existing inventory or from suppliers as required.
- Existing service agreements will be in place for support services, including drilling fluids, casing running, cementing, ROVs, solids control, mud logging, directional drilling, LWD/MWD, logging, boats, and helicopters.
- Specialist services for range finding to drill the relief well in close proximity to the original wellbore at the reservoir depth will be provided through Vector Magnetics LLC. Sperry Drilling/Halliburton and Baker Hughes have in-house personnel to supplement Vector Magnetics LLC under our existing directional drilling agreements.

For the locations proposed under this Initial EP, the maximum hydrocarbon discharge was MC 37 C-GG at 339,604 bopd based on NTL No. 2015-N01 guidance. The highest WCD for MC 36 was calculated to be MC 36 C-BB at 324,049 bopd. The highest WCD calculated for MC 80 was P-M at 268,262 bopd.

As previously denoted, the overall highest WCD for the area is MC 126 Y at 371,735 bopd as approved under Plan Control No.: N-10029 and also referenced in Plan Control No.: N-10117.

Blowout Scenario-MC 37 C-GG (Highest WCD for Cactus Bowl/Peach Bowl Prospects)

The MC 37 C-GG well will be drilled to the target(s), utilizing a MODU rig with a marine riser and subsea BOP.

The blowout scenario assumes the well has reached its objective TD and a hydrocarbon influx occurs, followed by a well control event. The subsea BOP and marine riser fail, and a blowout occurs at the seabed. The WCD scenario assumes 14" casing and an 11-7/8" liner set, and a 12-1/4" open hole drilled to the planned well total depth.

Exposed sands in the primary objective are the WCD scenario.

Estimated Flow Rate of the Potential Blowout

Category	Initial EP (Cactus Bowl)
Type of Activity	Drilling
Facility Location (area/block)	MC 37 C-GG
Facility Designation	MODU
Distance to Nearest Shoreline (miles)	51.6 miles
Uncontrolled Blowout (volume per day)	339,604 bopd
Type of Fluid(s)	Crude Oil

a) Potential for the well to bridge over:

Mechanical collapse of the reservoirs in the open-hole section of the wellbore was not considered.

During a WCD event, the open hole portion of the well will be exposed to a substantial underbalance condition. Due to the unconsolidated nature of the formations contributing flow and the relatively weak remaining exposed sediments, a significant quantity sand and heaving shale will enter the flow stream. The presence of sediments in the flow stream are excluded from Anadarko's discharge calculations and assumes no bridging will occur, however, bridging is likely to occur.

b) Likelihood and measures taken for surface and/or sub-sea intervention to stop the blowout:

The likelihood of surface intervention to stop a blowout is high. In addition to the surface intervention equipment the contracted MODU will have the equipment/ability to perform the following:

<u>ROV Secondary BOP Control System</u>: The BOP is confirmed to have a ROV Intervention Panel and circuits that have the following attributes:

- ROV Intervention is capable of Opening and Closing each Shear Ram, Ram Locks, One Pipe Ram and Disconnect the LMRP, all under MASP conditions.
- ROV Intervention is to be tested during the initial stump test and during the initial BOP latch up.
- BOP panels also can be operated by an ROV from an independent supply boat in the event of a loss-of-rig scenario.

<u>Deadman/Autoshear Function</u>: The rig is equipped with an automated sequence that closes the blind shear rams in the event of any of the following scenarios:

- Inadvertent disconnect of the LMRP
- Loss of both hydraulic pressure and electrical supply from the surface BOP control system

No human interface is required once these systems are armed.

c) Availability of a rig to drill a relief well:

Per the preliminary Mutual Aid agreements that are being worked between E&P Operators in the Gulf of Mexico, Anadarko will select from the best rig option available in the Gulf of Mexico fleet if, and when, it is required for relief well work. As of November 30, 2020, there were 16 additional rigs capable of operating under these conditions in the Gulf of Mexico. A rig that could be used to drill a relief well is the *Diamond Ocean BlackHornet* drillship, which is a drillship capable of drilling in 10,000 ft. of water without any constraints. The rig is currently under contract to BP and working in the EGOM area. There are no nearby platforms from which to drill a relief well.

It is not feasible to drill a relief well from land.

d) Rig constraints:

A rig capable of drilling in 5,000' of water to a total depth of greater than 20,000' TVD with a 15k stack is required for any relief well operations. The *Diamond Ocean BlackHornet* drillship meets these requirements.

e) Time taken to mobilize a rig and drill a relief well (Cactus Bowl):

An estimate of 7-21 days is required to suspend operations on a deepwater GOM well and begin drilling the relief well. This assumes 0-14 days to suspend current operations on an existing well and 7 days to mobilize and be ready to spud the relief well. The estimated time to drill the relief well to a blowout originating from the target zone is 50-54 days, for a total estimated time of 57-75 days from time of blowout to finishing the relief well.

f) Assumptions and calculations used in Oil Spill Response Plan or Initial EP (Cactus Bowl):

The maximum total volume during a blowout could potentially be 25,470,300 bopd assuming 75 days for the maximum duration of a blowout, multiplied by the WCD daily uncontrolled blowout volume of 339,604 bopd.

g) Measures taken to enhance ability to prevent a blowout:

- **Well Design**: Anadarko utilizes a systematic well design process for the planning and construction of a well operation. This process taps into the vast depth of experience Anadarko possesses in the deepwater drilling arena and involves a multi-team peer review of the well design, shallow hazards, and formation pressure hazards expected during drilling. This process minimizes the potential for an unplanned well control event that could lead to a blowout. This process will also include a Registered Professional Engineer review and approval of the final casing design and cementing program.

  A detailed pre-drill assessment of formation pressure provided by Anadarko's Geological and Geophysical team, along with third-party consultants, allows for a mud program that provides an overbalanced mud weight for the safe drilling of the well. For an exploration well, this may also include taking formation pressures to confirm the actual formation pressure during the well construction process to minimize the risk of an unplanned well control event. The pore pressure environment is understood due to the nearby offset wells.

  The well construction process also requires a systematic review and management acceptance of the start-up preparation work for the rig and crews and the third-party technical audit work on the rig and the rig's well control equipment. This measures the rig's ability to handle an unplanned well control event and provide assurance that the rig can successfully mitigate a loss of well control event and prevent it from becoming a blowout scenario.

- **Barrier Philosophy**: For all well designs, Anadarko requires and uses a redundant barrier philosophy–that being two independent tested barriers including one mechanical barrier across each flow path during well operations.

  For the final casing string (or liner if it is the final string), there shall be two mechanical barriers in addition to cement inside the wellbore.

It is also standard practice to conduct pressure testing, in accordance with the law, to confirm integrity on all relevant barriers.

In addition, all intermediate and production casings returned to the wellhead will be locked down before subsequent wellbore construction is proceeded.

- **BOP and Well Control Equipment**: The rig will have an 18-3/4" 15k psi BOP with primary and secondary BOP control systems. The BOP will have been completely recertified compliant to OEM specifications by a qualified third-party. Prior to commencement of operations, independent third-party verification will be obtained that the sub-sea BOP is designed for the specific equipment on the rig and this specific well design. 250.731(c) and (d).

- **BOP and Well Control Equipment Testing**: To ensure effectiveness of the BOP and well control equipment, a testing program will be conducted prior to running the BOP and then during the well operations. This testing program will provide compliance with current federal regulations for pressure and function testing and will also provide periodic assurance on the performance of both primary and secondary BOP control systems including actual interface operations with the ROV and the ROV panel.

- **Well Control Training and Drills**: Anadarko requires that key nominated onshore and offshore positions, including rig contractor personnel, hold a WellCAP or equivalent well control training certificate, renewable every two years for the type of floating drilling operation being conducted. Anadarko also monitors compliance for its personnel with the federal regulations and Sub-Part O for well control training.

  A comprehensive program of well control drills will be conducted offshore to ensure readiness to identify and then manage a well control situation and thereby minimize the potential for a well control event to lead to a blowout scenario.

h) Arrangements for drilling a relief well:

- Anadarko maintains a master agreement with Wild Well Control, Inc. for advice, management, engineering, well kick pre- and post-modeling, and resource support for an unplanned loss-of-well-control event. If any well control event occurs, Wild Well Control, Inc. would be contacted and mobilized if required to support Anadarko's operational team, both in the onshore and offshore locations.

- The conceptual relief well design is similar to the design of the MC 126 Y well, in that casing weights, grades, and setting points would be very similar. Site clearance letters for surface locations will be completed and deemed acceptable for drilling prior to any drilling operations. Depending on the nature of the blowout scenario, well geometry, and total depth required to intersect the blowout, previously submitted surface locations and/or additional surface locations would be submitted and all reviewed for best suitability for the location of the relief well if needed. The conceptual well design is not anticipated to take over two days to finalize upon initialization.

- Anadarko's philosophy is to carry adequate inventory in stock to drill a complete well(s) from surface to TD. Back-up long-lead equipment equivalent to the original well design will be carried in stock to allow a rapid response. This includes a spare deepwater subsea wellhead system and the large OD casing and connectors required. Smaller OD casing is considered widely available on the ground in the GOM and would be resourced out of existing inventory or from suppliers as required.

- Existing service agreements will be in place for support services, including drilling fluids, casing running, cementing, ROVs, solids control, mud logging, directional drilling, LWD/MWD, logging, boats, and helicopters.

- Specialist services for range finding to drill the relief well in close proximity to the original wellbore at the reservoir depth will be provided through Vector Magnetics LLC. Sperry Drilling/Halliburton and Baker Hughes have in-house personnel to supplement Vector Magnetics LLC under our existing directional drilling agreements.

g) Measures taken to enhance ability to prevent a blowout:

- **Well Design**: Anadarko utilizes a systematic well design process for the planning and construction of a well operation. This process taps into the vast depth of experience Anadarko possesses in the deepwater drilling arena and involves a multi-team peer review of the well design, shallow hazards, and formation pressure hazards expected during drilling. This process minimizes the potential for an unplanned well control event that could lead to a blowout. This process will also include a Registered Professional Engineer review and approval of the final casing design and cementing program.

  A detailed pre-drill assessment of formation pressure provided by Anadarko's Geological and Geophysical team, along with third-party consultants, allows for a mud program that provides an overbalanced mud weight for the safe drilling of the well. For an exploration well, this may also include taking formation pressures to confirm the actual formation pressure during the well construction process to minimize the risk of an unplanned well control event. The pore pressure environment is understood due to the nearby offset wells.

  The well construction process also requires a systematic review and management acceptance of the start-up preparation work for the rig and crews and the third-party technical audit work on the rig and the rig's well control equipment. This measures the rig's ability to handle an unplanned well control event and provide assurance that the rig can successfully mitigate a loss of well control event and prevent it from becoming a blowout scenario.

- **Barrier Philosophy**: For all well designs, Anadarko requires and uses a redundant barrier philosophy–that being two independent tested barriers including one mechanical barrier across each flow path during well operations.

For the final casing string (or liner if it is the final string), there shall be two mechanical barriers in addition to cement inside the wellbore.

It is also standard practice to conduct pressure testing, in accordance with the law, to confirm integrity on all relevant barriers.

In addition, all intermediate and production casings returned to the wellhead will be locked down before subsequent wellbore construction is proceeded.

- **BOP and Well Control Equipment**: The rig will have an 18-3/4" 15k psi BOP with primary and secondary BOP control systems. The BOP will have been completely recertified compliant to OEM specifications by a qualified third-party. Prior to commencement of operations, independent third-party verification will be obtained that the sub-sea BOP is designed for the specific equipment on the rig and this specific well design. 250.731(c) and (d).

- **BOP and Well Control Equipment Testing**: To ensure effectiveness of the BOP and well control equipment, a testing program will be conducted prior to running the BOP and then during the well operations. This testing program will provide compliance with current federal regulations for pressure and function testing and will also provide periodic assurance on the performance of both primary and secondary BOP control systems including actual interface operations with the ROV and the ROV panel.

- **Well Control Training and Drills**: Anadarko requires that key nominated onshore and offshore positions, including rig contractor personnel, hold a WellCAP or equivalent well control training certificate, renewable every two years for the type of floating drilling operation being conducted. Anadarko also monitors compliance for its personnel with the federal regulations and Sub-Part O for well control training.

  A comprehensive program of well control drills will be conducted offshore to ensure readiness to identify and then manage a well control situation and thereby minimize the potential for a well control event to lead to a blowout scenario.

h) Arrangements for drilling a relief well:

- Anadarko maintains a master agreement with Wild Well Control, Inc. for advice, management, engineering, well kick pre- and post-modeling, and resource support for an unplanned loss-of-well-control event. If any well control event occurs, Wild Well Control, Inc. would be contacted and mobilized if required to support Anadarko's operational team, both in the onshore and offshore locations.

- The conceptual relief well design is similar to the design of the MC 37 C-GG, in that casing weights, grades, and setting points would be very similar. Site clearance letters for surface locations will be completed and deemed acceptable for drilling prior to any drilling operations. Depending on the nature of the blowout scenario, well geometry, and total depth required to intersect the blowout, previously submitted surface locations and/or additional surface locations would be submitted and all reviewed for best suitability for the location of the relief well if needed. The conceptual well design is not anticipated to take over two days to finalize upon initialization.

- Anadarko's philosophy is to carry adequate inventory in stock to drill a complete well(s) from surface to TD. Back-up long-lead equipment equivalent to the original well design will be carried in stock to allow a rapid response. This includes a spare deepwater subsea wellhead system and the large OD casing (36", 28", 22", 14", and 13-5/8") and connectors required. Smaller OD casing (9-7/8", 7-3/4") is considered widely available on the ground in the GOM and would be resourced out of existing inventory or from suppliers as required.

- Existing service agreements will be in place for support services, including drilling fluids, casing running, cementing, ROVs, solids control, mud logging, directional drilling, LWD/MWD, logging, boats, and helicopters.

- Specialist services for range finding to drill the relief well in close proximity to the original wellbore at the reservoir depth will be provided through Vector Magnetics LLC. Sperry Drilling/Halliburton and Baker Hughes have in-house personnel to supplement Vector Magnetics LLC under our existing directional drilling agreements.

SECTION C
GEOLOGICAL AND GEOPHYSICAL INFORMATION

(a) Geological Description

Discussions regarding geologic information are considered proprietary and have been omitted from this public copy of the Initial EP.

(b) Structure Contour Maps

Current structure maps drawn to the top of each productive hydrocarbon sand showing the entire lease block, the surface locations of each well and locations of geological cross-sections, are enclosed as **Attachment C-1. (Omitted, proprietary.)**

(c) Interpreted 2-D and/or 3-D Seismic Lines

Interpreted seismic lines are enclosed as **Attachment C-2. (Omitted, proprietary.)**

(d) Geological Structure Cross-Sections

Interpreted geological structure cross-sections showing the location and depth of each proposed well are enclosed as **Attachment C-3. (Omitted, proprietary.)**

(e) Shallow Hazards Report

A Shallow Hazards Report prepared by Ocean Geo Solutions prepared a Shallow Hazard Report covering MC 36-37, MC 80-82, MC 124-126 and MC 168 (Project No. 2019-221, April 29, 2020) which was submitted to BOEM with Initial EP, Plan Control No: N-10117. Project No. 2019-221 covered Cactus Bowl/Peach Bowl.

(e) Shallow Hazards Report

A Shallow Hazards Report prepared by Ocean Geo Solutions prepared a Shallow Hazard Report covering MC 36-37, MC 80-82, MC 124-126 and MC 168 (Project No. 2019-221, April 29, 2020) which was submitted to BOEM with Initial EP, Plan Control No: N-10117. Project No. 2019-221 covered Cactus Bowl/Peach Bowl.

(f) Shallow Hazards Assessment

Shallow Hazards Site Clearance Letters for the proposed well locations in MC 36, 37 and 80 are enclosed as **Attachment C-4.** Multiple locations are denoted in a site clearance letter if within the same 500' radius. Refer to the Confidential Plat, **Attachment A-2**, for locations.

Site Clearance Letter:	Also Covers:	Site Clearance Letter:	Also Covers:
MC 36 C-B	MC 36 C-BB	MC 36 P-A	MC 36 P-AA
MC 36 C-C	MC 36 C-CC	MC 36 P-B	MC 36 P-BB
MC 36 C-E	MC 36 C-EE/MC 37 C-EEE/MC 37 C-EEEE	MC 36 P-C	MC 36 P-CC
MC 37 C-AAAA	MC 36 C-A/MC 36 C-AA/MC 37 C-AAA	MC 36 P-D	MC 36 P-DD
MC 37 C-DD	MC 36 C-D/MC 36 C-DDD/MC 36 C-DDDD	MC 36 P-E	MC 36 P-EE
MC 37 C-FF	MC 37 C-F	MC 36 P-F	MC 36 P-FF
MC 37 C-GG	MC 37 C-G	MC 36 P-G	MC 36 P-GG
MC 37 C-H	MC 37 C-HH	MC 36 P-H	MC 36 P-HH
MC 37 C-I	MC 37 C-II	MC 80 P-I	MC 80 P-II
MC 37 C-J	MC 37 C-JJ	MC 80 P-J	MC 80 P-JJ
		MC 80 P-K	MC 80 P-KK
		MC 80 P-L	MC 80 L-LL
		MC 80 M	MC 80 M-MM

*MC 36 C-A, C-AA and C-D have a surface location in MC 37.

(g) High-resolution Seismic Lines

High resolution seismic lines are enclosed as **Attachment C-5.**

(h) Stratigraphic Column

A generalized stratigraphic column depicting the wells from the seafloor to total depth is included as **Attachment C-6.**

(i) Time vs. Depth Tables

The proposed activities under this Initial EP are not considered to be in areas where there is no well control. Therefore, a seismic travel time versus depth table is not required per NTL No. 2008-G04.

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Cactus Prospect
Mississippi Canyon, Block MC36,
Offshore Gulf of Mexico

Description:
Proposed MC36_C-B Well Location

Project Number:
2020-318

Report Status:
Final

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www.oceangeosolutions.com

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	…………………. A Haigh
	Quality Assurance	…………………. D Haigh

Revision	**Date**	**Title**
0	August 25, 2020	Draft
1	October 2, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

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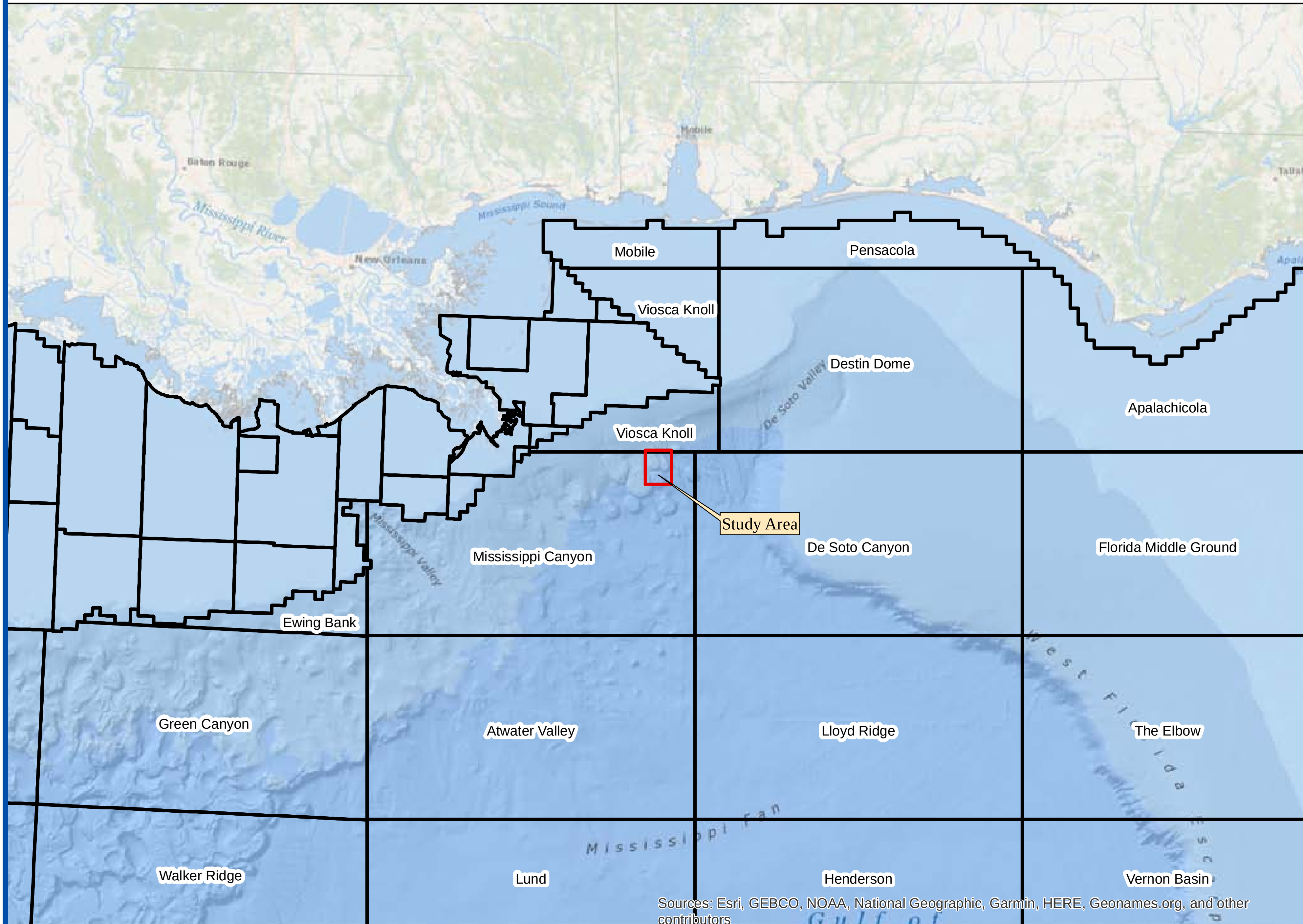
Location Map



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WELL CLEARANCE LETTER – PROPOSED MC36_C-B WELL LOCATION

October 2, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC36_C-B Well Location
Mississippi Canyon Block MC36
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC36_C-B Well Location, Mississippi Canyon Area (OCS-G-35308). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,446ft below sea surface (7,003ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC36_C-B well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC36_C-B Well Location lies in the northeast part of Block MC36 (OCS-G-35308).

Proposed MC36_C-B Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	57.044"	North	Easting	1,266,825	US ft. E
Longitude	88°	10'	07.165"	West	Northing	10,513,720	US ft. N
Latitude Decimal			28.9658456				
Longitude Decimal			-88.168657				
FEL Mississippi Canyon 036			375ft	US ft.	Inline	12825	
FNL Mississippi Canyon 036			4,040ft	US ft.	Crossline	18025	
Water Depth: -3,443ft			Slope: 3.8° SE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.0 Miles @ 36.0°		

Proposed MC36_C-BB Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	56.549"	North	Easting	1,266,825	US ft. E
Longitude	88°	10'	07.160"	West	Northing	10,513,670	US ft. N
Latitude Decimal			28.9657081				
Longitude Decimal			-88.1686555				
FEL Mississippi Canyon 036			375ft	US ft.	Inline	12824	
FNL Mississippi Canyon 036			4,090ft	US ft.	Crossline	18021	
Water Depth: -3,446ft			Slope: 3.5° SE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.0 Miles @ 36.0°		

Location MC36_C-BB is 50ft from MC36_C-B on a bearing of 180°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC36_C-B well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC36_C-B well location is -3,443ft below sea surface (Figure 1). The seafloor slopes to the southeast at 3.8°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC36_C-B well location is in the northeast part of block MC36. The proposed well is located in an area of relatively smooth seabed located on the eastern part of Horn Dome.

The proposed location is located approximately 1,400ft to the west of a slump scarp and associated debris flow to the east that occurs on the west flank of the Dorsey Canyon. These failures are retrogressive seabed failures. Maximum observed retrogressive cut backs in this area appear to be around 1,000ft.

A fault intersects seabed around 1,000ft to the north and northwest of the proposed location. This fault is downthrown to the north and does not impact the proposed wellsite.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,623ft below sea surface (180ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,623ft below sea surface (180ft below seabed).

4.3 Unit B

The upper part of Unit B from -3,623ft to -3,949ft below sea surface (180ft to 506ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The proposed location is on the updip extremity of these deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -3,949ft below sea surface (506ft below seabed) to -4,101ft below sea surface (658ft below seabed) presents acoustically as well-layered, low-amplitude reflectors with clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft.

Horizon H10 marks the base of Unit B, occurring at -4,101ft below sea surface (658ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,101ft to -4,511ft below sea surface (658ft to 1,068ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit C at the proposed well or within 2,000ft radius.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -4,511ft below sea surface (1,068ft below seabed).

4.5 Unit D

Unit D from -4,511ft to -5,116ft below sea surface (1,068ft to 1,673ft below seabed) is characterized by slightly-chaotic and well-layered, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sand. This interval appears presents an acoustic character suggestive of a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,000ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -5,116ft below sea surface (1,673ft below seabed).

4.6 Unit E

Unit E from -5,116ft to -6,588ft below sea surface (1,673ft to 3,143ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~2,000ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit E.

Horizon H40 marks the base of Unit E at -6,588ft below sea surface (3,145ft below seabed).

4.7 Unit F

Unit F from -6,588ft to -7,582ft below sea surface (3,145ft to 4,139ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~2,300ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit F.

Horizon H50 marks the base of Unit F at -7,582ft below sea surface (4,139ft below seabed).

4.8 Unit G

Unit G from -7,582ft to -10,446ft below sea surface (4,139ft to 7,003ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft.

The well-path will traverse two faults within Unit G at -8,559ft below sea surface (5,116ft below seabed) and at -9,448ft below sea surface (6,055ft below seabed). Thses fault are downthrown around 30ft to the west. Minor wellbore stability and drilling fluid circulation problmes may occur at the level of the faults.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,446ft below sea surface (7,003ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,623ft to -3,949ft below sea surface (180ft to 506ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -4,511ft to -5,116ft below sea surface (1,068ft to 1,673ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,116ft to -6,588ft below sea surface (1,673ft to 3,145ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -6,588ft to -7,582ft below sea surface (3,145ft to 4,139ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None hazards or problems interpreted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,623ft to -3,949ft below sea surface (180ft to 506ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  None Predicted.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -4,511ft to -5,116ft below sea surface (1,068ft to 1,673ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,116ft to -6,588ft below sea surface (1,673ft to 3,145ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -6,588ft to -7,582ft below sea surface (3,145ft to 4,139t below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit G

  Minor wellbore stability and drilling fluid circulation problems may occur within Unit G.

The well-path will traverse two faults within Unit G at -8,559ft below sea surface (5,116ft below seabed) and at -9,448ft below sea surface (6,055ft below seabed). Thses fault are downthrown around 30ft to the west. Minor wellbore stability and drilling fluid circulation problmes may occur at the level of the faults.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:

Proposed MC36_C-B Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

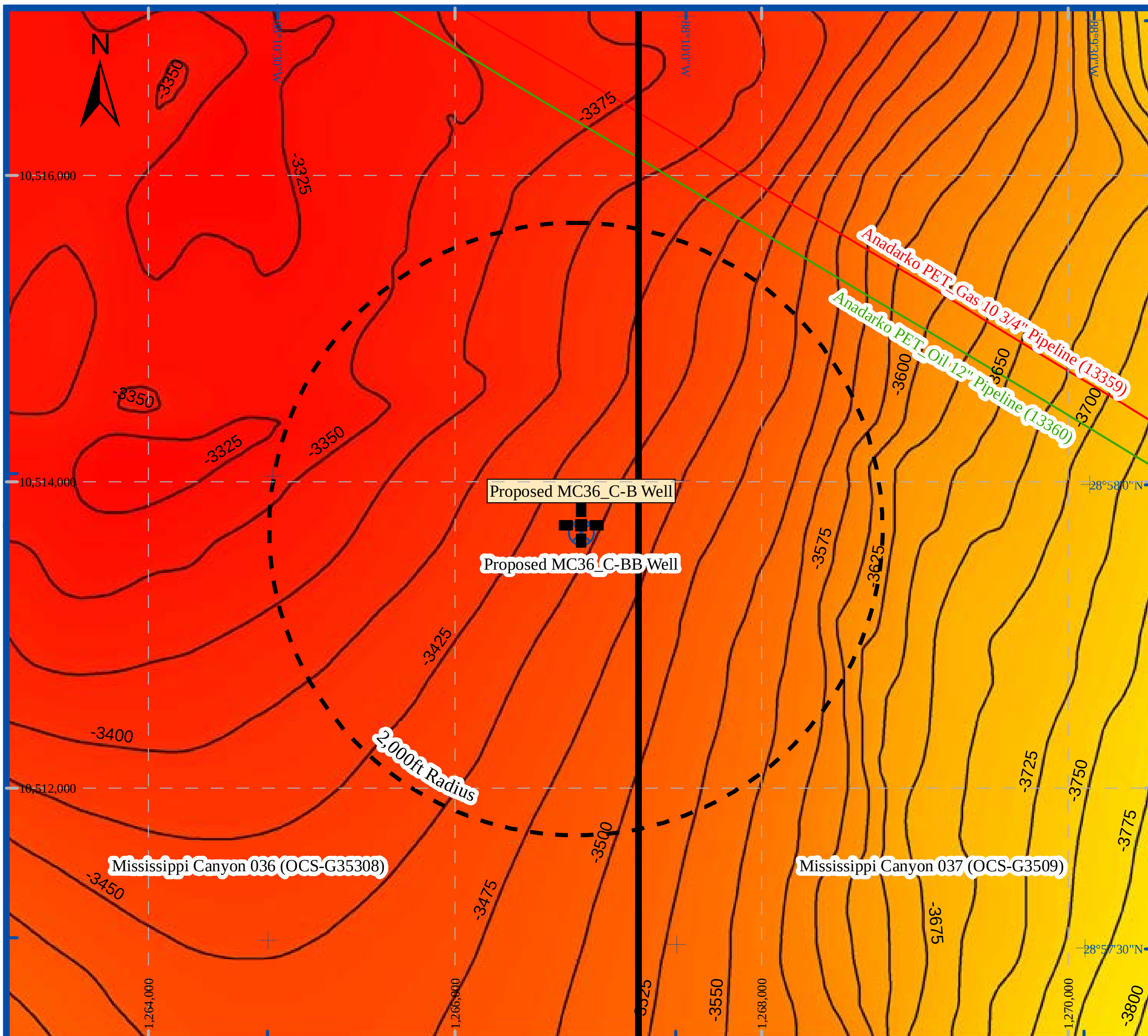
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC36_C-B Well Location (1,266,825ft E / 10,513,720ft N)

Proposed MC36_C-BB Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

-3443 Depth in feet below sea surface to seabed, contoured at 25ft intervals

-5400 -5000 -4600 -4200 -3800 -3400

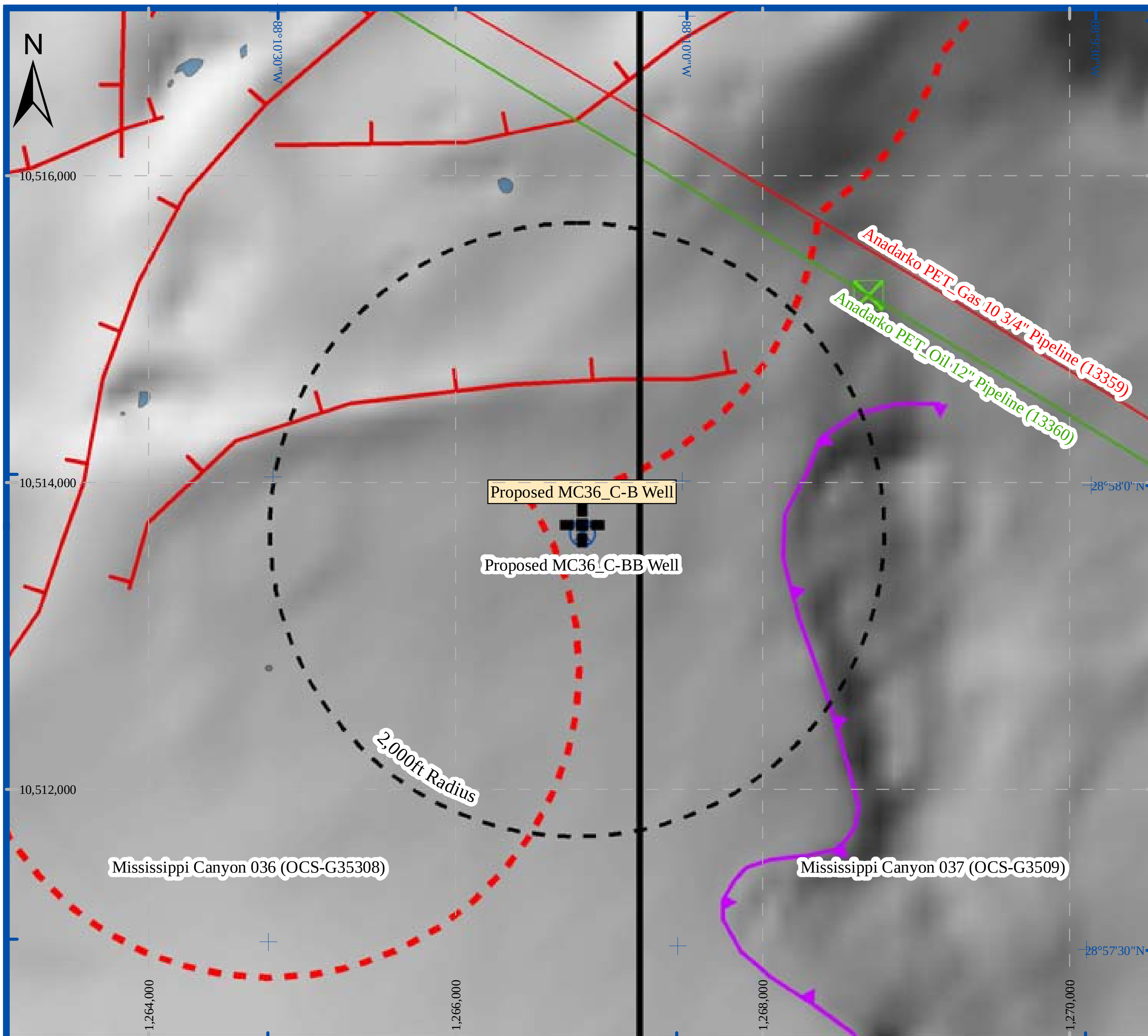
Seabed Depth (Feet)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 1 (MC36_C-B)



Seabed Morphology Extract

Proposed MC36_C-B Well Location (1,266,825ft E / 10,513,720ft N)

Proposed MC36_C-BB Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

Slump scar

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

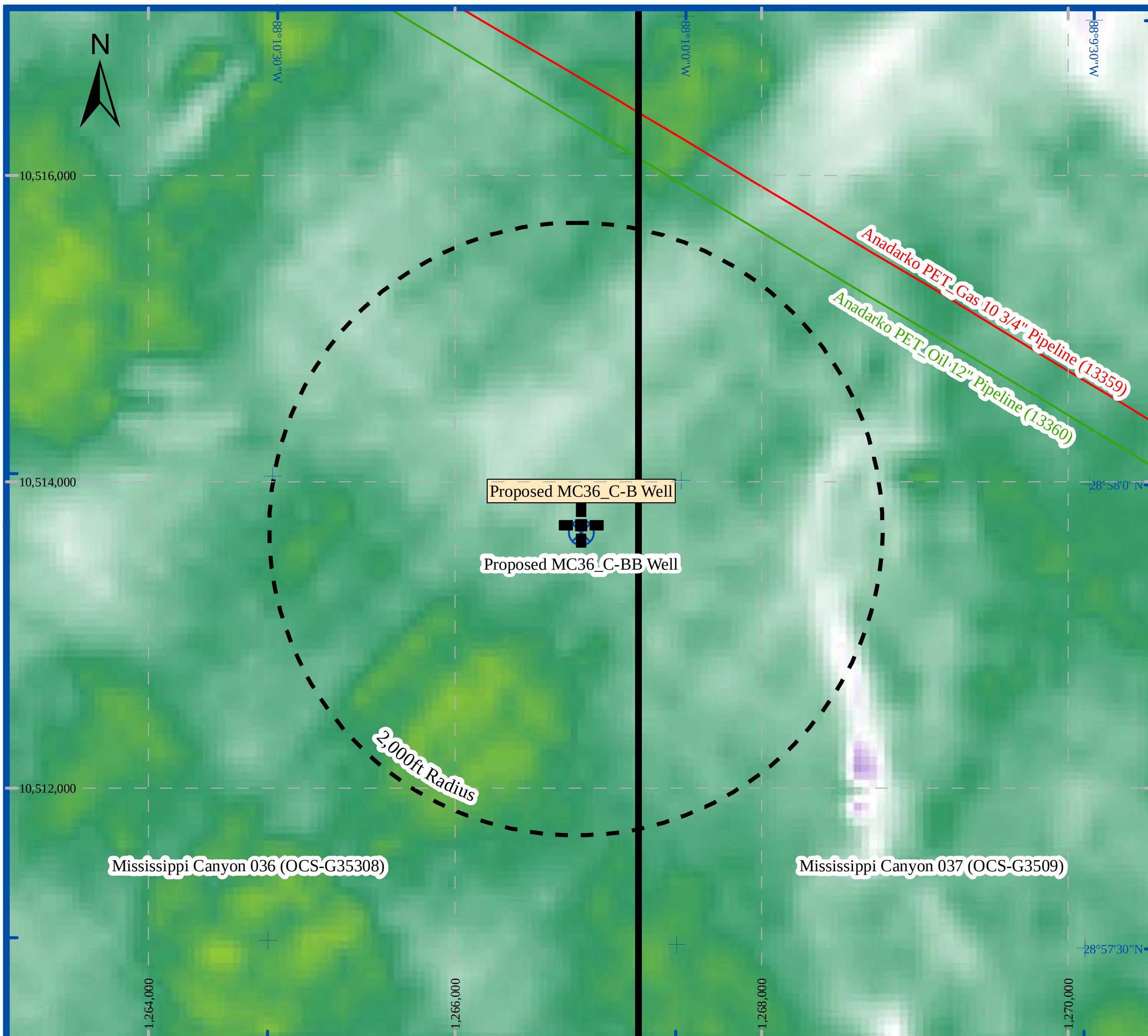
Sonar contacts, interpreted modern debris

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2 (MC36_C-B)



Seabed Amplitude Extract

Proposed MC36_C-B Well Location
(1,266,825ft E / 10,513,720ft N)

Proposed MC36_C-BB Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32

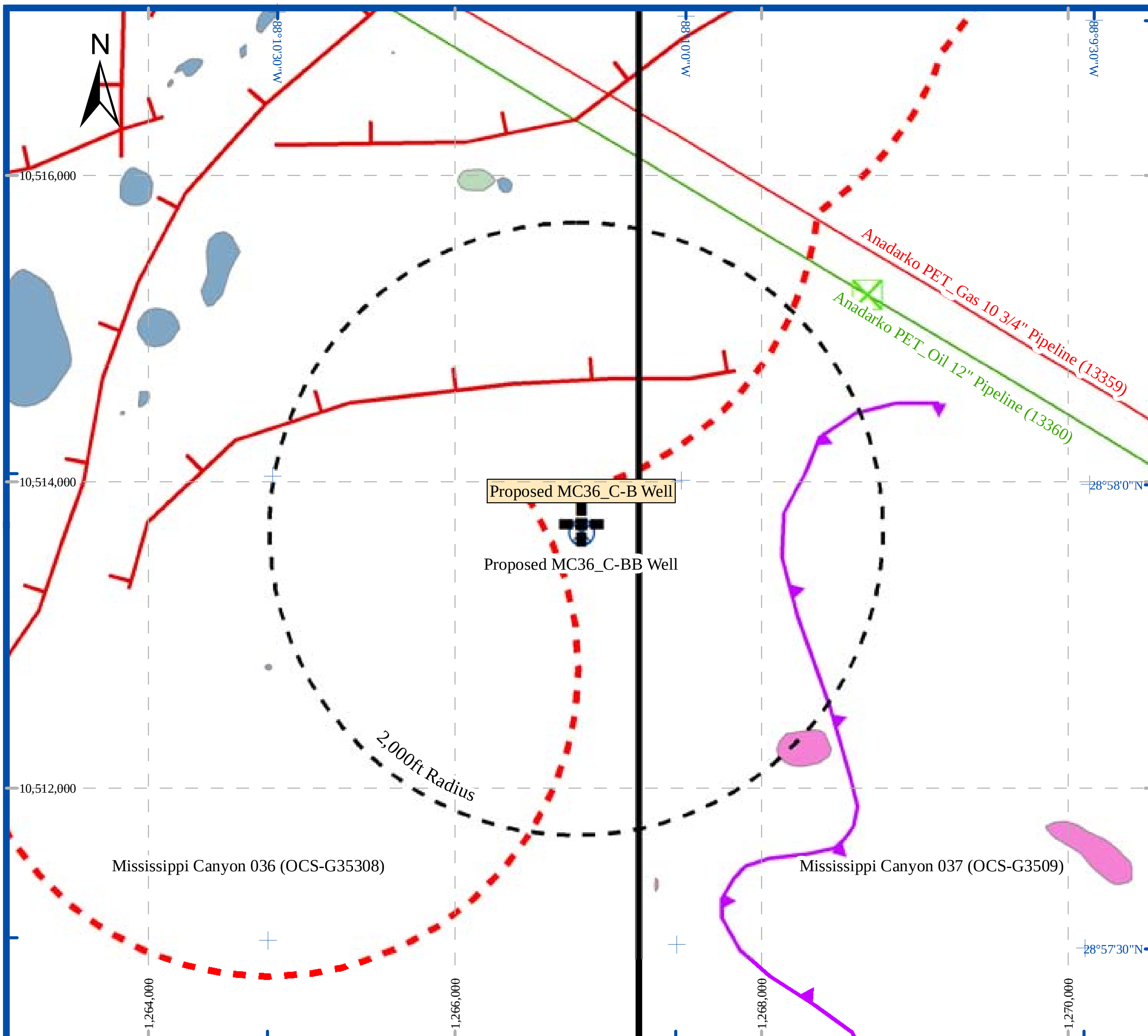
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC36_C-B)



Geohazard Summary Extract

Proposed MC36_C-B Well Location (1,266,825ft E / 10,513,720ft N)

Proposed MC36_C-BB Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Slump scar

Hardgrounds exposures at seabed mapped from side scan sonar data

Sonar contacts, interpreted modern debris

Slight and Moderate Risk of Gas within Unit A

Slight, Moderate, and High Risk of Gas within Unit B

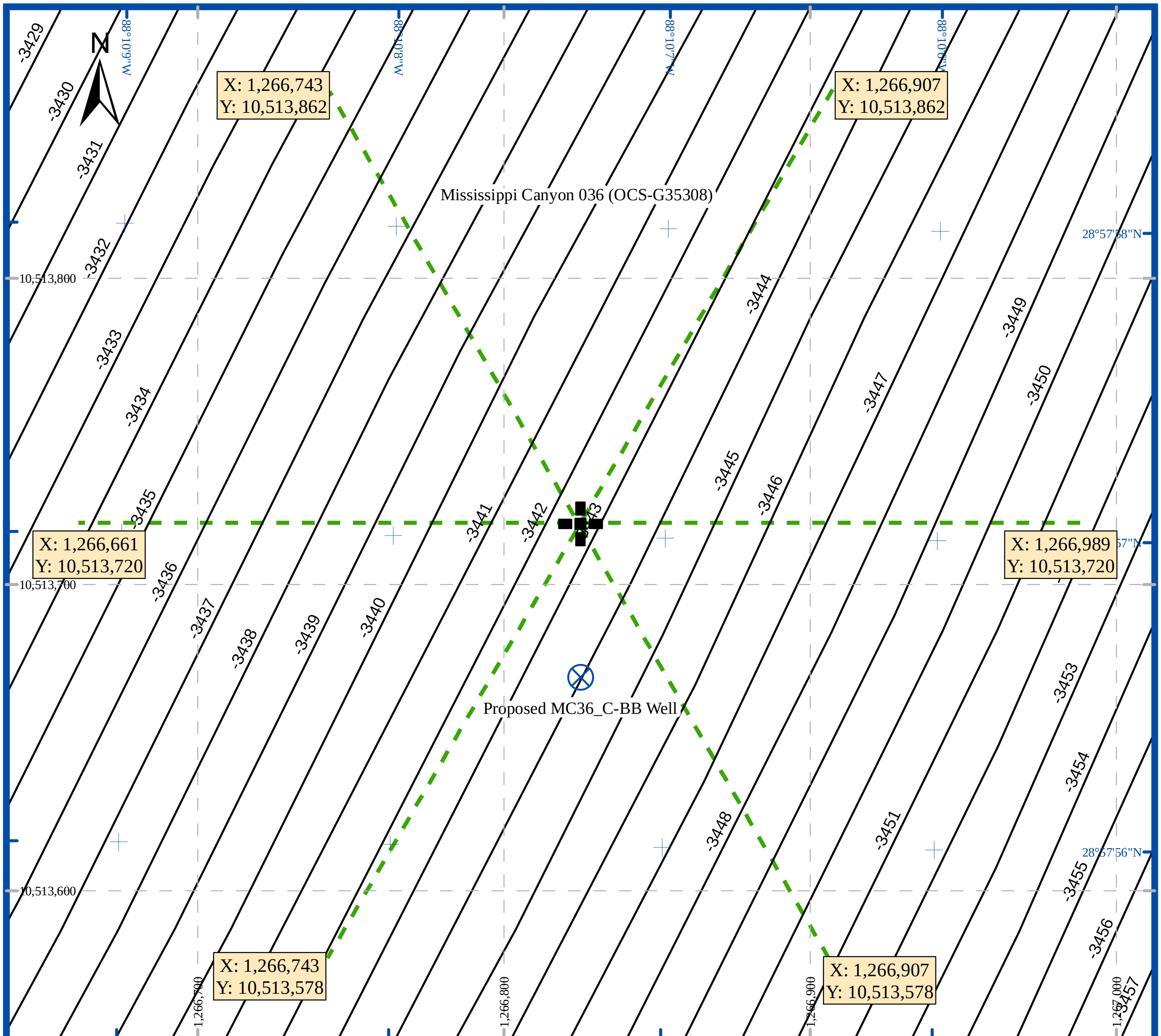
Slight and Moderate Risk of Gas within Unit G

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC36_C-B)



ROV Plat (MC36_C-B)

Proposed MC36_C-B Well Location
(1,266,825ft E / 10,513,720ft N)

Proposed MC36_C-BB Well Location

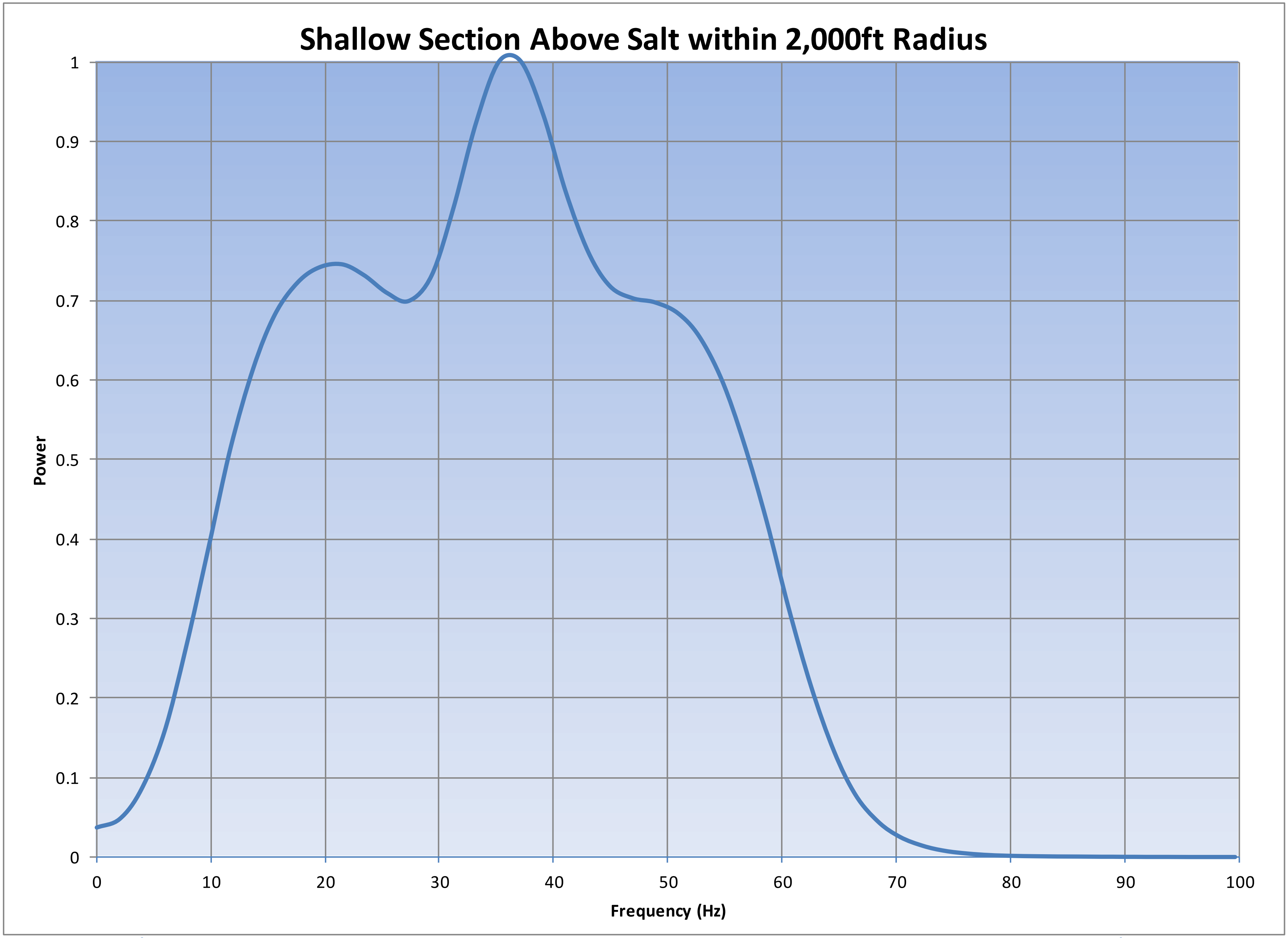
-3443 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC36_C-B)



MC36_C-B	Power Spectrum	Figure 10

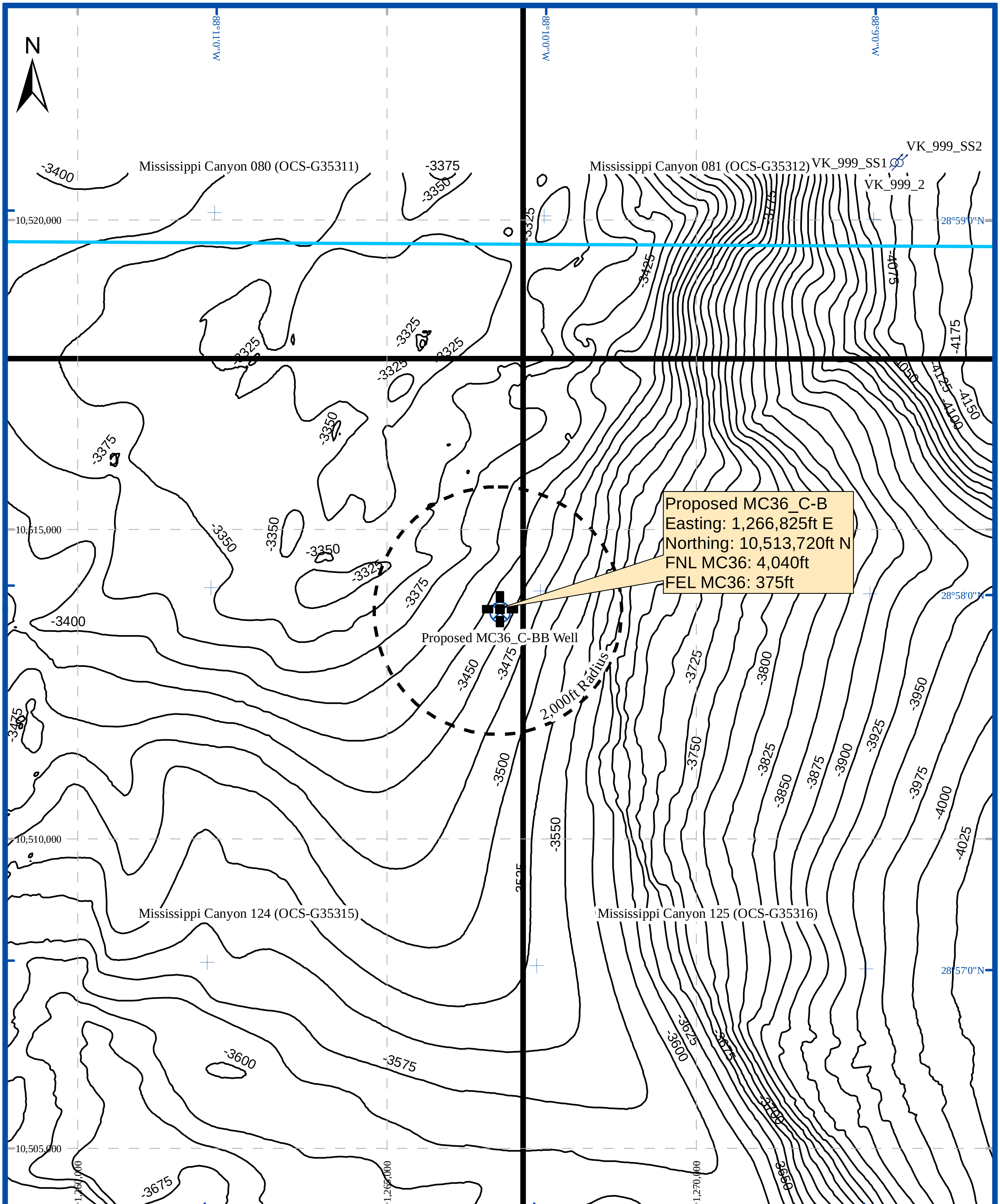


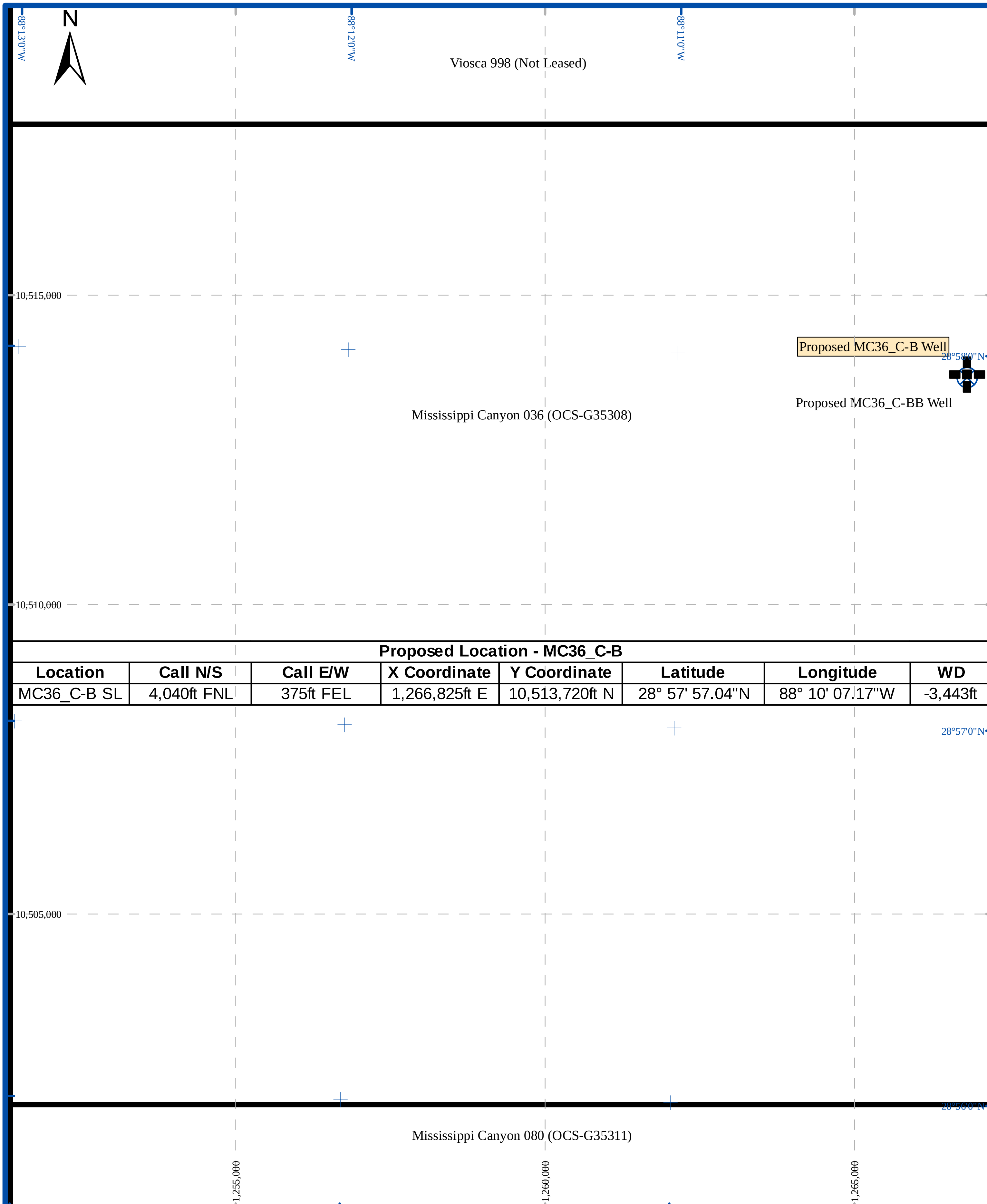
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC36_C-B

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC36_C-B SL	4,040ft FNL	375ft FEL	1,266,825ft E	10,513,720ft N	28° 57' 57.04"N	88° 10' 07.17"W	-3,443ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

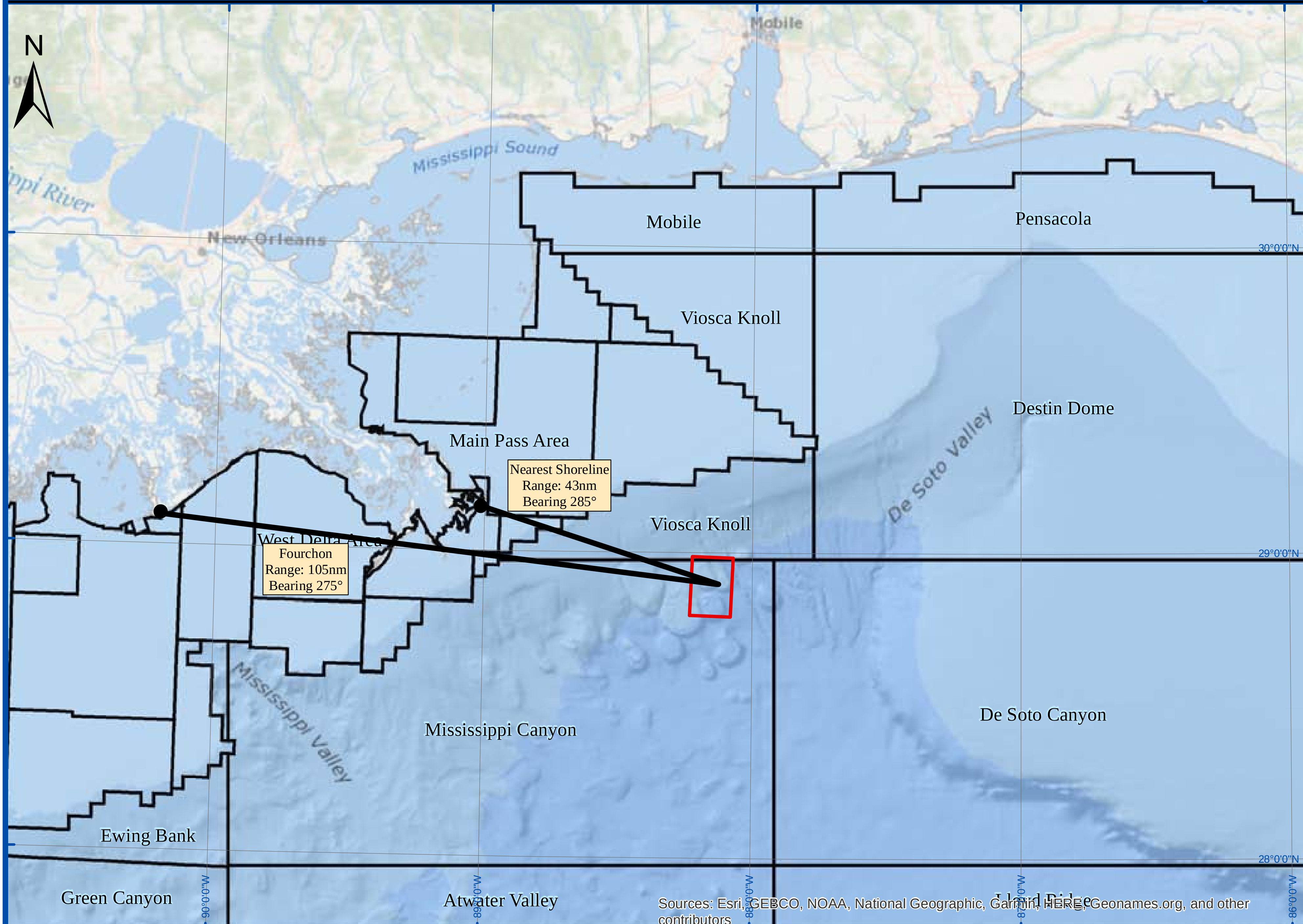
0 150 300 600 Meters

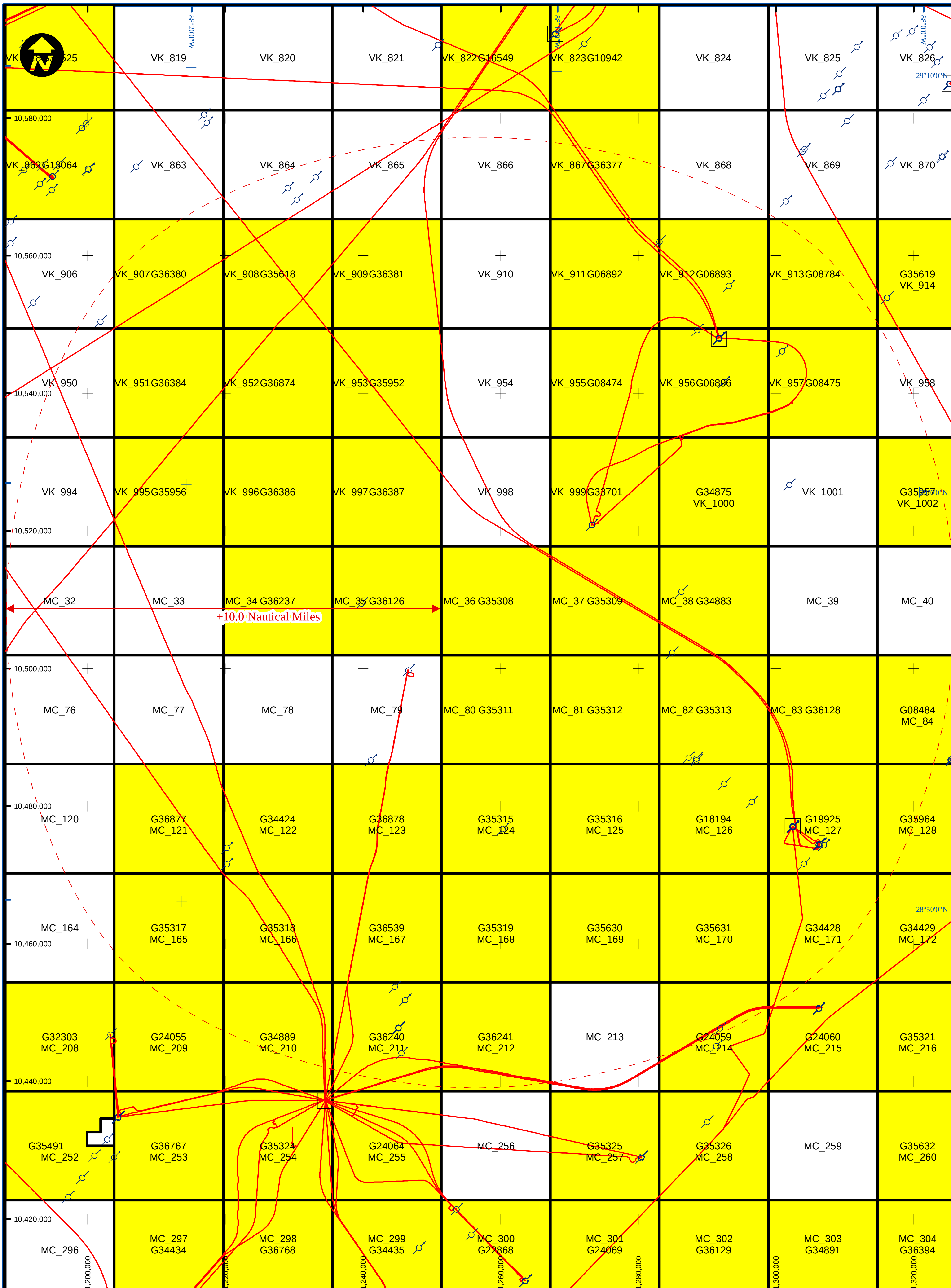
Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 36

Figure 13





Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 36

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC36_C-B Well Location

October 2, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 36
(OCS-G OCS-G-35308)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_C-B well location with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.5 seconds two-way time (TWT), -10,446ft below sea surface (7,003ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 3.8° to the southeast A region of past surficial instability occurs around 1,400ft to the east of the proposed well. A fault at seafloor occurs around 1,000ft north and northwest of the proposed well.

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

No exsiting wells or pipelines occur within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas is assigned at the propsoed well or within 2,000ft.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect two faults within Unit G.

Proposed MC36_C-B Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	57.044”	North	Easting	1,266,825	US ft. E
Longitude	88°	10’	07.165”	West	Northing	10,513,720	US ft. N
Latitude Decimal	28.9658456						
Longitude Decimal	-88.168657						
FEL Mississippi Canyon 036	375ft	US ft.	Inline	12825			
FNL Mississippi Canyon 036	4,040ft	US ft.	Crossline	18025			
Water Depth: -3,443ft	Slope: 3.8° SE						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.0 Miles @ 36.0°					

Proposed MC36_C-BB Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	56.549”	North	Easting	1,266,825	US ft. E
Longitude	88°	10’	07.160”	West	Northing	10,513,670	US ft. N
Latitude Decimal	28.9657081						
Longitude Decimal	-88.1686555						
FEL Mississippi Canyon 036	375ft	US ft.	Inline	12824			
FNL Mississippi Canyon 036	4,090ft	US ft.	Crossline	18021			
Water Depth: -3,446ft	Slope: 3.5° SE						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.0 Miles @ 36.0°					

Conclusions and Recommendations. No major problems are anticipated at the seabed.

No risk of gas is assigned at the proposedd well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect two faults within Unit G.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC36_C-B Well Location

Anadarko Petroleum Corporation

October 2, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC36_C-B Well Location (OCS-G-35308)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_C-B with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 2,188ft to the southwest.

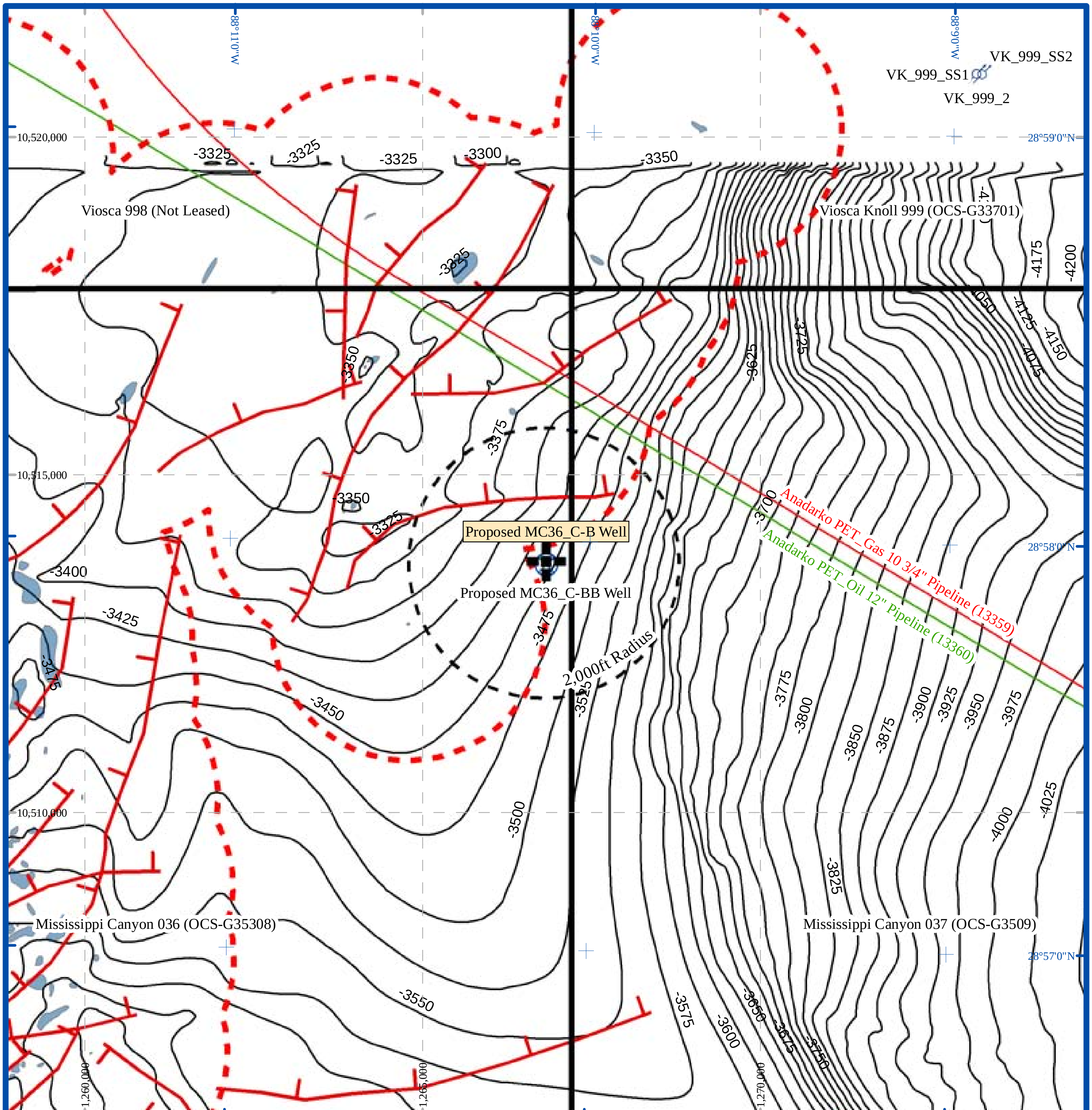
Proposed MC36_C-B Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	57.044”	North	Easting	1,266,825	US ft. E
Longitude	88°	10’	07.165”	West	Northing	10,513,720	US ft. N
Latitude Decimal			28.9658456				
Longitude Decimal			-88.168657				
FEL Mississippi Canyon 036			375ft		US ft.	Inline	12825
FNL Mississippi Canyon 036			4,040ft		US ft.	Crossline	18025
Water Depth: -3,443ft			Slope: 3.8° SE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon			105 Nautical Miles @ 275°	
Nearest Manned Platform			A Ram-Powell in VK956			8.0 Miles @ 36.0°	

Proposed MC36_C-BB Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	56.549”	North	Easting	1,266,825	US ft. E
Longitude	88°	10’	07.160”	West	Northing	10,513,670	US ft. N
Latitude Decimal			28.9657081				
Longitude Decimal			-88.1686555				
FEL Mississippi Canyon 036			375ft		US ft.	Inline	12824
FNL Mississippi Canyon 036			4,090ft		US ft.	Crossline	18021
Water Depth: -3,446ft			Slope: 3.5° SE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon			105 Nautical Miles @ 275°	
Nearest Manned Platform			A Ram-Powell in VK956			8.0 Miles @ 36.0°	

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

Conclusions and Recommendations: The proposed MC36_C-B and proposed MC36_C-BB well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC36_C-B Well Location (1,266,825ft E / 10,513,720ft N)

Proposed MC36_C-BB Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

-3443 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Cactus Prospect
Mississippi Canyon, Block MC36,
Offshore Gulf of Mexico

Description:
Proposed MC36_C-C Well Location

Project Number:
2020-319

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	A.A. .... A Haigh
	Quality Assurance	D Haigh .... D Haigh

Revision	**Date**	**Title**
0	August 27, 2020	Draft
1	October 02, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

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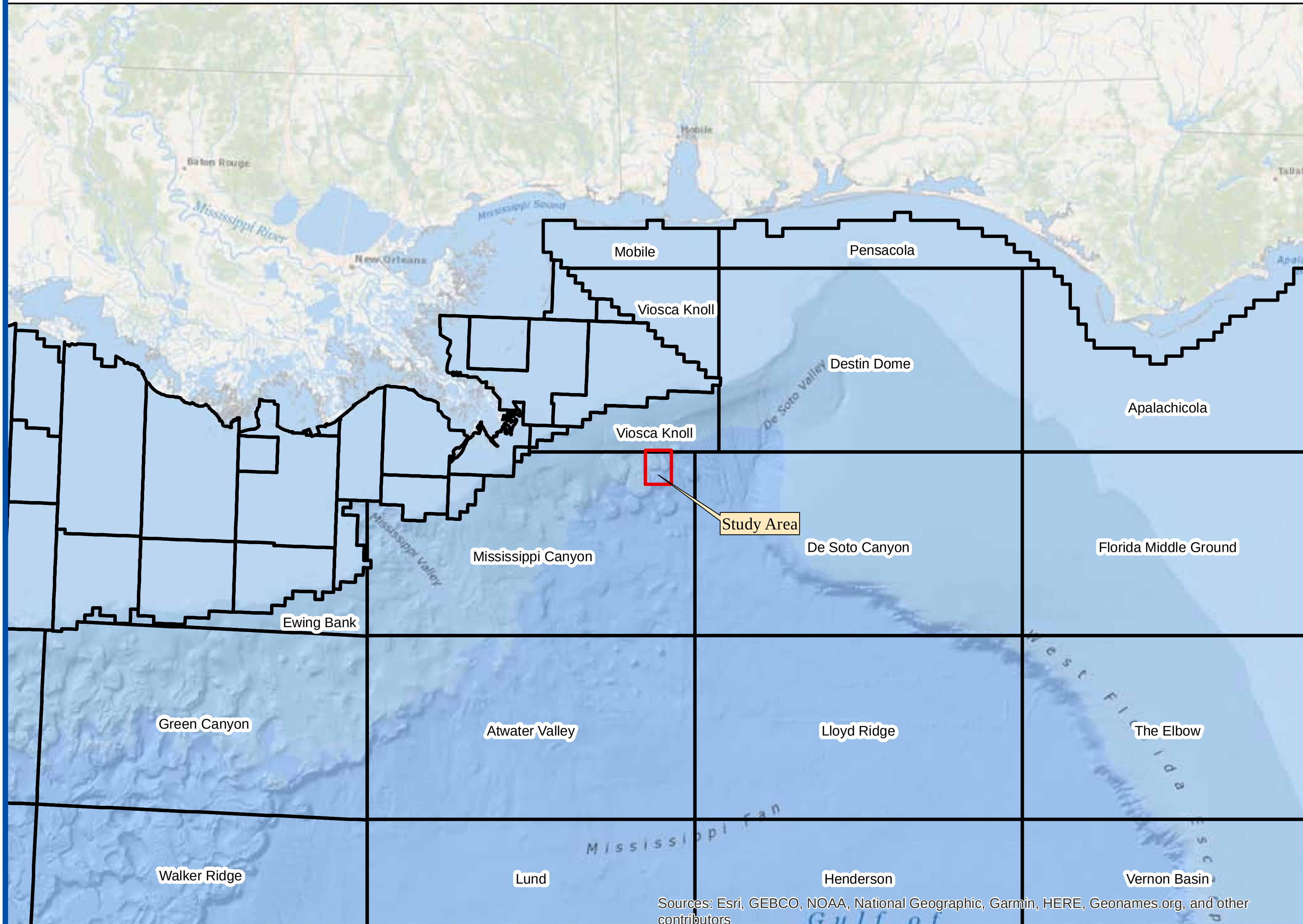
OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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WELL CLEARANCE LETTER – PROPOSED MC36_C-C WELL LOCATION

October 02, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC36_C-C Well Location
Mississippi Canyon Block MC36
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC36_C-C Well Location, Mississippi Canyon Area (OCS-G-35308). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,414ft below sea surface (6,941ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC36_C-C well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC36_C-C Well Location lies in the northeast part of Block MC36 (OCS-G-35308).

Proposed MC36_C-C Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	49.318”	North	Easting	1,267,000	US ft. E
Longitude	88°	10’	05.108”	West	Northing	10,512,938	US ft. N
Latitude Decimal			28.9636993				
Longitude Decimal			-88.1680855				
FEL Mississippi Canyon 036			200ft	US ft.	Inline	12820	
FNL Mississippi Canyon 036			4,822ft	US ft.	Crossline	17989	
Water Depth: -3,473ft			Slope: 3.4° ESE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.1 Miles @ 35.3°		

Proposed MC36_C-CC Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	48.822”	North	Easting	1,267,000	US ft. E
Longitude	88°	10’	05.102”	West	Northing	10,512,988	US ft. N
Latitude Decimal			28.9638369				
Longitude Decimal			-88.1680871				
FEL Mississippi Canyon 036			200ft	US ft.	Inline	12820	
FNL Mississippi Canyon 037			4,872ft	US ft.	Crossline	17989	
Water Depth: -3,474ft			Slope: 3.4° ESE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.1 Miles @ 35.3°		

Location MC36_C-CC is 50ft from MC36_C-C on a bearing of 180°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC36_C-C well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC36_C-C well location is -3,473ft below sea surface (Figure 1). The seafloor slopes to the ESEt at 3.4°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC36_C-C well location is in the northeast part of block MC36. The proposed well is located in an area of relatively smooth seabed located on the eastern part of Horn Dome.

The proposed location is located approximately 1,365ft to the west of a slump scarp and associated debris flow to the east that occurs on the west flank of the Dorsey Canyon. These failures are retrogressive seabed failures. Maximum observed retrogressive cut backs in this area appear to be around 1,000ft.

A fault intersects seabed around 1,520ft to the north and northwest of the proposed location. This fault is downthrown to the north and does not impact the proposed wellsite.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,660ft below sea surface (187ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,660ft below sea surface (187ft below seabed).

4.3 Unit B

The upper part of Unit B from -3,660ft to -4,003ft below sea surface (187ft to 530ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The proposed location is on the updip extremity of these deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -4,003ft below sea surface (530ft below seabed) to -4,191ft below sea surface (718ft below seabed) presents acoustically as well-layered, low-amplitude reflectors with clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft.

Horizon H10 marks the base of Unit B, occurring at -4,191ft below sea surface (718ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,191ft to -4,681ft below sea surface (718ft to 1,208ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit C at the proposed well or within 2,000ft radius.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -4,681ft below sea surface (1,208ft below seabed).

4.5 Unit D

The upper part of Unit D from -4,681ft to -5,263ft below sea surface (1,208ft to 1,790ft below seabed) is characterized by slightly-chaotic and well-layered, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sand. This interval appears presents an acoustic character suggestive of a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,600ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit D from -5,263ft to -5,432ft below sea surface (1,790ft to 1.959ft below seabed) is characterized by acoustically featureless section interpreted as clays and silts.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -5,432ft below sea surface (1,959ft below seabed).

4.6 Unit E

Unit E from -5,432ft to -6,950ft below sea surface (1,959ft to 3,477ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~2,000ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft.

The well-path will traverse a fault within Unit E at -6,518ft below sea surface (3,045ft below seabed). This fault is downthrown approximatley 30ft to the southwest. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

Horizon H40 marks the base of Unit E at -6,950ft below sea surface (3,477ft below seabed).

4.7 Unit F

Unit F from -6,950ft to -7,754ft below sea surface (3,477ft to 4,281ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~2,000ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft.

The well-path will traverse a fault within Unit F at -7,457ft below sea surface (3,984ft below seabed). This fault is downthrown approximately 30ft to the west. Minor wellbore stability and drilling fluid circulation problmesmay occur at the level of the fault.

Horizon H50 marks the base of Unit F at -7,754ft below sea surface (4,281ft below seabed).

4.8 Unit G

Unit G from -7,754ft to -10,414ft below sea surface (4,281ft to 6,941ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit G at the proposed well. The nearest risk of gas anomaly is located 1,300ft to the southeast with no direct connectivity to the proposed well-path.

The well-path will traverse a fault within Unit G at -8,459ft below sea surface (4,986ft below seabed). This fault is downthrown approximatley 30ft to the west. Minor wellbore stability and drilling fluid circulation problmes may occur at the level of the fault.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,414ft below sea surface (6,941ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,660ft to -4,003ft below sea surface (187ft to 530ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -4,681ft to -5,263ft below sea surface (1,208ft to 1,790ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,432ft to -6,950ft below sea surface (1,959ft to 3,477ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -6,950ft to -7,754ft below sea surface (3,477ft to 4,281ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None hazards or problems interpreted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,660ft to -4,003ft below sea surface (187ft to 530ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  None Predicted.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -4,681ft to -5,263ft below sea surface (1,208ft to 1,790ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,432ft to -6,950ft below sea surface (1,959ft to 3,477ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  The well-path will traverse a fault within Unit E at -6,518ft below sea surface (3,045ft below seabed). Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -6,950ft to -7,754ft below sea surface (3,477ft to 4,281ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

The well-path will traverse a fault within Unit F at -7,457ft below sea surface (3,984ft below seabed). Minor wellbore stability and drilling fluid circulation problmesmay occur at the level of the fault.

- Unit G

Minor wellbore stability and drilling fluid circulation problems may occur within Unit G.

The well-path will traverse a fault within Unit G at -8,459ft below sea surface (4,986ft below seabed). Minor wellbore stability and drilling fluid circulation problmes may occur at the level of the fault.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh
Geophysical Manager

Denise Haigh
Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC36_C-C Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

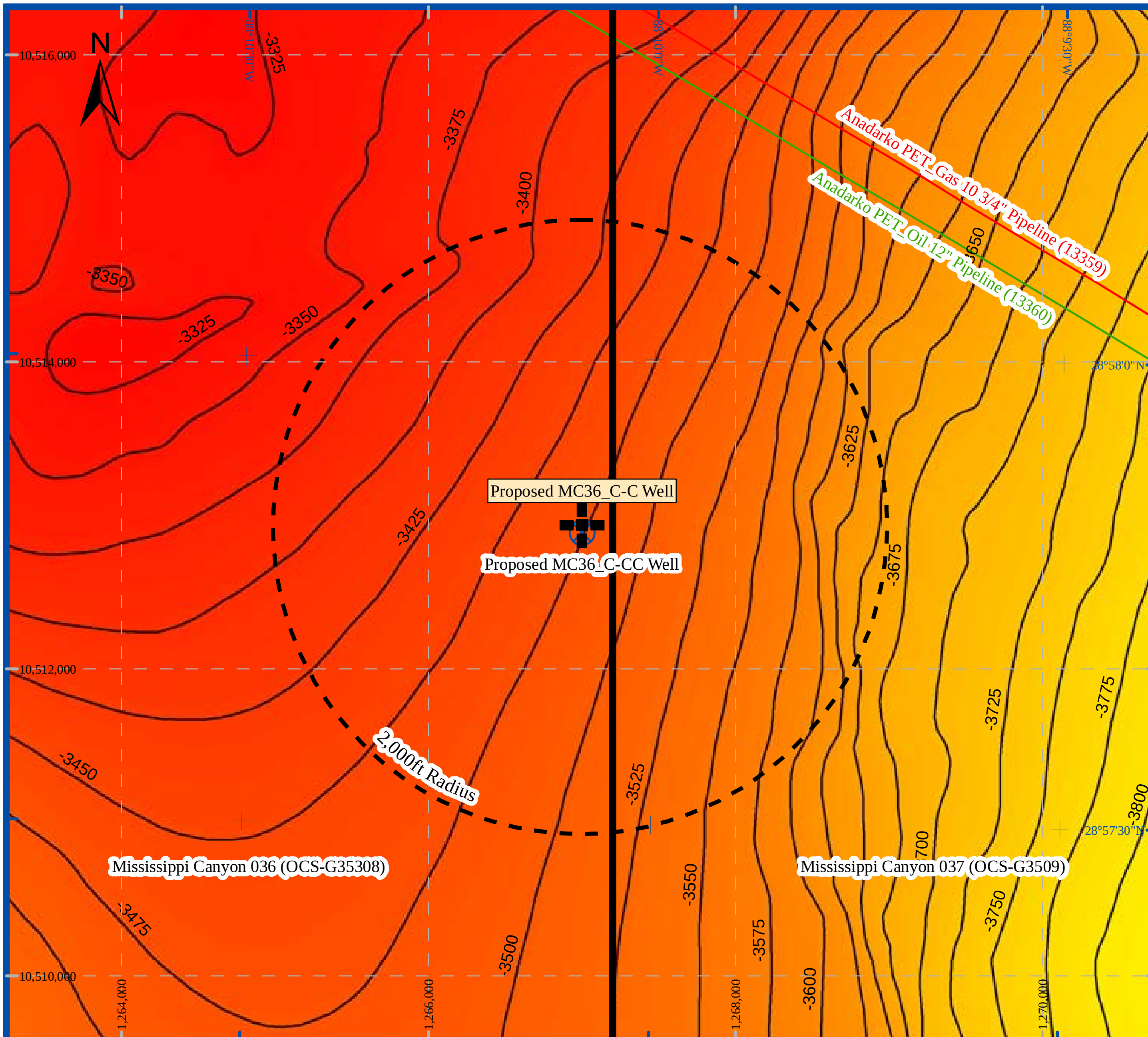
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC36_C-C Well Location (1,267,000ft E / 10,512,938ft N)

Proposed MC36_C-CC Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

-3473 Depth in feet below sea surface to seabed, contoured at 25ft intervals

-5400 -5000 -4600 -4200 -3800 -3400

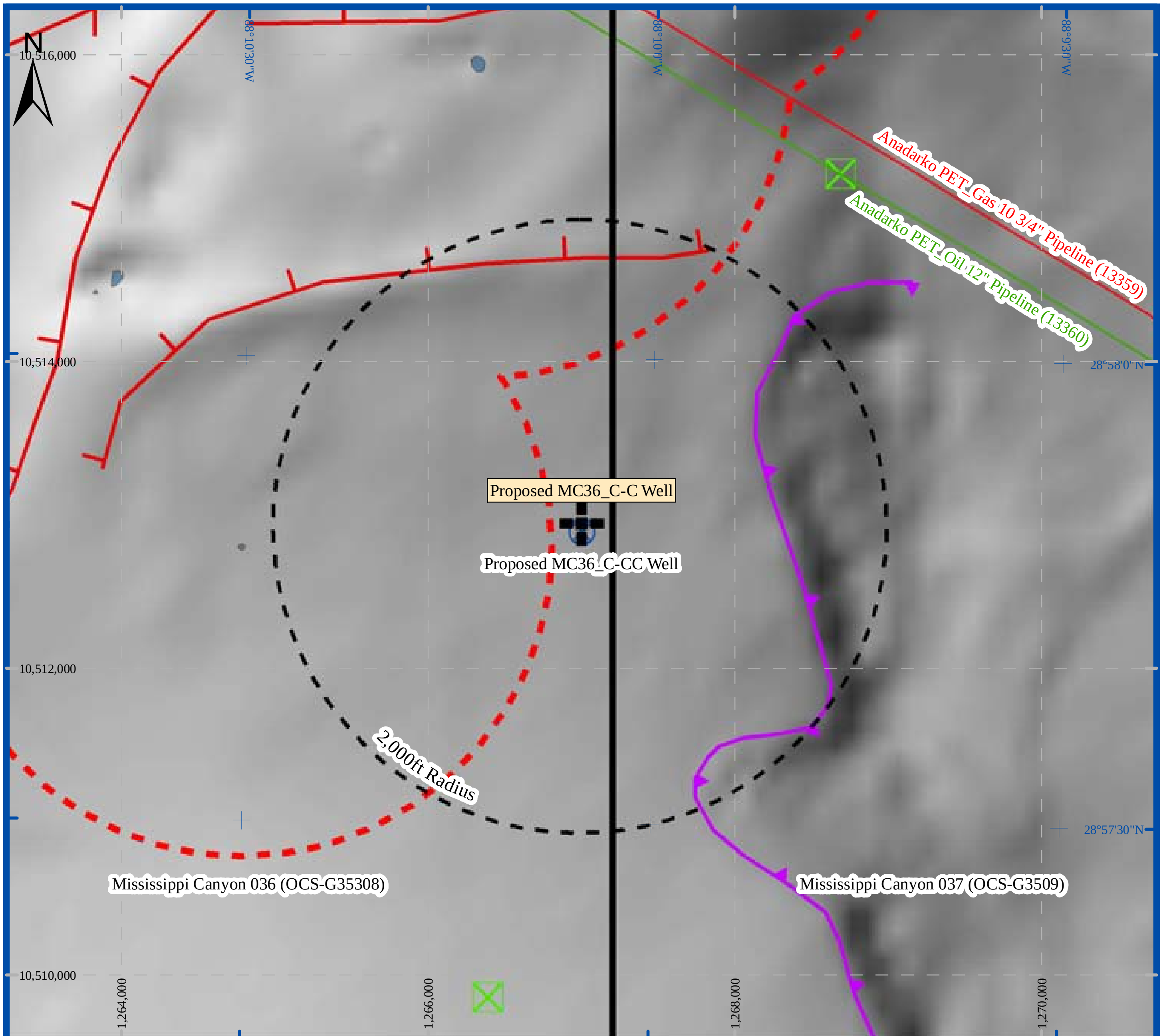
Seabed Depth (Feet)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 1 (MC36_C-C)



Seabed Morphology Extract

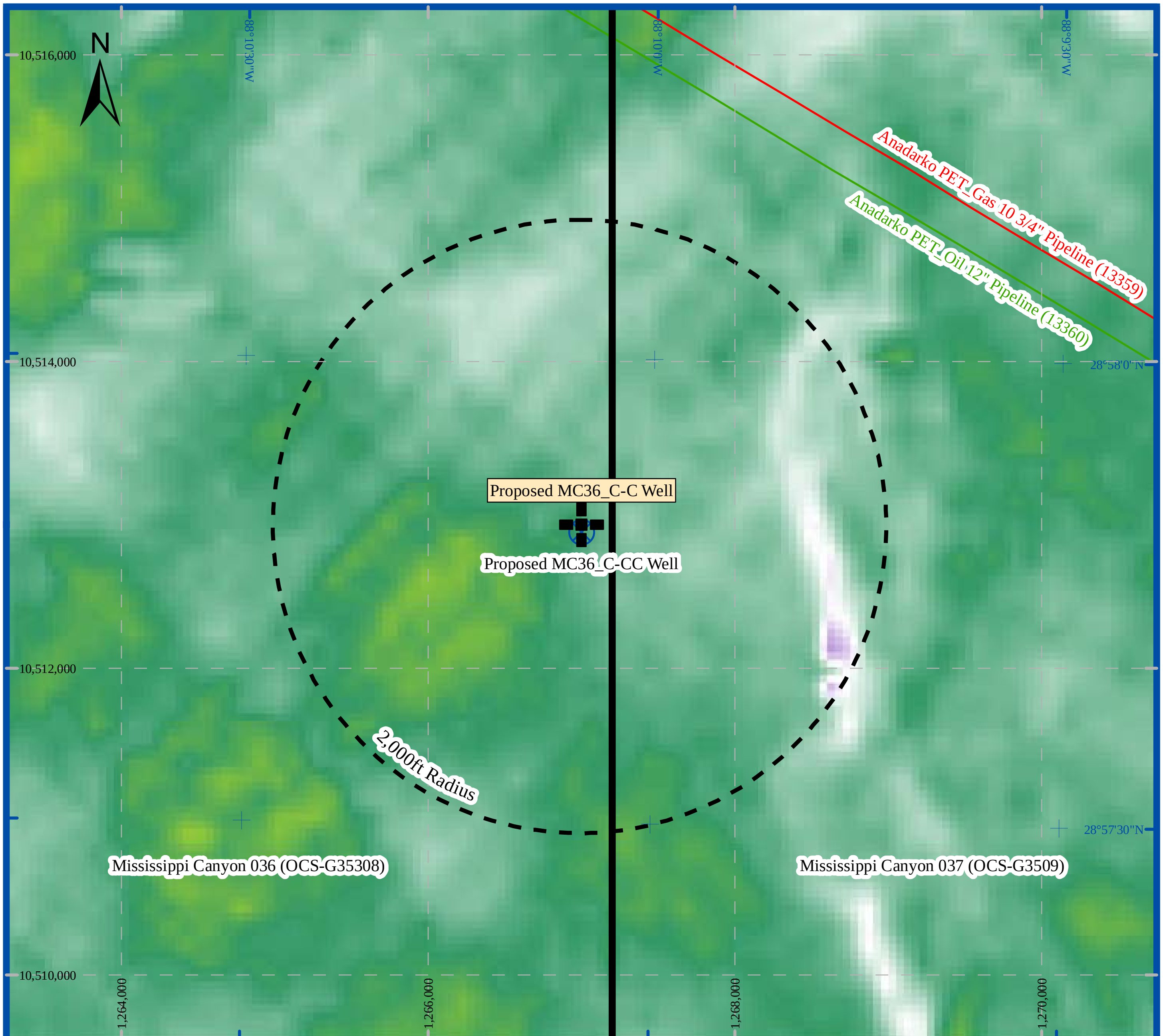
- Proposed MC36_C-C Well Location (1,267,000ft E / 10,512,938ft N)
- Proposed MC36_C-CC Well Location
- Oil Pipeline
- Gas Pipeline
- Block boundaries
- Seafloor fault intersection. Tick denotes downthrown block
- Slump scar
- 2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar
- Hardgrounds exposures at seabed mapped from side scan sonar data
- Sonar contacts, interpreted modern debris

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC36_C-C)



Seabed Amplitude Extract

Proposed MC36_C-C Well Location (1,267,000ft E / 10,512,938ft N)

Proposed MC36_C-CC Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

Relative Seabed Amplitude

Chart Scale 1" = 1,000'

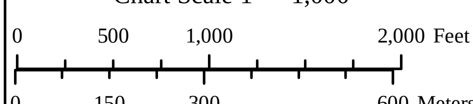
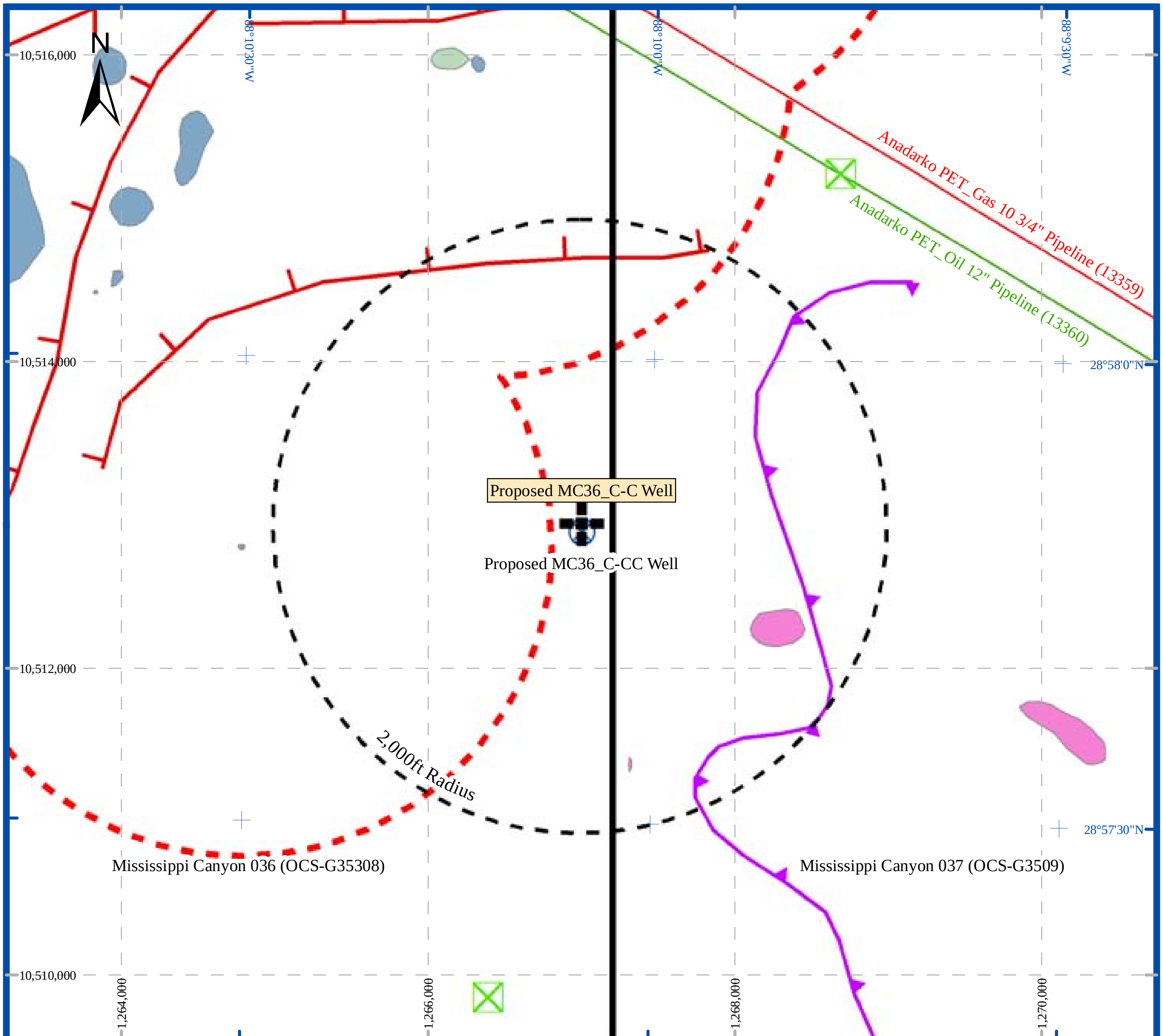


Figure 3
(MC36_C-C)



Geohazard Summary Extract

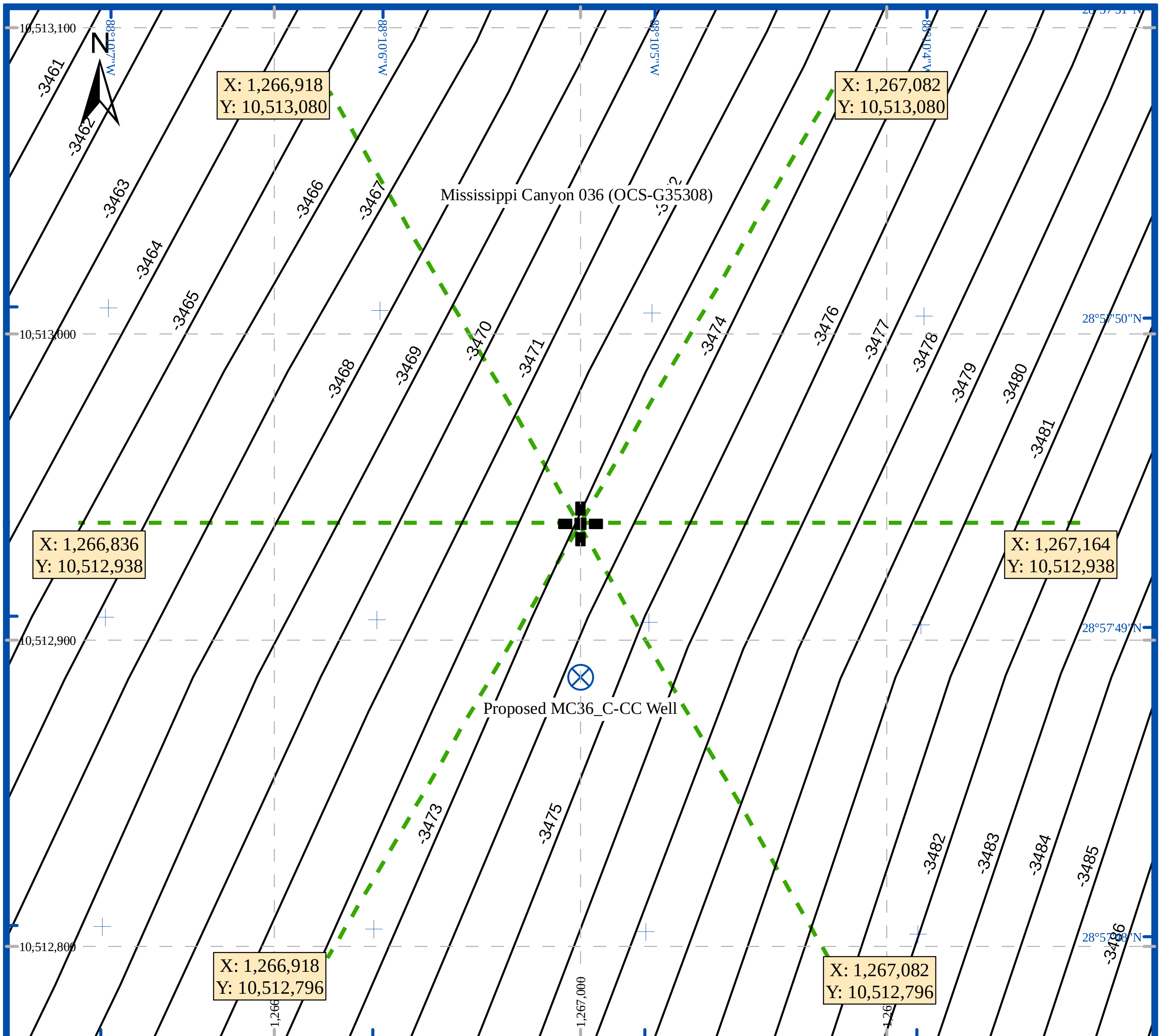
- Proposed MC36_C-C Well Location (1,267,000ft E / 10,512,938ft N)
- Proposed MC36_C-CC Well Location
- Oil Pipeline
- Gas Pipeline
- Block boundaries
- Seafloor fault intersection. Tick denotes downthrown block
- 2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar
- Slump scar
- Hardgrounds exposures at seabed mapped from side scan sonar data
- Sonar contacts, interpreted modern debris
- Slight and Moderate Risk of Gas within Unit A
- Slight, Moderate, and High Risk of Gas within Unit B
- Slight and Moderate Risk of Gas within Unit G

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC36_C-C)



ROV Plat (MC36_C-C)

Proposed MC36_C-C Well Location (1,267,000ft E / 10,512,938ft N)

Proposed MC36_C-CC Well Location

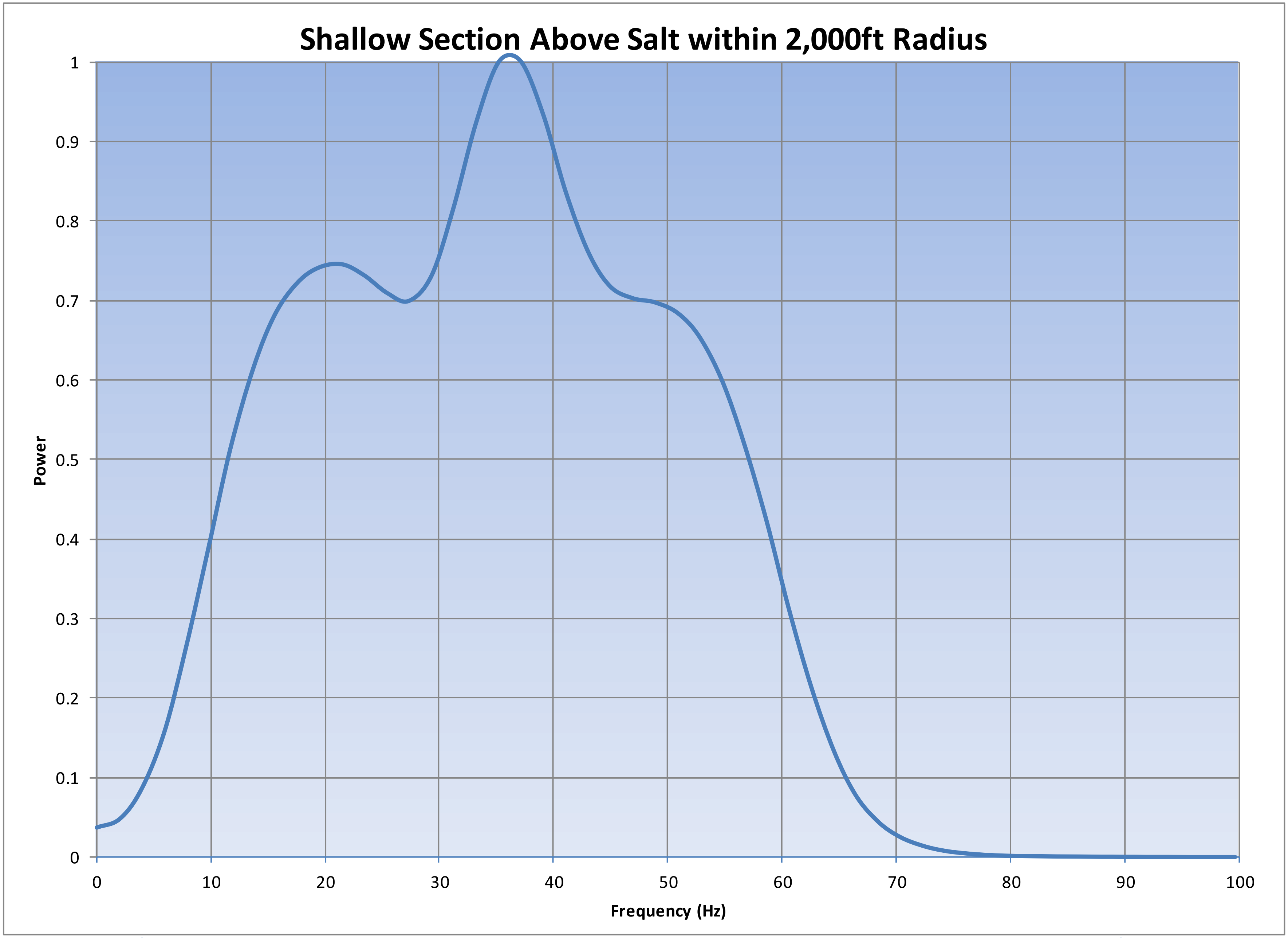
-3473 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC36_C-C)



MC36_C-C	Power Spectrum	Figure 10

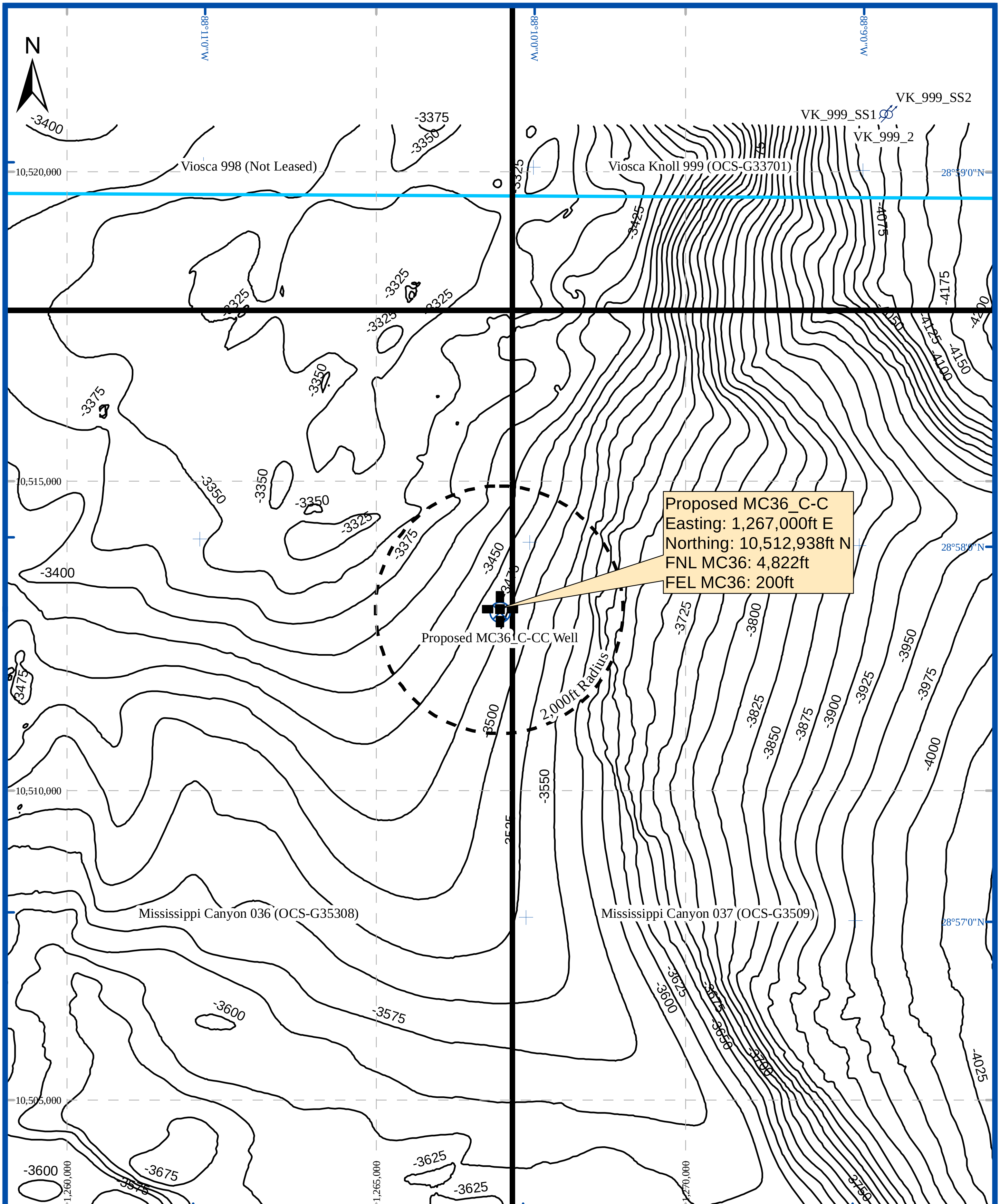


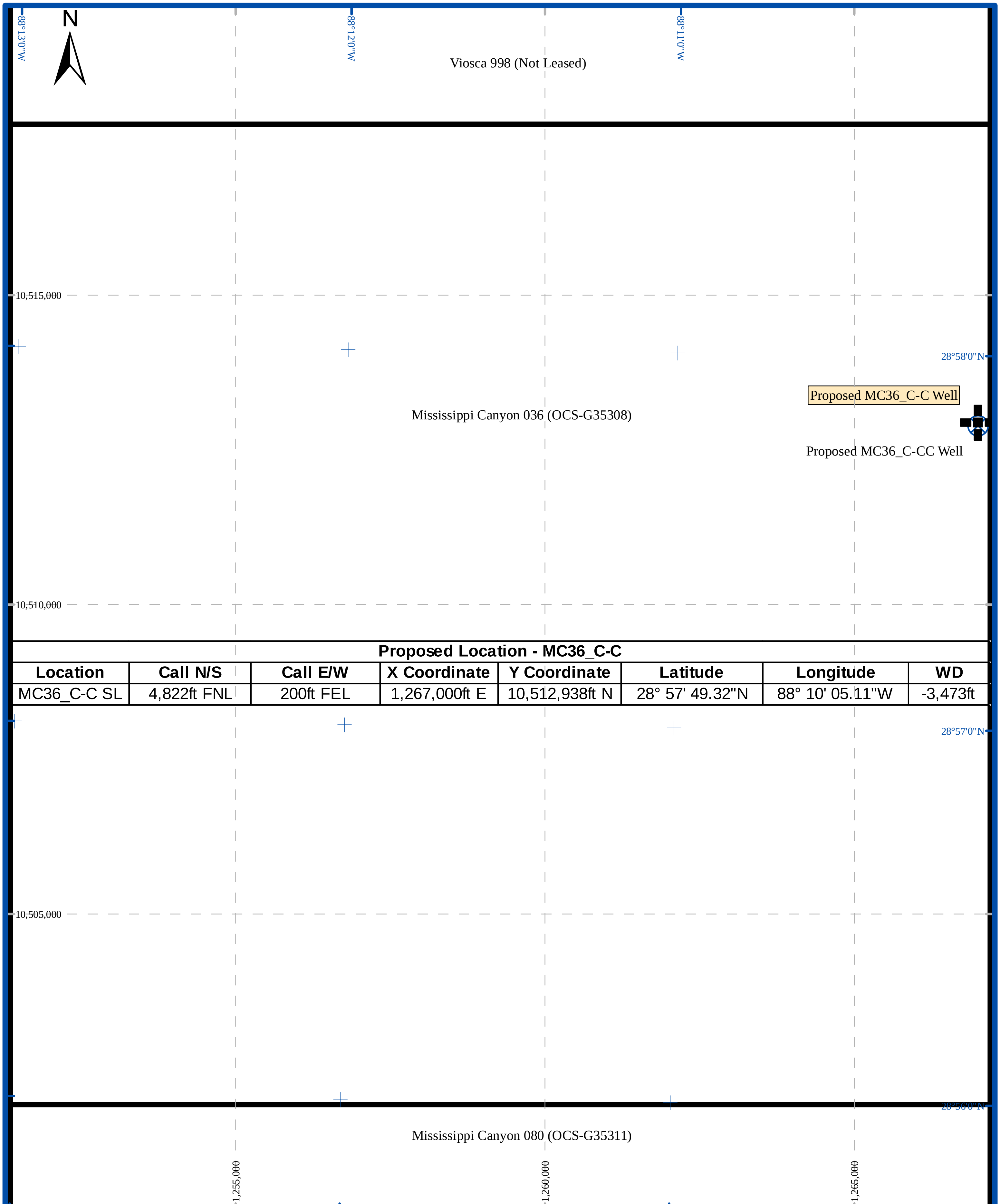
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC36_C-C

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC36_C-C SL	4,822ft FNL	200ft FEL	1,267,000ft E	10,512,938ft N	28° 57' 49.32"N	88° 10' 05.11"W	-3,473ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

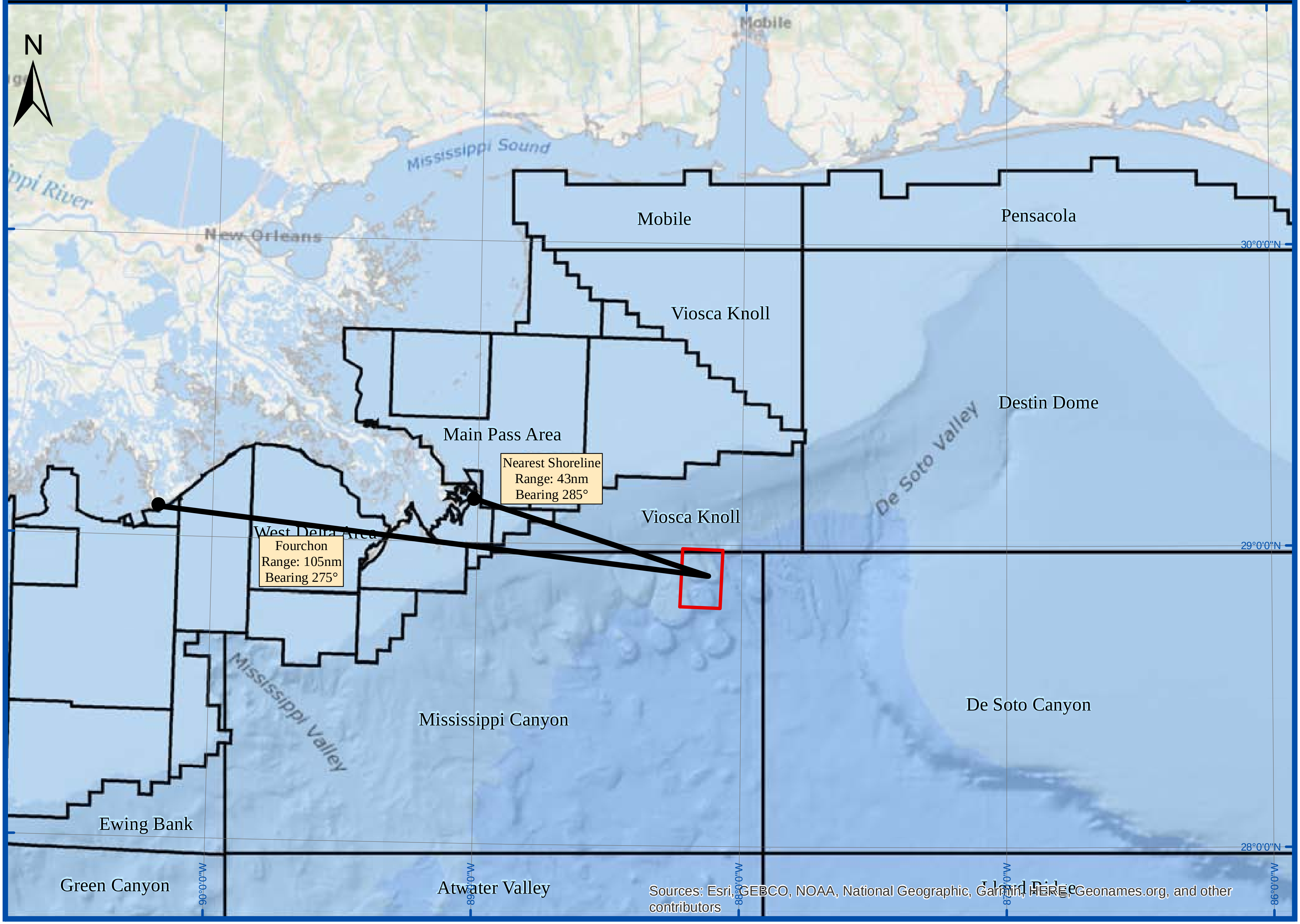
0 150 300 600 Meters

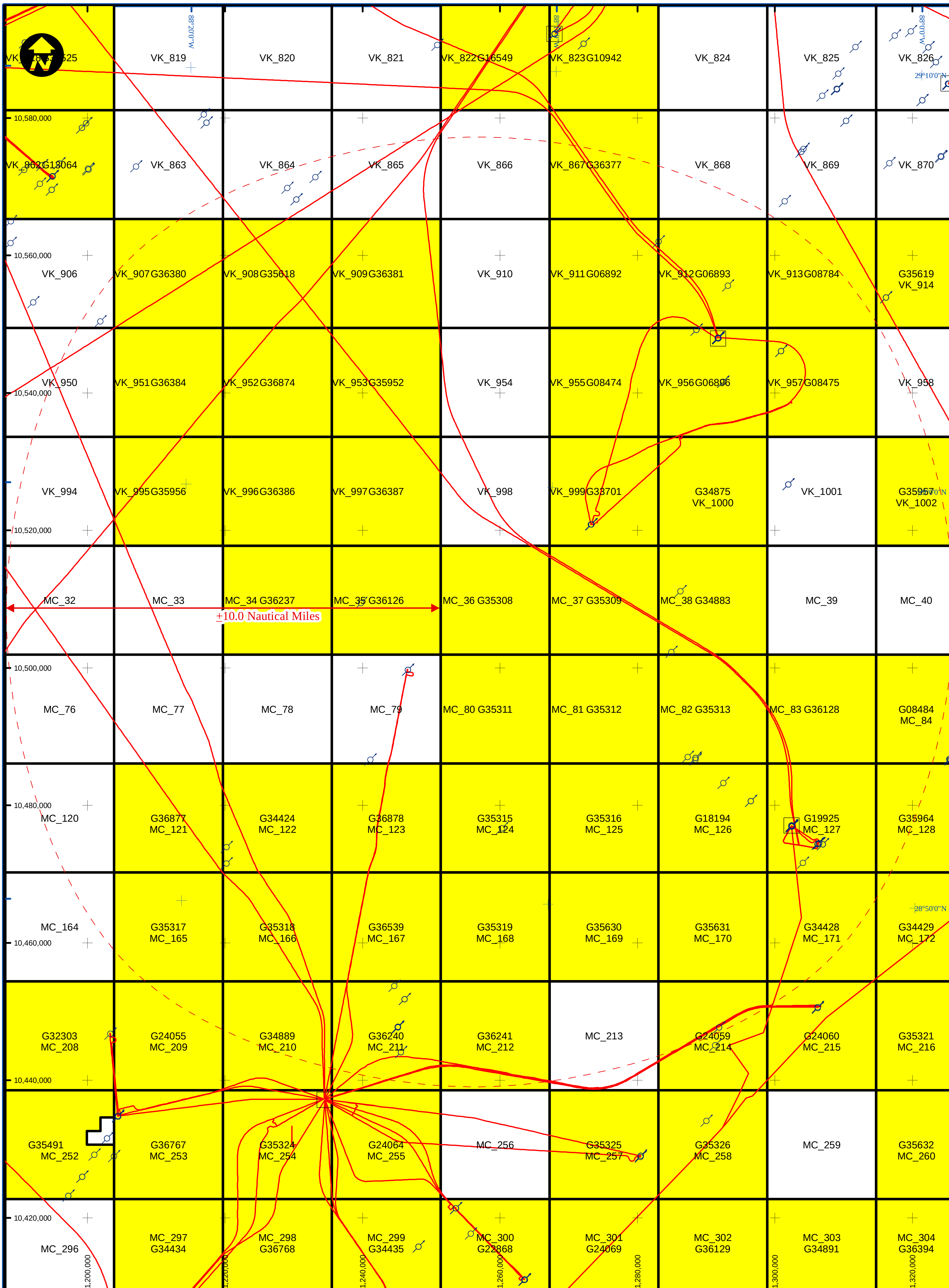
Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 36

Figure 13





Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 36

0 5 10 Miles

1 inch = 2.5 miles

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC36_C-C Well Location

October 02, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 36
(OCS-G OCS-G-35308)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_C-C well location with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.5 seconds two-way time (TWT), -10,414ft below sea surface (6,941ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 3.4° to the ESE The proposed location is located approximately 1,365ft to the west of a slump scarp A fault intersects seabed around 1,520ft to the north and northwest of the proposed location.

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

No exsiting wells or pipelines occur within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas is assigned at the proposed well. Anomalies occur within 2,000ft in Unit G, but are not connected to the proposed well-path.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect a fault within Unit E, F, and G.

Proposed MC36_C-C Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	49.318”	North	Easting	1,267,000	US ft. E
Longitude	88°	10’	05.108”	West	Northing	10,512,938	US ft. N
Latitude Decimal	28.9636993						
Longitude Decimal	-88.1680855						
FEL Mississippi Canyon 036	200ft	US ft.	Inline	12820			
FNL Mississippi Canyon 036	4,822ft	US ft.	Crossline	17989			
Water Depth: -3,473ft	Slope: 3.4° ESE						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.1 Miles @ 35.3°					

Proposed MC36_C-CC Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	48.822”	North	Easting	1,267,000	US ft. E
Longitude	88°	10’	05.102”	West	Northing	10,512,988	US ft. N
Latitude Decimal	28.9638369						
Longitude Decimal	-88.1680871						
FEL Mississippi Canyon 036	200ft	US ft.	Inline	12820			
FNL Mississippi Canyon 037	4,872ft	US ft.	Crossline	17989			
Water Depth: -3,474ft	Slope: 3.4° ESE						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.1 Miles @ 35.3°					

Conclusions and Recommendations. No major problems are anticipated at the seabed.

No risk of gas is assigned at the proposed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect three faults.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC36_C-C Well Location

Anadarko Petroleum Corporation

October 02, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC36_C-C Well Location (OCS-G-35308)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_C-C with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 2,243ft to the west.

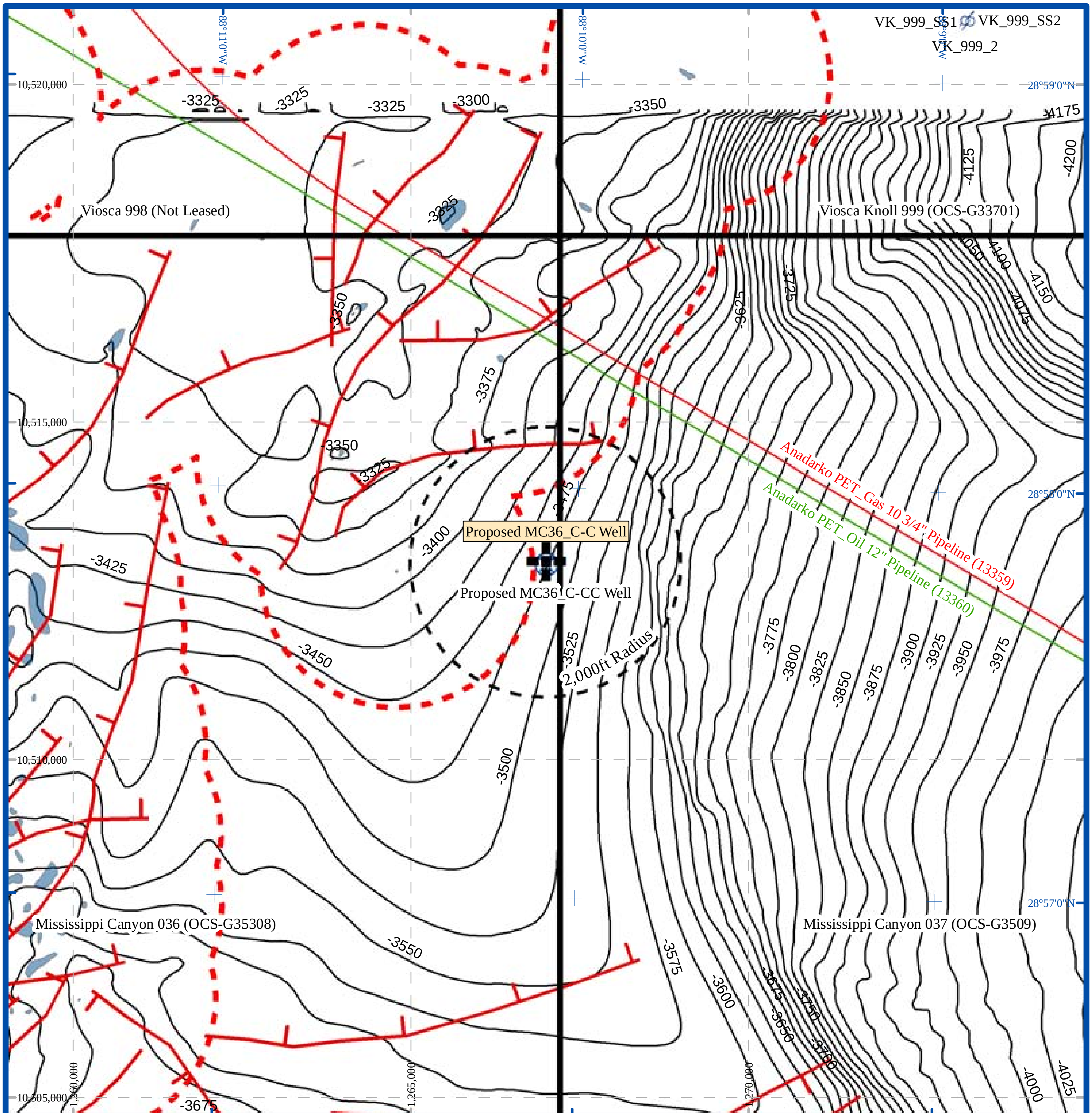
Proposed MC36_C-C Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					**UTM Zone 16 - CM 87° West**		
Latitude	28°	57'	49.318"	North	Easting	1,267,000	US ft. E
Longitude	88°	10'	05.108"	West	Northing	10,512,938	US ft. N
Latitude Decimal		28.9636993					
Longitude Decimal		-88.1680855					
FEL Mississippi Canyon 036		200ft		US ft.	Inline	12820	
FNL Mississippi Canyon 036		4,822ft		US ft.	Crossline	17989	
Water Depth: -3,473ft		Slope: 3.4° ESE					
Nearest Shoreline		43 Nautical Miles @ 285°					
Port of Operation		Fourchon			105 Nautical Miles @ 275°		
Nearest Manned Platform		A Ram-Powell in VK956			8.1 Miles @ 35.3°		

Proposed MC36_C-CC Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					**UTM Zone 16 - CM 87° West**		
Latitude	28°	57'	48.822"	North	Easting	1,267,000	US ft. E
Longitude	88°	10'	05.102"	West	Northing	10,512,988	US ft. N
Latitude Decimal		28.9638369					
Longitude Decimal		-88.1680871					
FEL Mississippi Canyon 036		200ft		US ft.	Inline	12820	
FNL Mississippi Canyon 037		4,872ft		US ft.	Crossline	17989	
Water Depth: -3,474ft		Slope: 3.4° ESE					
Nearest Shoreline		43 Nautical Miles @ 285°					
Port of Operation		Fourchon			105 Nautical Miles @ 275°		
Nearest Manned Platform		A Ram-Powell in VK956			8.1 Miles @ 35.3°		

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

Conclusions and Recommendations: The proposed MC36_C-C and proposed MC36_C-CC well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC36_C-C Well Location (1,267,000ft E / 10,512,938ft N)

Proposed MC36_C-CC Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

-3473 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Cactus Prospect
Mississippi Canyon, Block MC36,
Offshore Gulf of Mexico

Description:
Proposed MC36_C-E Well Location

Project Number:
2020-321

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	.... A Haigh
	Quality Assurance	.... D Haigh

Revision	**Date**	**Title**
0	September 10, 2020	Draft
1	October 02, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

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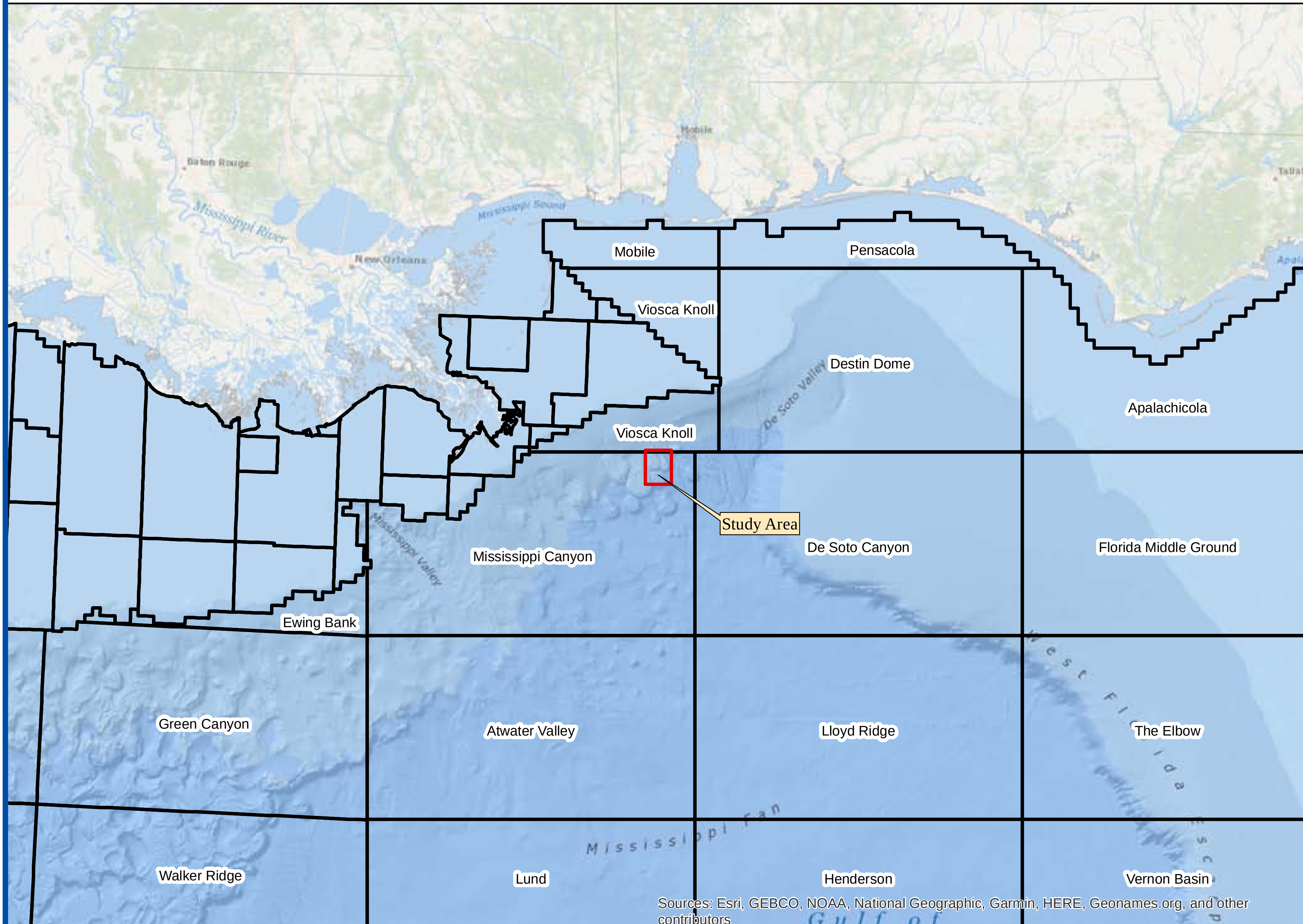
OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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WELL CLEARANCE LETTER – PROPOSED MC36_C-E WELL LOCATION

October 02, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC36_C-E Well Location
Mississippi Canyon Block MC36
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC36_C-E Well Location, Mississippi Canyon Area (OCS-G-35308). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,382ft below sea surface (6,860ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC36_C-E well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC36_C-E Well Location lies in the east central part of Block MC36 (OCS-G-35308).

Proposed MC36_C-E Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	09.837”	North	Easting	1,267,100	US ft. E
Longitude	88°	10’	03.539”	West	Northing	10,508,950	US ft. N
Latitude Decimal			28.9527324				
Longitude Decimal			-88.1676497				
FEL Mississippi Canyon 036			100ft	US ft.	Inline	12792	
FSL Mississippi Canyon 036			7,030ft	US ft.	Crossline	17849	
Water Depth: -3,522ft			Slope: 1.63° East				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.4 Miles @ 33.4°		

Proposed MC36_C-EE Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	09.341”	North	Easting	1,267,100	US ft. E
Longitude	88°	10’	03.533”	West	Northing	10,508,900	US ft. N
Latitude Decimal			28.9525948				
Longitude Decimal			-88.1676481				
FEL Mississippi Canyon 036			100ft	US ft.	Inline	12792	
FSL Mississippi Canyon 036			6,980ft	US ft.	Crossline	17849	
Water Depth: -3,522ft			Slope: 2.0° East				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.4 Miles @ 33.4°		

Proposed MC37_C-EEE Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	09.856”	North	Easting	1,267,300	US ft. E
Longitude	88°	10’	01.287”	West	Northing	10,508,950	US ft. N
Latitude Decimal			28.9527378				
Longitude Decimal			-88.1670242				
FWL Mississippi Canyon 037			100ft	US ft.	Inline	12794	
FSL Mississippi Canyon 037			7,030ft	US ft.	Crossline	17841	
Water Depth: -3,531ft			Slope: 2.0° East				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.4 Miles @ 33.4°		

Proposed MC37_C-EEEE Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	09.856”	North	Easting	1,267,300	US ft. E
Longitude	88°	10’	01.287”	West	Northing	10,508,900	US ft. N
Latitude Decimal			28.9526003				
Longitude Decimal			-88.1670227				
FWL Mississippi Canyon 037			100ft	US ft.	Inline	12794	
FSL Mississippi Canyon 037			6,980ft	US ft.	Crossline	17841	
Water Depth: -3,531ft			Slope: 2.0° East				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.4 Miles @ 33.4°		

Location MC36_C-EE is 50ft from MC36_C-E on a bearing of 180°.
Location MC37_C-EEE is 200ft from MC36_C-E on a bearing of 090°.
Location MC37_C-EEEE is 205ft from MC36_C-E on a bearing of 105°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC36_C-E well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC36_C-E well location is -3,522ft below sea surface (Figure 1). The seafloor slopes to the east at 1.63°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC36_C-E well location is in the east-central part of block MC36. The proposed well is located in an area of relatively smooth seabed located on the eastern part of Horn Dome.

The proposed location is located approximately 1,820ft to the west of a retrogressive cuspate, cut back slump scarp with an associated debris flow to the east, that occurs on the west flank of the Dorsey Canyon. These failures are retrogressive seabed failures. Maximum observed retrogressive cut backs in this area appear to be around 1,000ft. Given the closest approach is already to a well defined cut-back, it is considered a reduced risk that slope failure would cut back further towards the well location.

No seabed faults occur within 2,000ft of the proposed well.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,725ft below sea surface (203ft below seabed) is characterized by well-layered, low and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,725ft below sea surface (203ft below seabed).

4.3 Unit B

The upper part of Unit B from -3,725ft to -3,970ft below sea surface (203ft to 448ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The proposed location is on the updip part of these deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -3,970ft below sea surface (448ft below seabed) to -4,289ft below sea surface (767ft below seabed) presents acoustically as well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft.

Horizon H10 marks the base of Unit B, occurring at -4,289ft below sea surface (767ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

The upper part of Unit C from -4,289ft to -4,573ft below sea surface (767ft to 1,051ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

The lower part of Unit C from -4,573ft to -4,676ft below sea surface (1,051ft to 1,154ft below seabed) is characterized by slightly-chaotic, slightly higher energy, low-and occasional moderate-amplitude reflectors interpreted as clays, silts, and several sands. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Minor wellbore stability and drilling fluid circulation problems may also occur within this lower interval.

No risk of gas is predicted within Unit C at the proposed well or within 2,000ft radius.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -4,676ft below sea surface (1,154ft below seabed).

4.5 Unit D

The upper part of Unit D from -4,676ft to -4,880ft below sea surface (1,154ft to 1,358ft below seabed) is characterized by slightly-chaotic and well-layered, low and isolated moderate-amplitude reflectors interpreted as clays, silts and occasional sands.

Unit D from -4,880ft to -5,351ft below sea surface (1,358ft to 1,829ft below seabed) is characterized by slightly-chaotic and well-layered, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sand. This interval appears presents an acoustic character suggestive of a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can on occasions form some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,100ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit D from -5,351ft to -5,722ft below sea surface (1,829ft to 2,202ft below seabed) is characterized by well layered low amplitude reflectors interpreted as clays and silts.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -5,722ft below sea surface (2,202ft below seabed).

4.6 Unit E

Unit E from -5,722ft to -7,2070ft below sea surface (2,202ft to 3,685ft below seabed) is characterized by low and occasional moderate amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions form some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,300ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft.

The well-path will traverse a possible minor fault within Unit E at –6,999ft below sea surface (3,477ft below seabed). This fault is downthrown approximatley 20ft to the west. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

Horizon H40 marks the base of Unit E at -7,207ft below sea surface (3,685ft below seabed).

4.7 Unit F

Unit F from -7,207ft to -7,760ft below sea surface (3,685ft to 4,238ft below seabed) is characterized by low and occasional moderate amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions form some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,800ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit F.

Horizon H50 marks the base of Unit F at -7,760ft below sea surface (4,238ft below seabed).

4.8 Unit G

Unit G from -7,760ft to -10,382ft below sea surface (4,238ft to 6,860ft below seabed) is characterized by low and occasional moderate amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted with possibility of downdip connectivity to deeper parts of the mini-basin (~2,000ft). This geological setting can on occasions form some minor over-pressure. As such a **Slight Shallow Water Flow Risk** is assigned to Unit G.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft.

The well-path will traverse a fault within Unit G at -7,928ft below sea surface (4,406ft below seabed). This fault is downthrown approximatley 30ft to the west. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,382ft below sea surface (6,860ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,725ft to -3,970ft below sea surface (203ft to 448ft below seabed).

Within Unit C, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,573ft to -4,676ft below sea surface (1,051ft to 1,154ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -4.880ft to -5,351ft below sea surface (1,358ft to 1,829ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,722ft to -7,207ft below sea surface (2,202ft to 3,685ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,207ft to -7,760ft below sea surface (3,685ft to 4,238ft below seabed).

Throughout Unit G, a **Slight Shallow Water Flow Risk** is interpreted from -7,760ft to -10,382ft below sea surface (4,238ft to 6,860ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

None hazards or problems interpreted.

- Unit A

No drilling hazards or problems interpreted.

- Unit B

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,725ft to -3,970ft below sea surface (203ft to 448ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

A **Slight Shallow Water Flow Risk** and minor wellbore stability and drilling fluid circulation problems may occur from -4,573ft to -4,676ft below sea surface (1,051ft to 1,1547ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event.

- Unit D

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -4.880ft to -5,351ft below sea surface (1,358ft to 1,829ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,722ft to -7,207ft below sea surface (2,202ft to 3,685ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

The well-path will traverse a fault within Unit E at -6,999ft below sea surface (3,477ft below seabed). Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

- Unit F

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,207ft to -7,760ft below sea surface (3,685ft to 4,238ft below seabed). Appropriate drilling methodology is

recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit G

  Throughout Unit G, a **Slight Shallow Water Flow Risk** is interpreted from -7,760ft to -10,382ft below sea surface (4,238ft to 6,860ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  The well-path will traverse a fault within Unit G at -7,928ft below sea surface (4,406ft below seabed). Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:

Proposed MC36_C-E Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

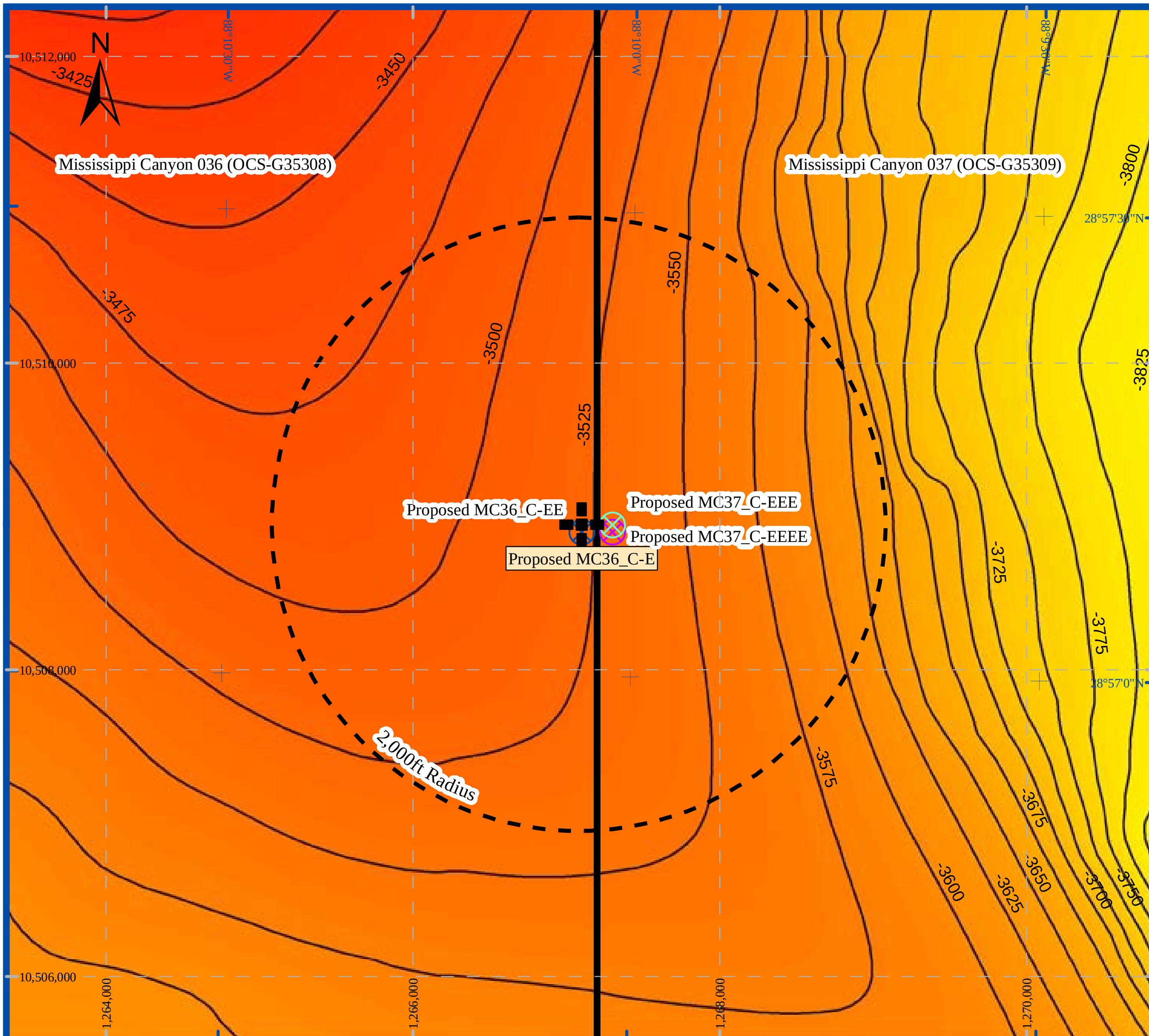
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC36_C-E Well Location (1,267,100ft E / 10,508,950ft N)

Proposed MC36_C-EE Well Location

Proposed MC37_C-EEE Well Location

Proposed MC37_C-EEEE Well Location

Block boundaries

-3522 Depth in feet below sea surface to seabed, contoured at 25ft intervals

Seabed Depth (Feet)

Chart Scale 1" = 1,000'

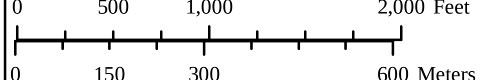
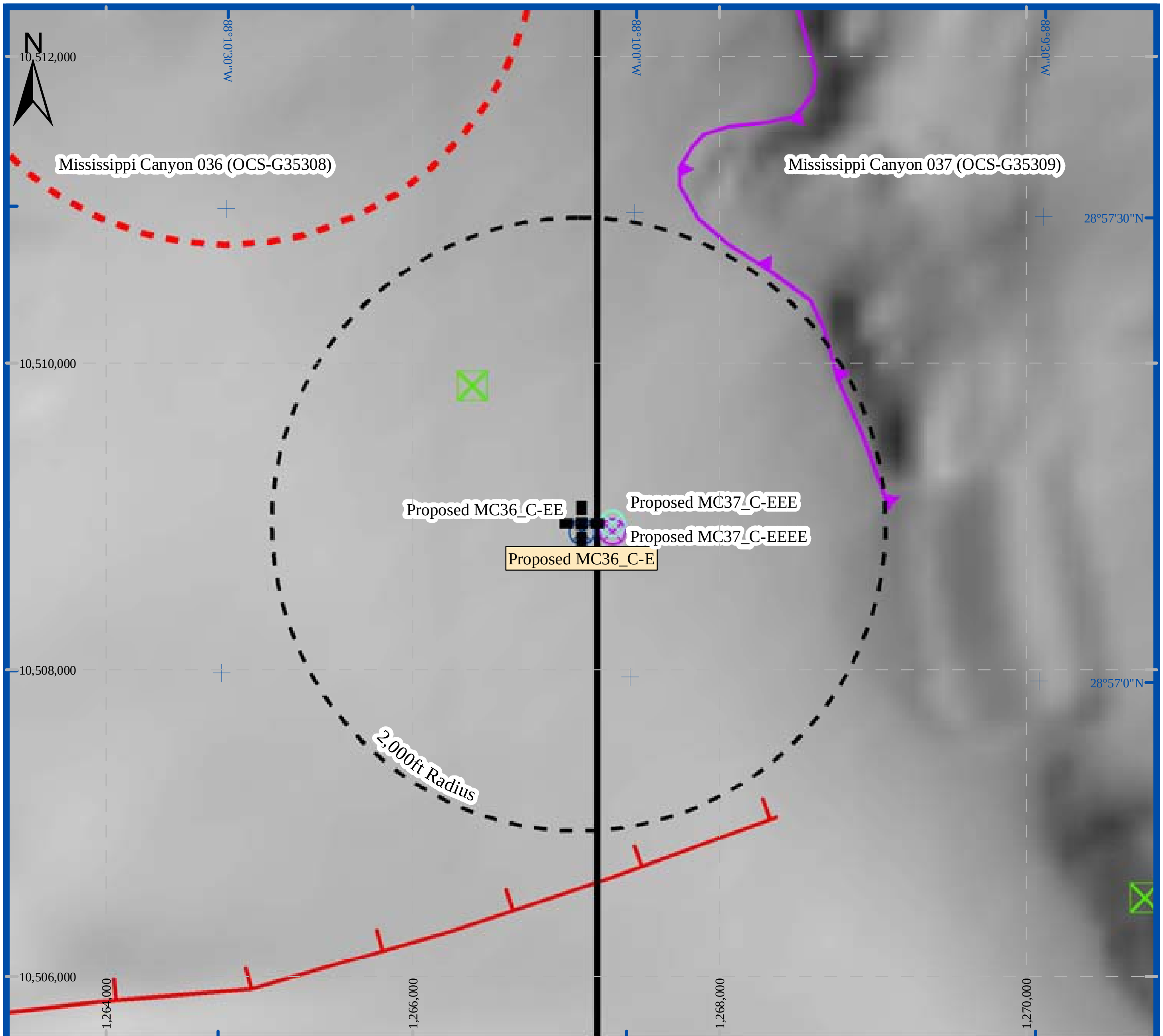


Figure 1
(MC36_C-E)



Seabed Morphology Extract

Proposed MC36_C-E Well Location (1,267,100ft E / 10,508,950ft N)

Proposed MC36_C-EE Well Location

Proposed MC37_C-EEE Well Location

Proposed MC37_C-EEEE Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

Slump scar

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

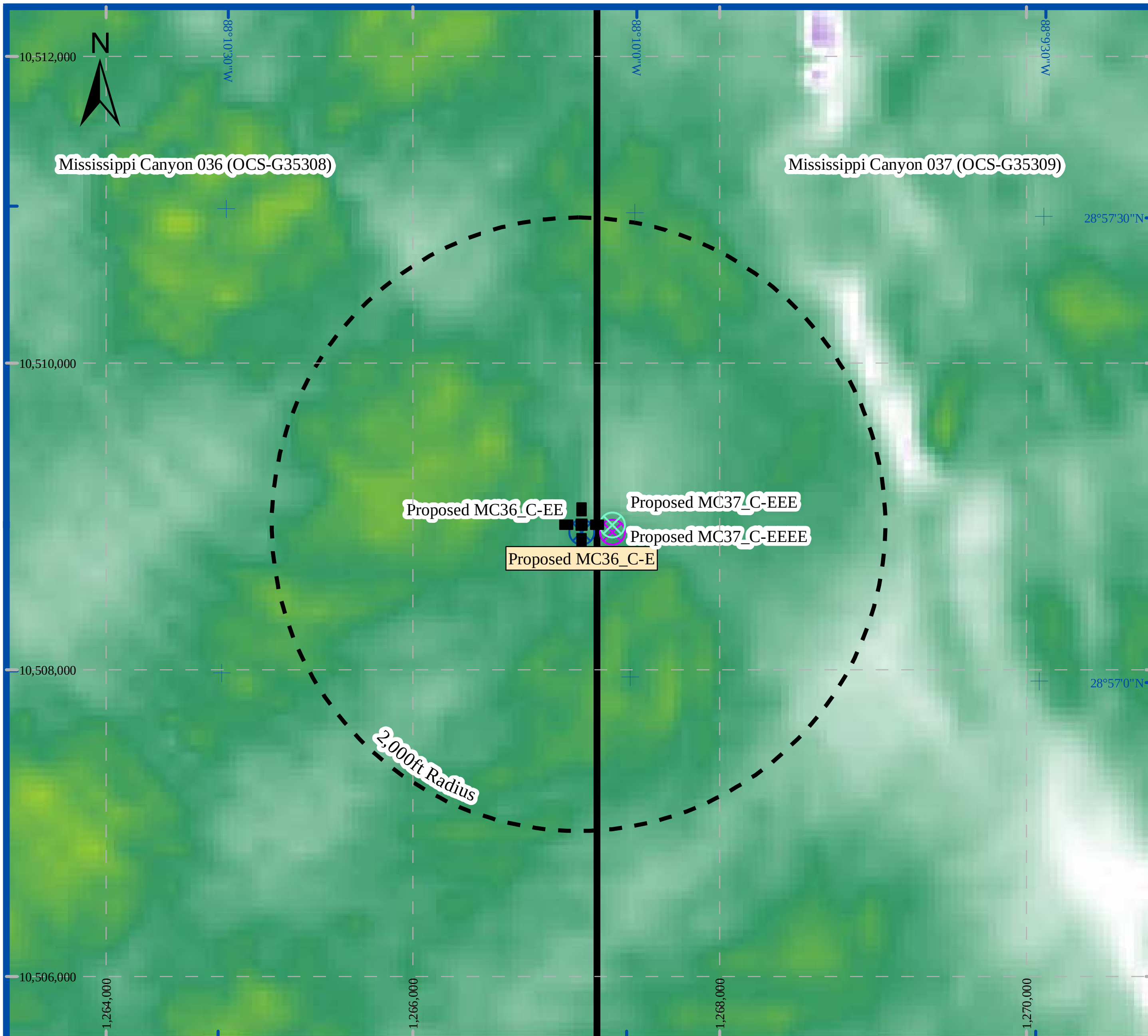
Sonar contacts, interpreted modern debris

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

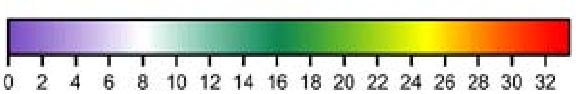
0 150 300 600 Meters

Figure 2
(MC36_C-E)



Seabed Amplitude Extract

- Proposed MC36_C-E Well Location (1,267,100ft E / 10,508,950ft N)
- Proposed MC36_C-EE Well Location
- Proposed MC37_C-EEE Well Location
- Proposed MC37_C-EEEE Well Location
- Block boundaries



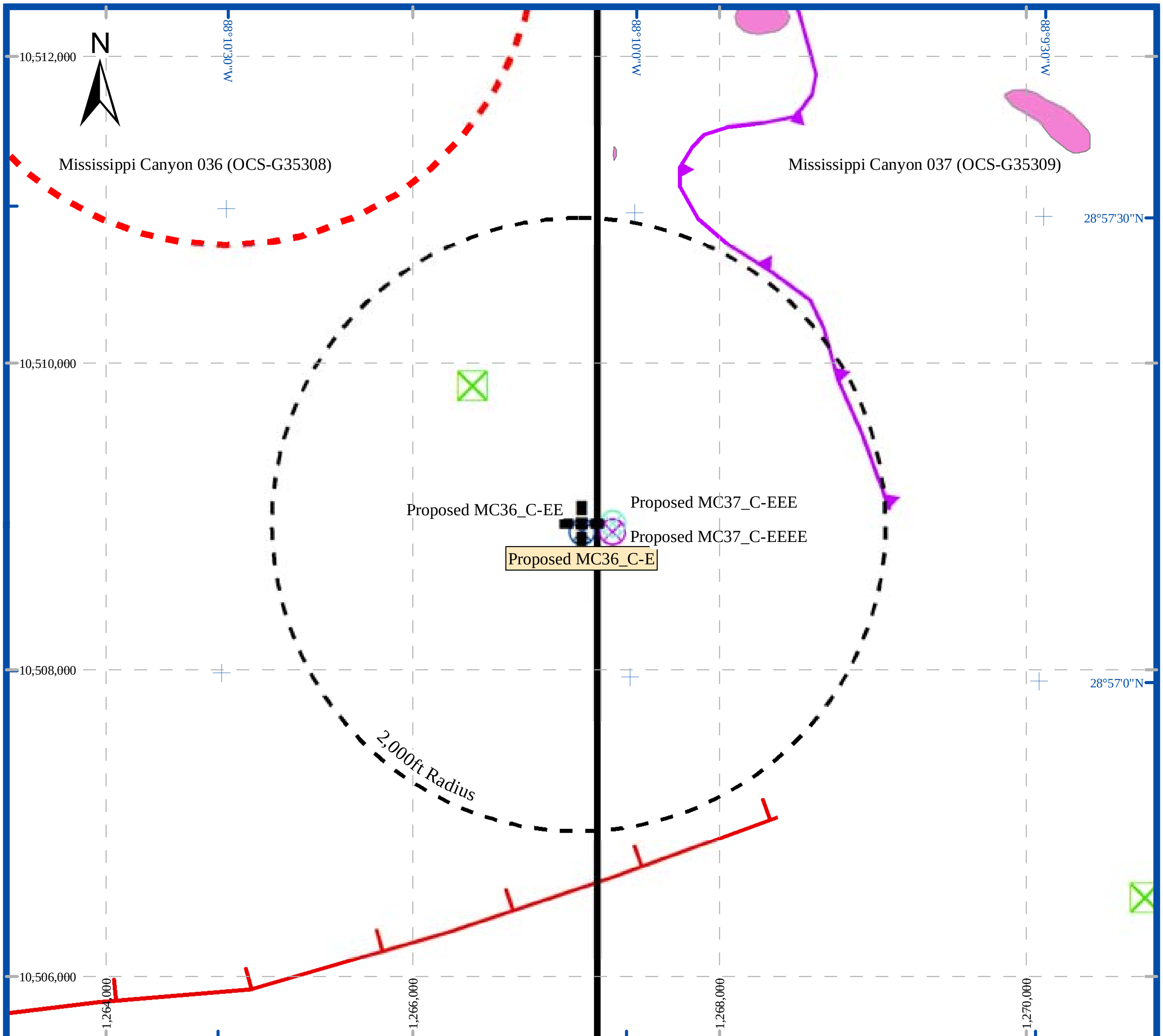
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC36_C-E)



Geohazard Summary Extract

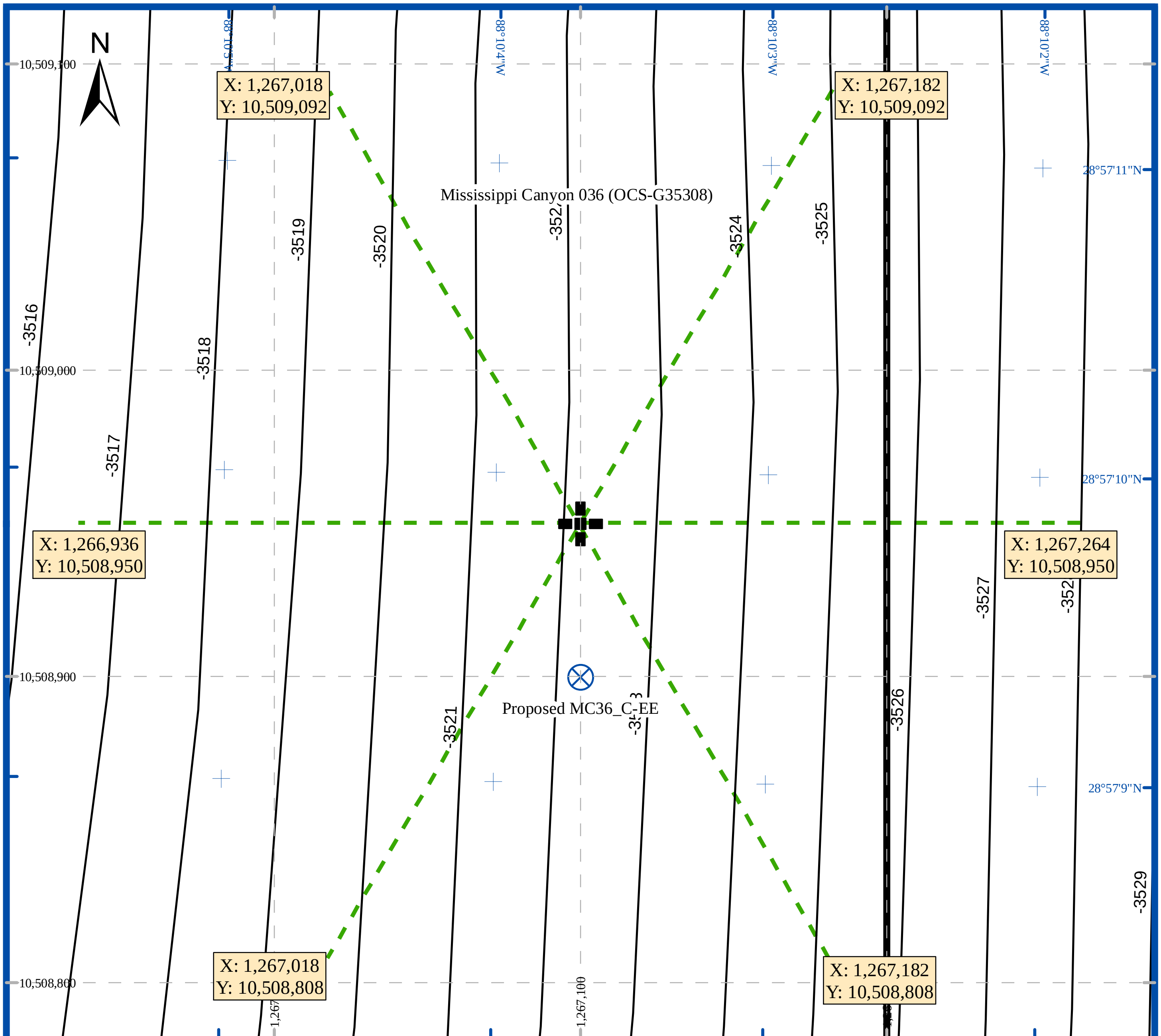
- Proposed MC36_C-E Well Location (1,267,100ft E / 10,508,950ft N)
- Proposed MC36_C-EE Well Location
- Proposed MC37_C-EEE Well Location
- Proposed MC37_C-EEEE Well Location
- Block boundaries
- Seafloor fault intersection. Tick denotes downthrown block
- Slump scar
- 2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar
- Sonar contacts, interpreted modern debris
- Slight and Moderate Risk of Gas within Unit G

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC36_C-E)



ROV Plat (MC36_C-E)

Proposed MC36_C-E Well Location
(1,267,100ft E / 10,508,950ft N)

Proposed MC36_C-EE Well Location

Block boundaries

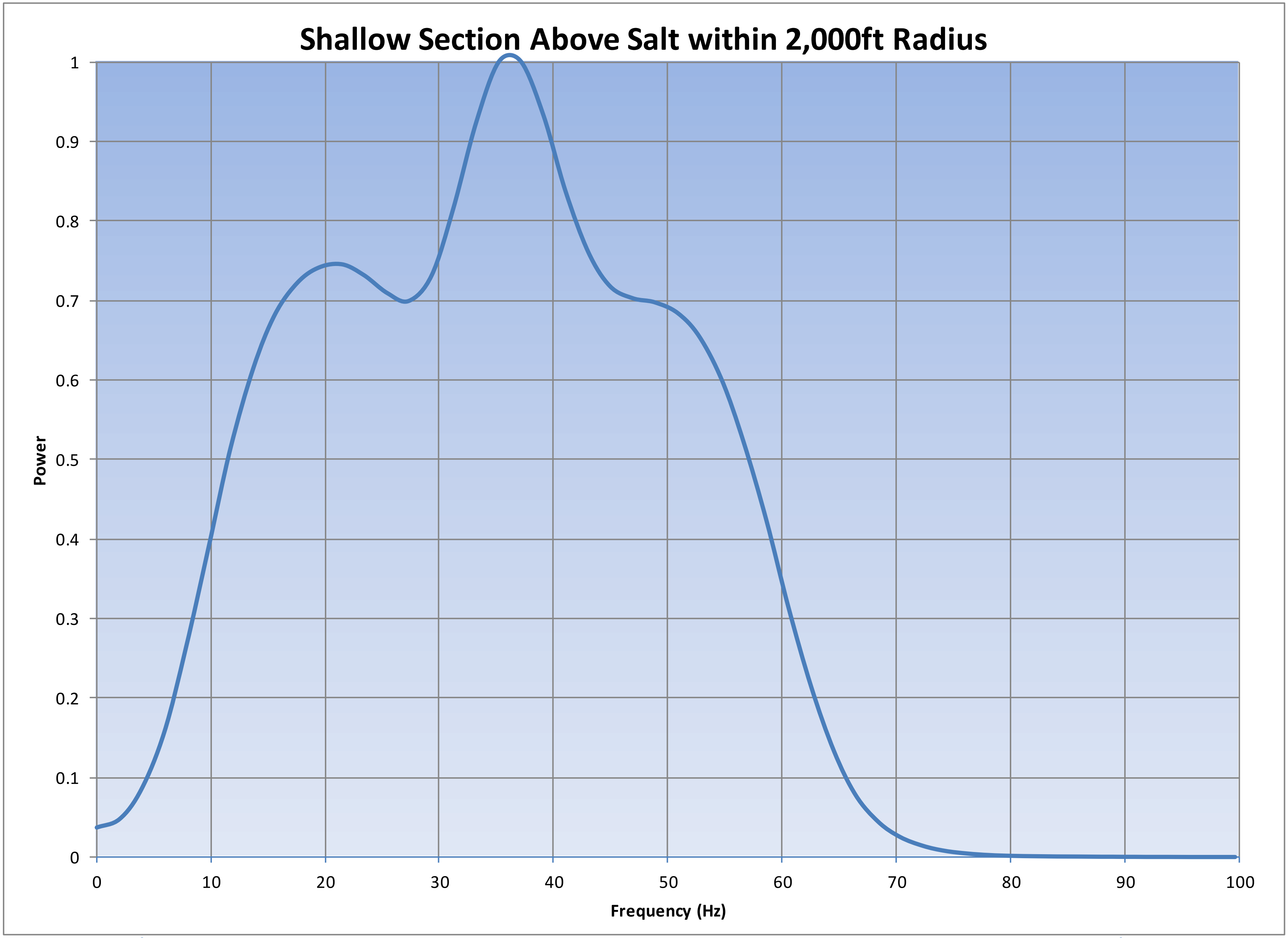
-3522 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC36_C-E)



MC36_C-E	Power Spectrum	Figure 10

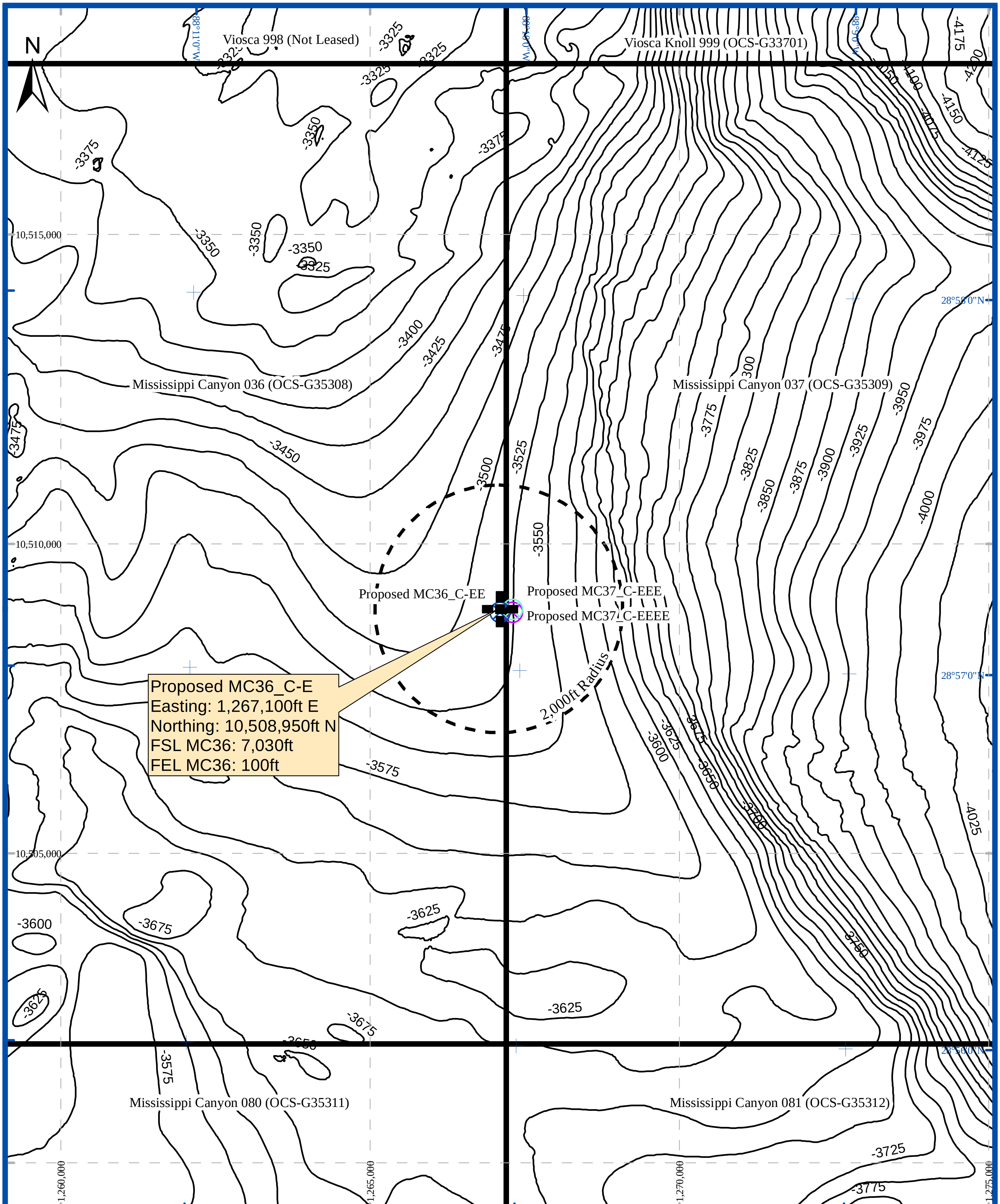


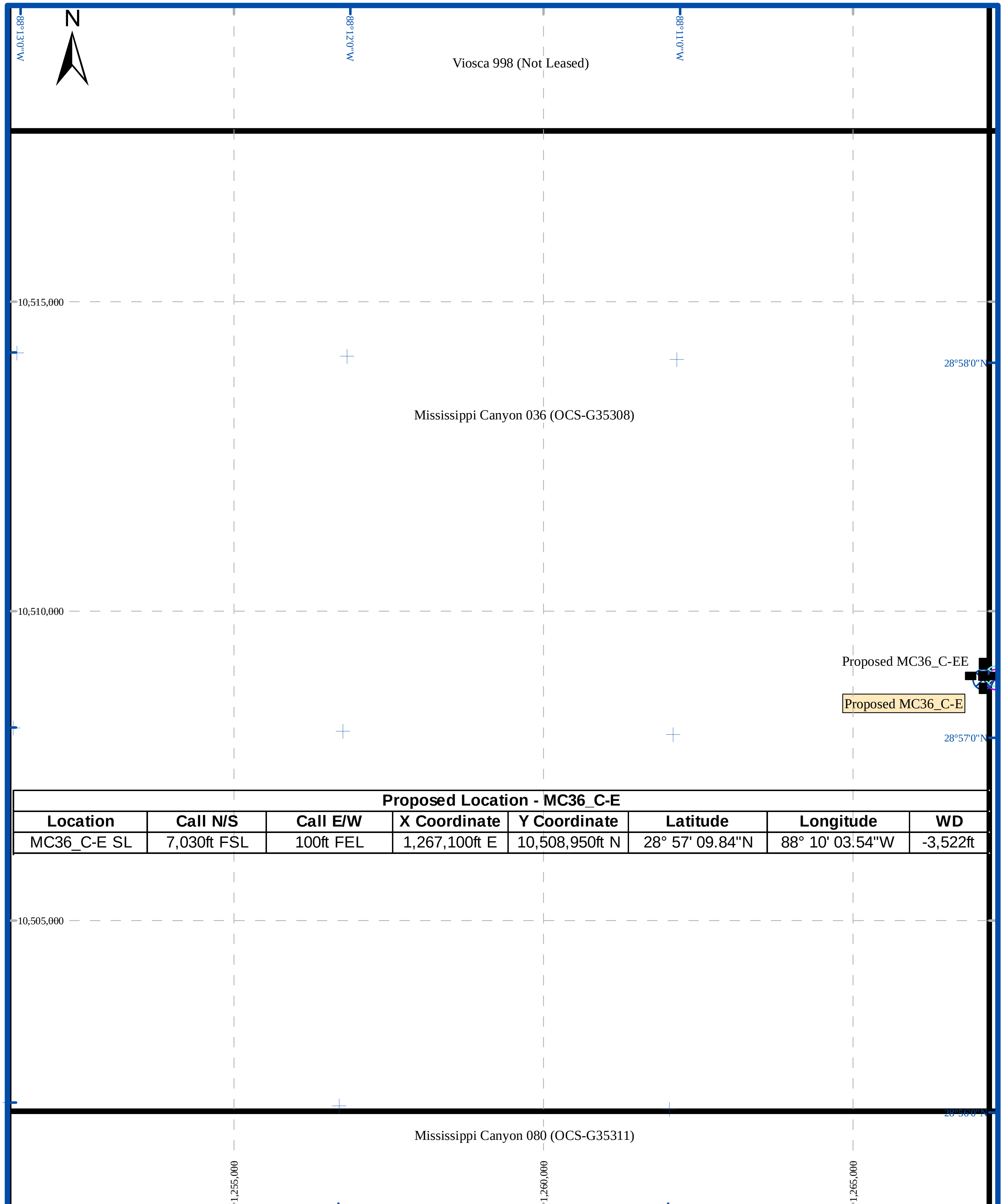
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC36_C-E							
Location	**Call N/S**	**Call E/W**	**X Coordinate**	**Y Coordinate**	**Latitude**	**Longitude**	**WD**
MC36_C-E SL	7,030ft FSL	100ft FEL	1,267,100ft E	10,508,950ft N	28° 57' 09.84"N	88° 10' 03.54"W	-3,522ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

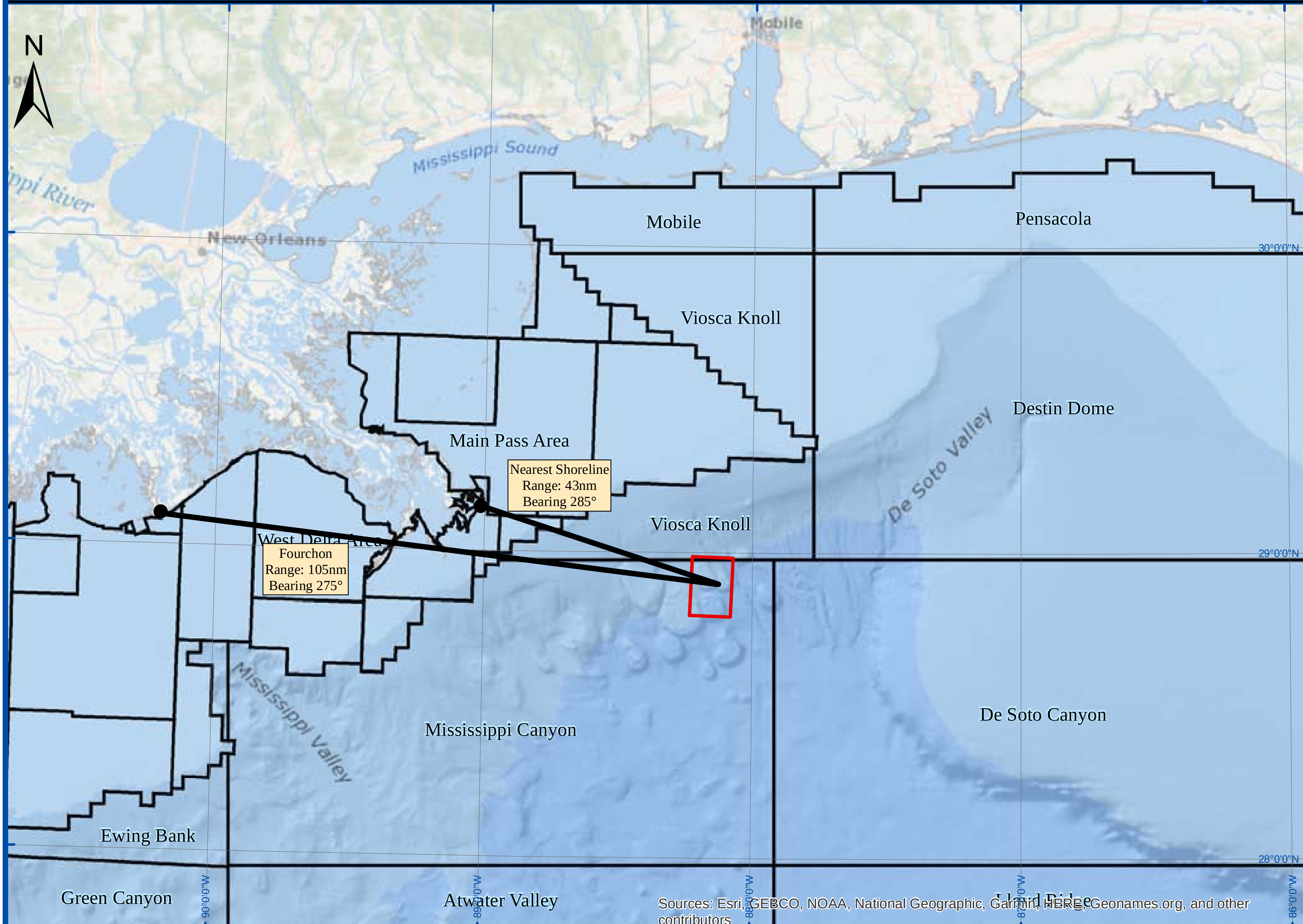
0 150 300 600 Meters

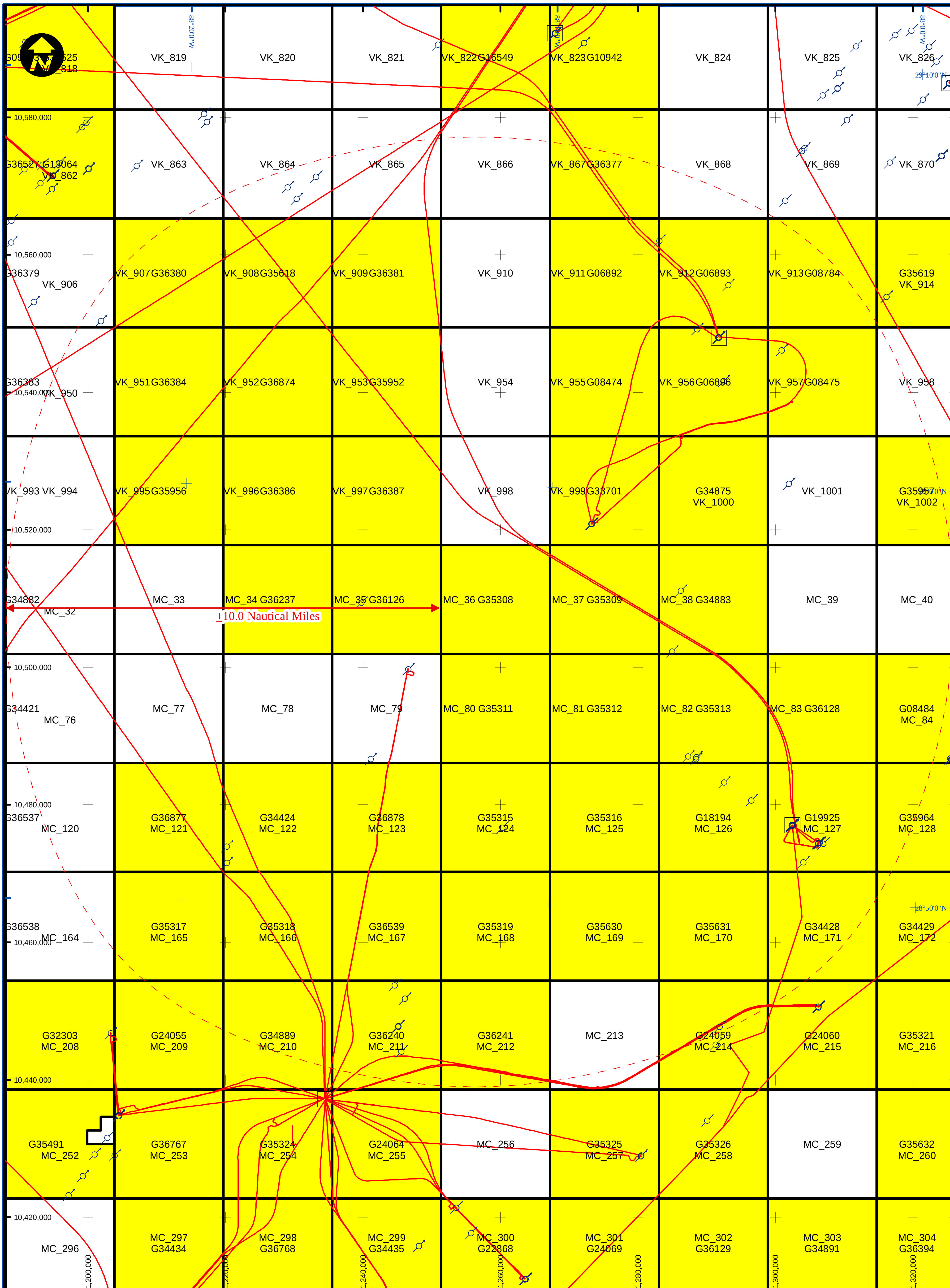
Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 36

Figure 13





Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 36

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC36_C-E Well Location

October 02, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 36
(OCS-G OCS-G-35308)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_C-E well location with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,382ft below sea surface (6,860ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 1.63° to the East The proposed location is located approximately 1,820ft to the west of a retrogressive cuspate, cut back slump scarp and associated debris flow to the east that occurs on the west flank of the Dorsey Canyon. No seabed faults occur at the proposed well or within 2,000ft of the proposed well.

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

No existing wells or pipelines occur within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas is assigned at the proposed well or within 2,000ft of the proposed well.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit C, Unit D, and throughout Unit E, Unit F, and Unit G.

The well-path will intersect a fault within Unit E and G.

Proposed MC36_C-E Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	09.837"	North	Easting	1,267,100	US ft. E
Longitude	88°	10'	03.539"	West	Northing	10,508,950	US ft. N
Latitude Decimal	28.9527324						
Longitude Decimal	-88.1676497						
FEL Mississippi Canyon 036	100ft	US ft.	Inline	12792			
FSL Mississippi Canyon 036	7,030ft	US ft.	Crossline	17849			
Water Depth: -3,522ft	Slope: 1.63° East						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.4 Miles @ 33.4°					

Proposed MC36_C-EE Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	09.341"	North	Easting	1,267,100	US ft. E
Longitude	88°	10'	03.533"	West	Northing	10,508,900	US ft. N
Latitude Decimal	28.9525948						
Longitude Decimal	-88.1676481						
FEL Mississippi Canyon 036	100ft	US ft.	Inline	12792			
FSL Mississippi Canyon 036	6,980ft	US ft.	Crossline	17849			
Water Depth: -3,522ft	Slope: 2.0° East						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.4 Miles @ 33.4°					

Proposed MC37_C-EEE Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	09.856”	North	Easting	1,267,300	US ft. E
Longitude	88°	10’	01.287”	West	Northing	10,508,950	US ft. N
Latitude Decimal			28.9527378				
Longitude Decimal			-88.1670242				
FWL Mississippi Canyon 037			100ft	US ft.	Inline	12794	
FSL Mississippi Canyon 037			7,030ft	US ft.	Crossline	17841	
Water Depth: -3,531ft			Slope: 2.0° East				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.4 Miles @ 33.4°		

Proposed MC37_C-EEEE Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	09.856”	North	Easting	1,267,300	US ft. E
Longitude	88°	10’	01.287”	West	Northing	10,508,900	US ft. N
Latitude Decimal			28.9526003				
Longitude Decimal			-88.1670227				
FWL Mississippi Canyon 037			100ft	US ft.	Inline	12794	
FSL Mississippi Canyon 037			6,980ft	US ft.	Crossline	17841	
Water Depth: -3,531ft			Slope: 2.0° East				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.4 Miles @ 33.4°		

Conclusions and Recommendations. No major problems are anticipated at the seabed.

No risk of gas is assigned at the proposed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit C, Unit D, and throughout Unit E, Unit F, and Unit G.

The well-path will intersect two minor faults.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC36_C-E Well Location

Anadarko Petroleum Corporation

October 02, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC36_C-E Well Location (OCS-G-35308)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_C-E with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 4,500ft to the northwest.

Proposed MC36_C-E Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	09.837"	North	Easting	1,267,100	US ft. E
Longitude	88°	10'	03.539"	West	Northing	10,508,950	US ft. N
Latitude Decimal	28.9527324						
Longitude Decimal	-88.1676497						
FEL Mississippi Canyon 036	100ft	US ft.	Inline	12792			
FSL Mississippi Canyon 036	7,030ft	US ft.	Crossline	17849			
Water Depth: -3,522ft	Slope: 1.63° East						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.4 Miles @ 33.4°					

Proposed MC36_C-EE Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	09.341"	North	Easting	1,267,100	US ft. E
Longitude	88°	10'	03.533"	West	Northing	10,508,900	US ft. N
Latitude Decimal	28.9525948						
Longitude Decimal	-88.1676481						
FEL Mississippi Canyon 036	100ft	US ft.	Inline	12792			
FSL Mississippi Canyon 036	6,980ft	US ft.	Crossline	17849			
Water Depth: -3,522ft	Slope: 2.0° East						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.4 Miles @ 33.4°					

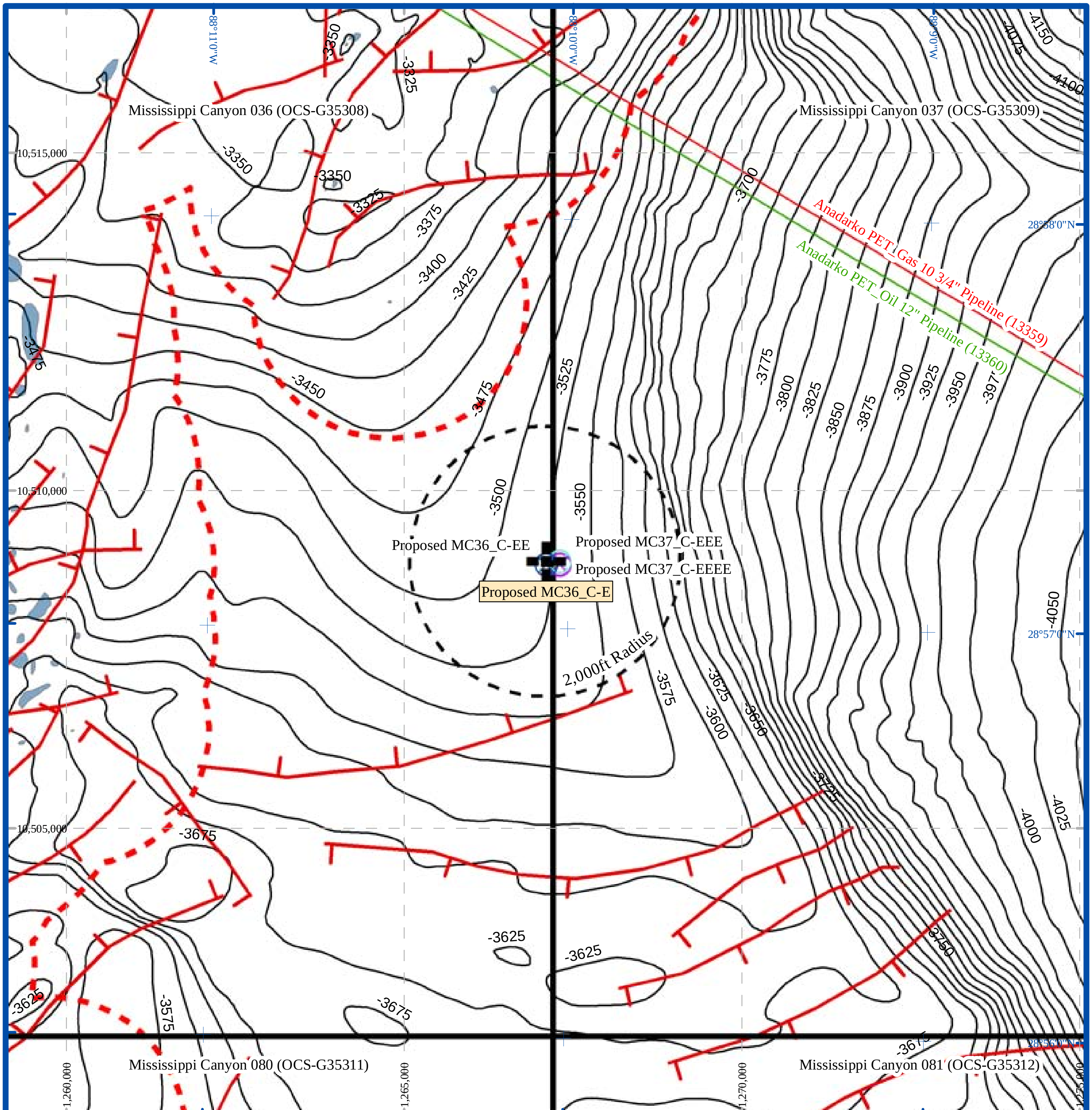
Proposed MC37_C-EEE Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	09.856”	North	Easting	1,267,300	US ft. E
Longitude	88°	10’	01.287”	West	Northing	10,508,950	US ft. N
Latitude Decimal	28.9527378						
Longitude Decimal	-88.1670242						
FWL Mississippi Canyon 037	100ft	US ft.	Inline	12794			
FSL Mississippi Canyon 037	7,030ft	US ft.	Crossline	17841			
Water Depth: -3,531ft	Slope: 2.0° East						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.4 Miles @ 33.4°					

Proposed MC37_C-EEEE Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	09.856”	North	Easting	1,267,300	US ft. E
Longitude	88°	10’	01.287”	West	Northing	10,508,900	US ft. N
Latitude Decimal	28.9526003						
Longitude Decimal	-88.1670227						
FWL Mississippi Canyon 037	100ft	US ft.	Inline	12794			
FSL Mississippi Canyon 037	6,980ft	US ft.	Crossline	17841			
Water Depth: -3,531ft	Slope: 2.0° East						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.4 Miles @ 33.4°					

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

Conclusions and Recommendations: The proposed MC36_C-E, MC36_C-EE, MC37_C-EEE, and MC37_C-EEEE well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC36_C-E Well Location (1,267,100ft E / 10,508,950ft N)

Proposed MC36_C-EE Well Location

Proposed MC37_C-EEE Well Location

Proposed MC37_C-EEEE Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

-3522 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Cactus Prospect
Mississippi Canyon, Block MC37,
Offshore Gulf of Mexico

Description:
Proposed MC37_C-AAAA Well Location

Project Number:
2020-317

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	………………… A Haigh
	Quality Assurance	………………… D Haigh

Revision	**Date**	**Title**
0	October 02, 2020	Draft
1	October 05, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

Please be aware that further distribution of this report, in whole or part, or the use of the data for a purpose not expressly stated within the contractual work scope is at the client's sole risk, and Ocean Geo Solutions, Inc recommends that this disclaimer is included in any such distribution.

OCEAN GEO SOLUTIONS, INC
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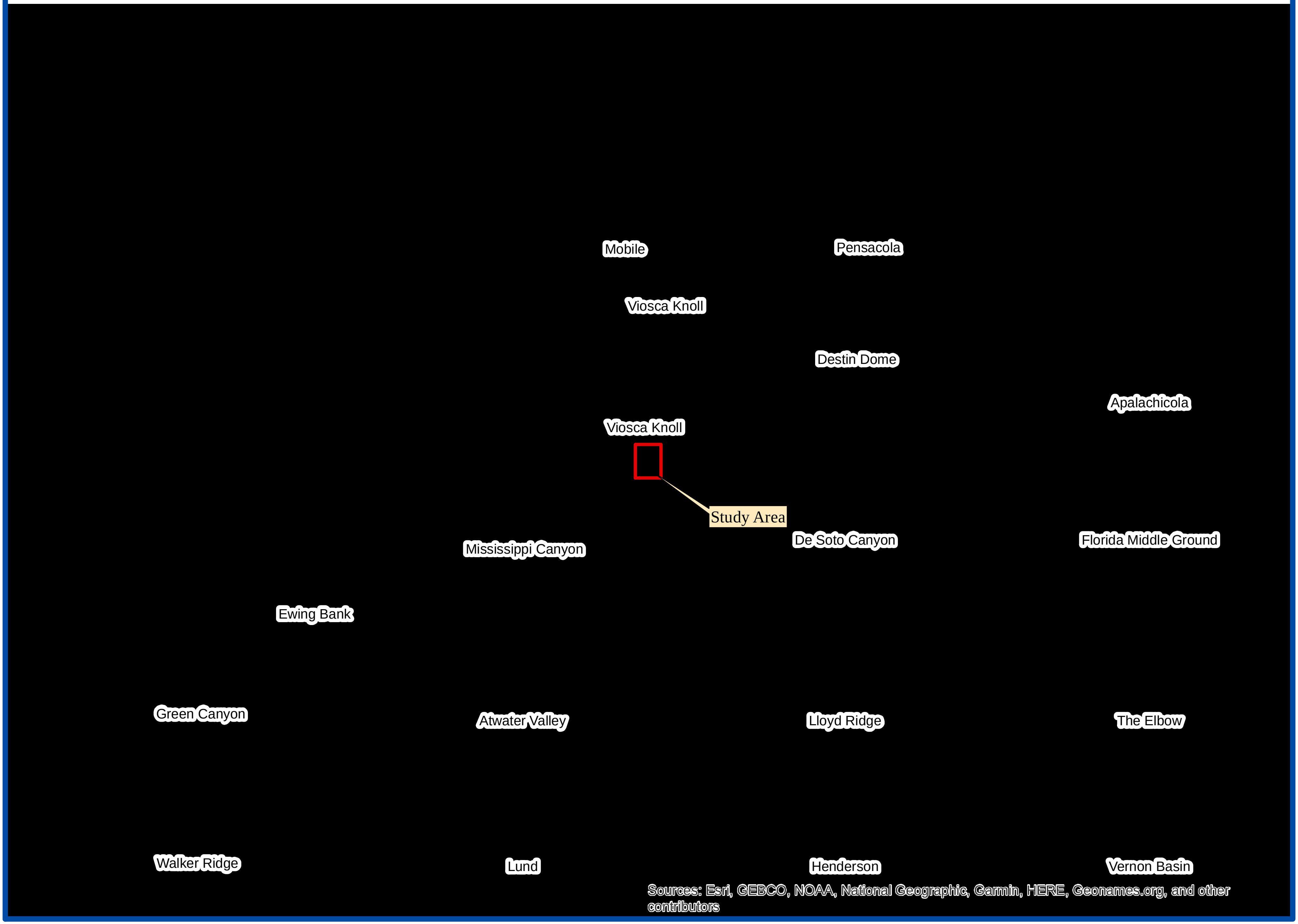
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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LIST OF FIGURES

WELL CLEARANCE LETTER – PROPOSED MC37_C-AAAA WELL LOCATION

October 05, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC37_C-AAAA Well Location
Mississippi Canyon Block MC37
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC37_C-AAAA Well Location, Mississippi Canyon Area (OCS-G-35309). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,263ft below sea surface (6,558ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC37_C-AAAA well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC37_C-AAAA Well Location lies in the northwest part of Block MC37 (OCS-G-35309).

Proposed MC37_C-AAAA Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	13.560"	North	Easting	1,270,680	US ft. E
Longitude	88°	09'	23.939"	West	Northing	10,515,350	US ft. N
Latitude Decimal			28.9704334				
Longitude Decimal			-88.1566498				
FWL Mississippi Canyon 037			3,480ft	US ft.	Inline	12864	
FNL Mississippi Canyon 037			2,410ft	US ft.	Crossline	17945	
Water Depth: -3,705ft			Slope: 3.6° SE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		7.4 Miles @ 32.9°		

Proposed MC36_C-A Location (MC 37 Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	15.046"	North	Easting	1,270,680	US ft. E
Longitude	88°	09'	23.956"	West	Northing	10,515,500	US ft. N
Latitude Decimal			28.970846				
Longitude Decimal			-88.1566544				
FWL Mississippi Canyon 037			3,480ft	US ft.	Inline	12865	
FNL Mississippi Canyon 037			2,260ft	US ft.	Crossline	17953	
Water Depth: -3,699ft			Slope: 3.6° SE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		7.4 Miles @ 32.9°		

Proposed MC36_C-AA Location (MC 37 Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	14.551"	North	Easting	1,270,680	US ft. E
Longitude	88°	09'	23.950"	West	Northing	10,515,450	US ft. N
Latitude Decimal			28.9707085				
Longitude Decimal			-88.1566529				
FWL Mississippi Canyon 037			3,480ft	US ft.	Inline	12865	
FNL Mississippi Canyon 037			2,310ft	US ft.	Crossline	17949	
Water Depth: -3,701ft			Slope: 3.6° SE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		7.4 Miles @ 32.9°		

Proposed MC37_C-AAA Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	14.055"	North	Easting	1,270,680	US ft. E
Longitude	88°	09'	23.945"	West	Northing	10,515,400	US ft. N
Latitude Decimal			28.9705709				
Longitude Decimal			-88.1566513				
FWL Mississippi Canyon 037			3,480ft	US ft.	Inline	12864	
FNL Mississippi Canyon 037			2,360ft	US ft.	Crossline	17949	
Water Depth: -3,703ft			Slope: 3.6° SE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		7.4 Miles @ 32.9°		

Location MC37_C-AAA is 50ft from MC37_C-AAAA on a bearing of 000°.
Location MC36_C-AA (MC 37 surface) is 100ft from MC37_C-AAAA on a bearing of 000°.
Location MC36_C-A (MC 37 surface) is 150ft from MC37_C-AAAA on a bearing of 000°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC37_C-AAAA well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC37_C-AAAA well location is -3,705ft below sea surface (Figure 1). The seafloor slopes to the southeast at 3.6°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC37_C-AAAA well location is in the northwest of block MC37. The proposed well is located in an area of relatively smooth seabed located between Horn Dome and Dorsey Canyon.

The proposed location is located to the southwest of a relict failure on the west flank of a terrace of Dorsey Canyon. Further surficial failures due to underlying salt uplift occur around 2,000ft to the west and southwest. Minor slump lobe deposits from these failures occur within the southwest quadrant of the 2,000ft radius.

No seabed fault intersections occur within 2,000ft of the proposed location.

Clays and silts are interpreted at the seabed.

No existing wells occur within 2,000ft radius.

Two northwest to southeast trending pipelines traverse to the southwest of the proposed well. The gas pipeline is 915ft to the southwest and the oil pipeline is about 1,130ft to the southwest. The following are the details:

Operator	Block-Origin/Termination	Pipeline Segment	Outside Diameter (in)	Product	Status
Anadarko Pet	MC127/MC260	13359	10 ¾"	Gas	ACT
Anadarko Pet	MC127/Mc289	13360	12"	Oil	ACT

A sonar contact, interpreted as modern debris occurs 2,000ft to the west of the proposed location.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,921ft below sea surface (216ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,921ft below sea surface (216ft below seabed).

4.3 Unit B

The upper part of Unit B from -3,921ft to -4,214ft below sea surface (216ft to 509ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The proposed location is on the updip extremity of these deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -4,214ft below sea surface (509ft below seabed) to -4,352ft below sea surface (647ft below seabed) presents acoustically as well-layered, low-amplitude reflectors with clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft.

Horizon H10 marks the base of Unit B, occurring at -4,352ft below sea surface (647ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,352ft to -5,045ft below sea surface (647ft to 1,340ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit C at the proposed well or within 2,000ft radius.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -5,045ft below sea surface (1,340ft below seabed).

4.5 Unit D

The upper part of Unit D from -5,045 below sea surface (1,340ft below seabed) to -5,238ft below sea surface (1,472ft below seabed) is characterized by well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional sands.

The mid-section of Unit D from -5,238ft to -6,042ft below sea surface (1,533ft to 2,337ft below seabed) is characterized by slightly-chaotic, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sands interpreted as mass-transport or channelized deposits. This interval appears presents an acoustic character suggestive of a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can, on occasions, induce minor over-pressure and as such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -6,042ft below sea surface (2,337ft below seabed).

4.6 Unit E

The upper part of Unit E from -6,042ft to -6,263ft below sea surface (2,337ft to 2,558ft below seabed) is characterized by low-amplitude reflectors interpreted as clays and silts.

From -6,263ft to -7,064ft below sea surface (2,558ft to 3,359ft below seabed) is interpreted to comprise of well-layered, low-amplitude reflectors with clays and silts with several sands. Minor wellbore stability and drilling fluid circulation problems may occur.

Unit E from -7,064ft to -8,150ft below sea surface (3,359ft to 4,445ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,000ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit E.

Horizon H40 marks the base of Unit E at -8,150ft below sea surface (4,445ft below seabed).

4.7 Unit F

Unit F from -8,150ft to -8,832ft below sea surface (3,359ft to 4,445ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,000ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit F.

Horizon H50 marks the base of Unit F at -8,832ft below sea surface (5,127ft below seabed).

4.8 Unit G

Unit G from -8,832ft to -10,263ft below sea surface (5,127ft to 6,558ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit G.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,263ft below sea surface (6,558ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,921ft to -4,214ft below sea surface (216ft to 509ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,238ft to -6,042ft below sea surface (1,533ft to 2,337ft below seabed).

Within Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -7,064ft to -8,150ft below sea surface (3,359ft to 4,445ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -8,150ft to -8,832ft below sea surface (4,445ft to 5,127ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None predicted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,921ft to -4,214ft below sea surface (216ft to 509ft below seabed) Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  None Predicted.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,238ft to -6,042ft below sea surface (1,533ft to 2,337ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Within Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -7,064ft to -8,150ft below sea surface (3,359ft to 4,445ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  Minor wellbore stability and drilling fluid circulation problems may occur within the interval from -6,263ft to -7,064ft below sea surface (2,558ft to 3,359ft below seabed).

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -8,150ft to -8,832ft below sea surface (4,445ft to 5,127ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit G

  Minor wellbore stability and drilling fluid circulation problems may occur within Unit G.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC37_C-AAAA Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

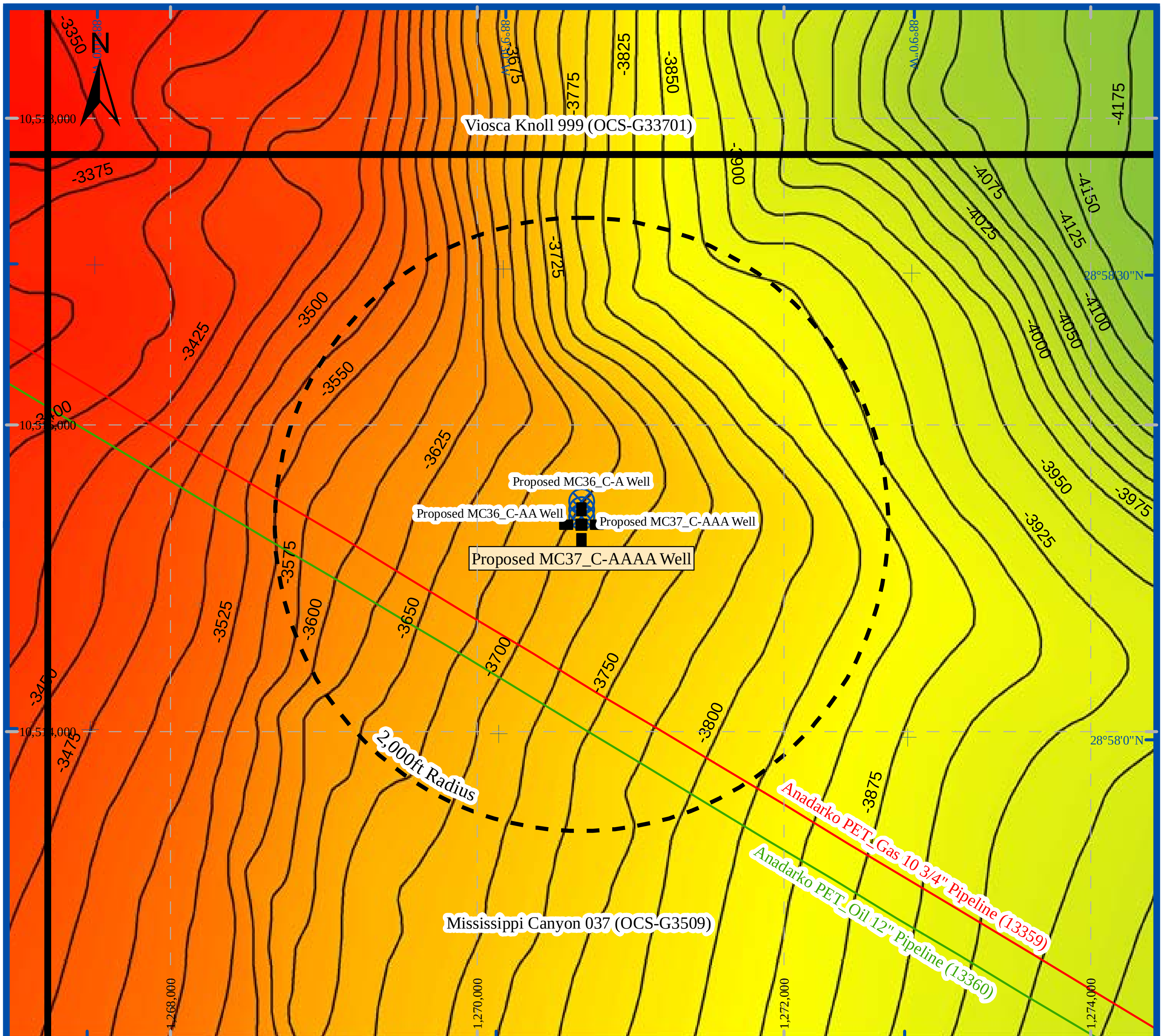
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC37_C-AAAA Well Location (1,270,680ft E / 10,515,350ft N)

Proposed MC36_C-A Well Location

Proposed MC36_C-AA Well Location

Proposed MC37_C-AAA Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

-3705 Depth in feet below sea surface to seabed, contoured at 25ft intervals

Seabed Depth (Feet)

Chart Scale 1" = 1,000'

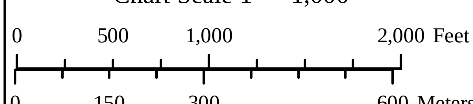
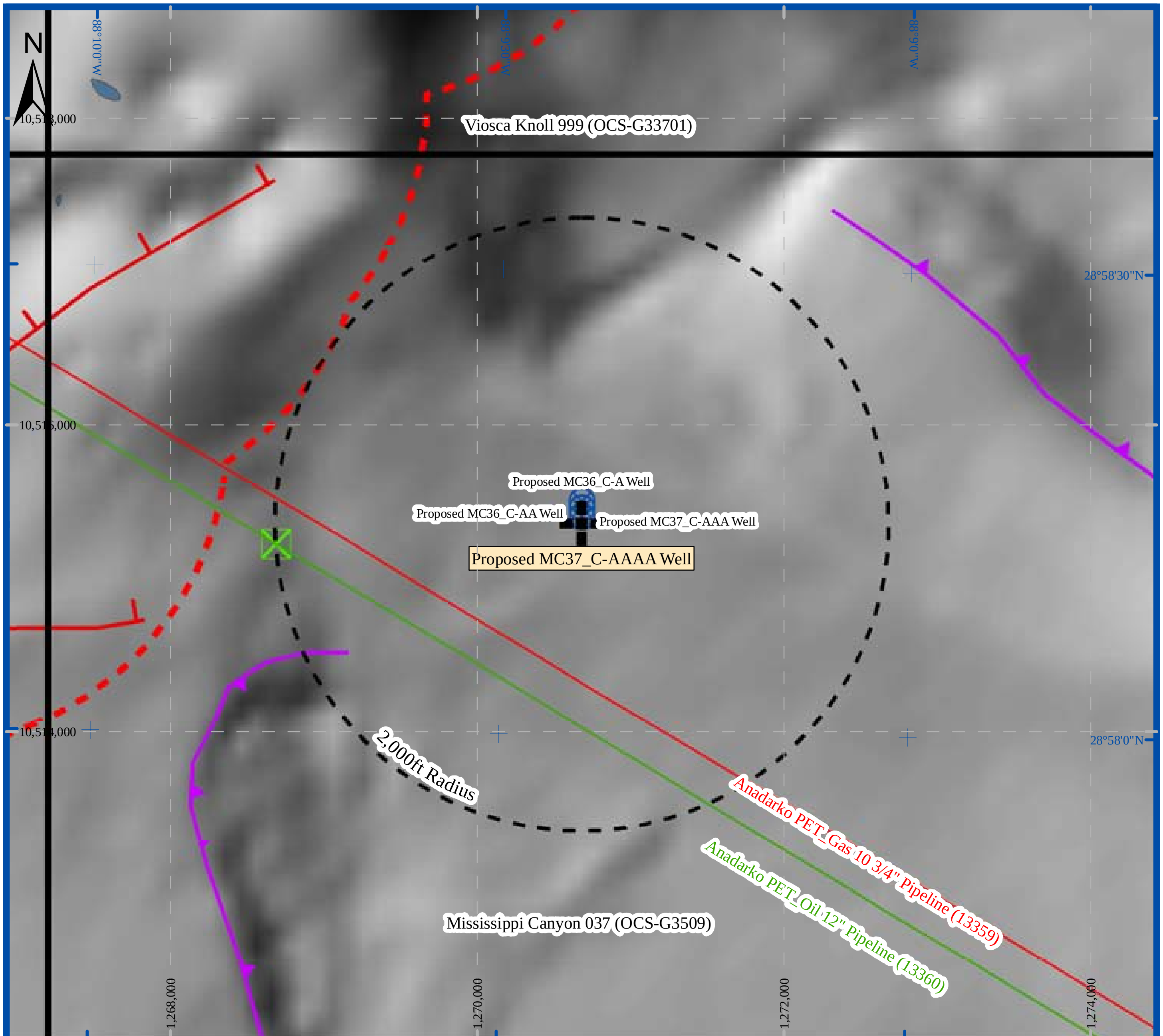


Figure 1
(MC37_C-AAAA)



Seabed Morphology Extract

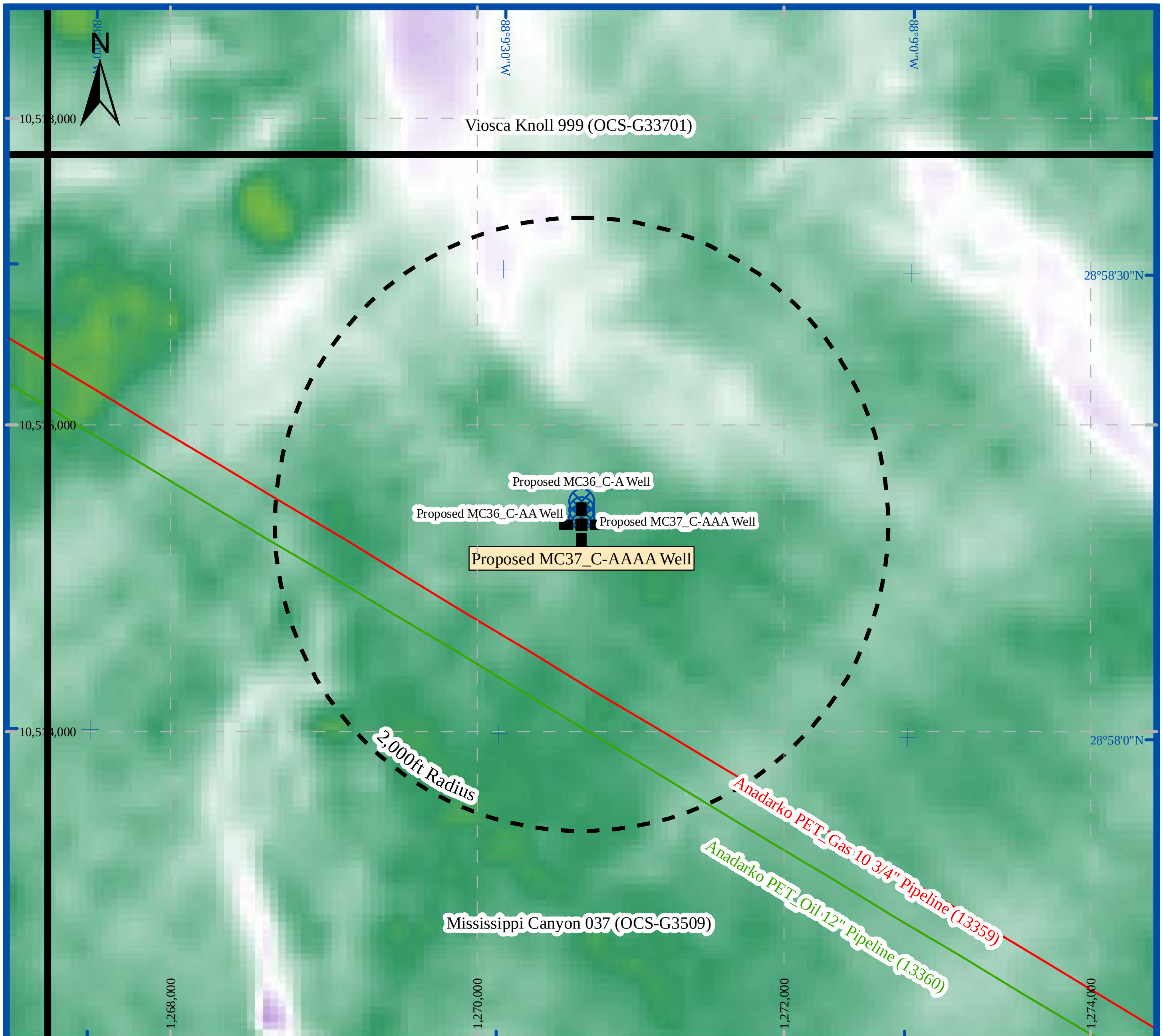
- Proposed MC37_C-AAAA Well Location (1,270,680ft E / 10,515,350ft N)
- Proposed MC36_C-A Well Location
- Proposed MC36_C-AA Well Location
- Proposed MC37_C-AAA Well Location
- Oil Pipeline
- Gas Pipeline
- Block boundaries
- Seafloor fault intersection. Tick denotes downthrown block
- Slump scar
- 2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar
- Hardgrounds exposures at seabed mapped from side scan sonar data
- Sonar contacts, interpreted modern debris

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC37_C-AAAA)



Seabed Amplitude Extract

- Proposed MC37_C-AAAA Well Location (1,270,680ft E / 10,515,350ft N)
- Proposed MC36_C-A Well Location
- Proposed MC36_C-AA Well Location
- Proposed MC37_C-AAA Well Location
- Oil Pipeline
- Gas Pipeline
- Block boundaries

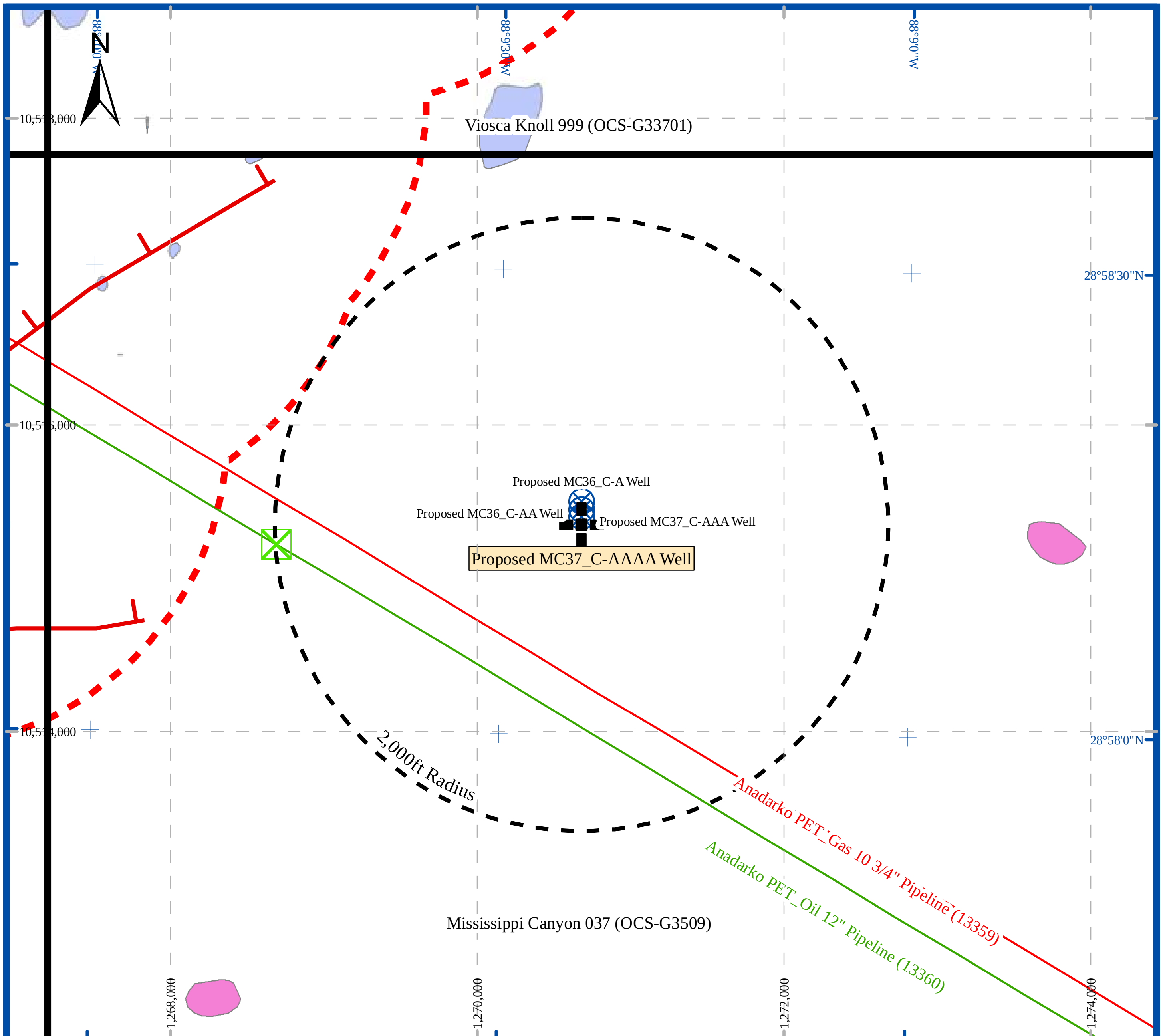
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC37_C-AAAA)



Geohazard Summary Extract

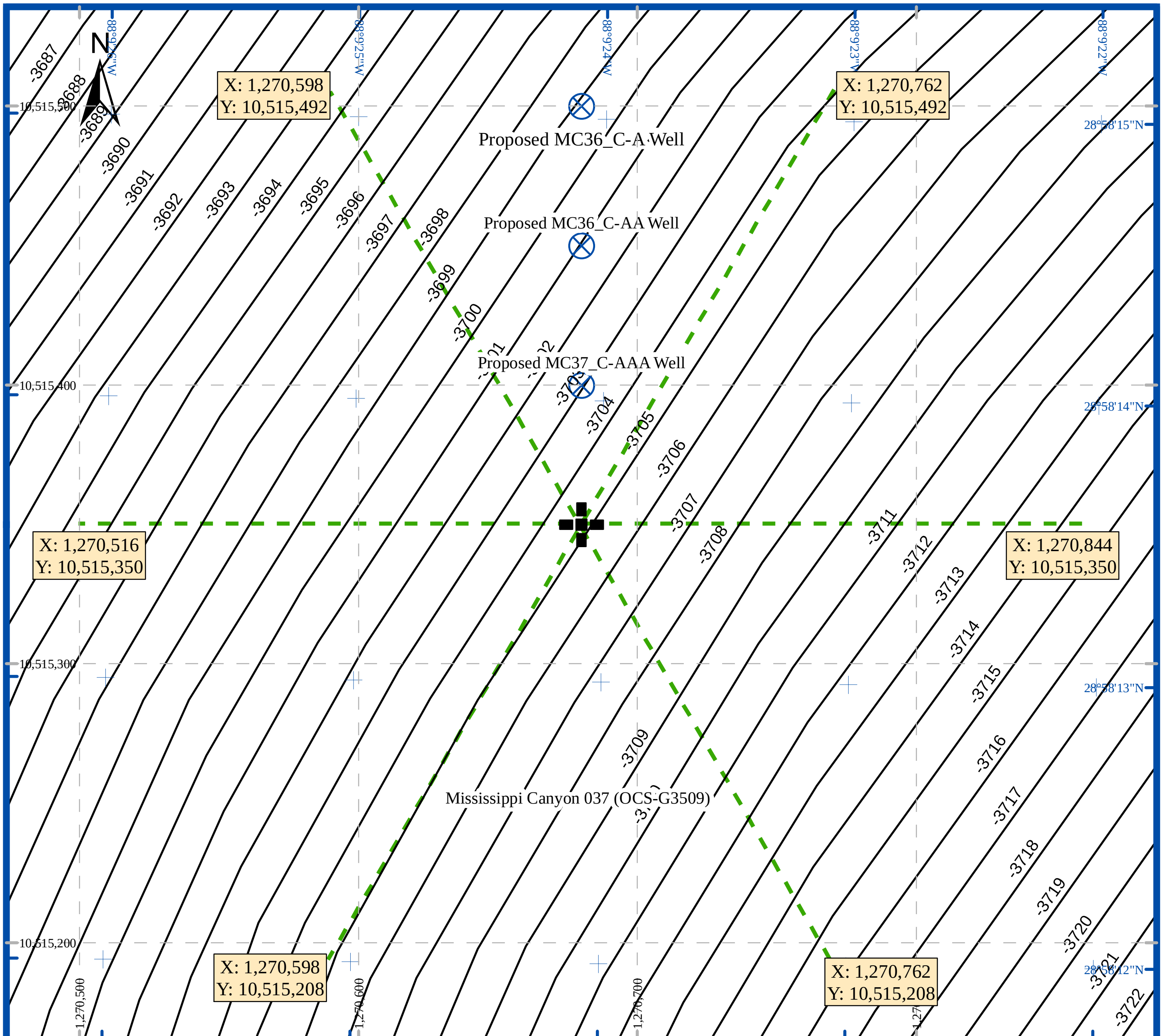
- Proposed MC37_C-AAAA Well Location (1,270,680ft E / 10,515,350ft N)
- Proposed MC36_C-A Well Location
- Proposed MC36_C-AA Well Location
- Proposed MC37_C-AAA Well Location
- Oil Pipeline
- Gas Pipeline
- Block boundaries
- Seafloor fault intersection. Tick denotes downthrown block
- 2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar
- Hardgrounds exposures at seabed mapped from side scan sonar data
- Sonar contacts, interpreted modern debris
- Slight, Moderate, and High Risk of Gas within Unit B
- Slight and Moderate Risk of Gas within Unit E
- Slight and Moderate Risk of Gas within Unit G

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC37_C-AAAA)



ROV Plat (MC37_C-AAAA)

Proposed MC37_C-AAAA Well Location
(1,270,680ft E / 10,515,350ft N)

Proposed MC37_C-A Well Location

Proposed MC37_C-AA Well Location

Proposed MC37_C-AAA Well Location

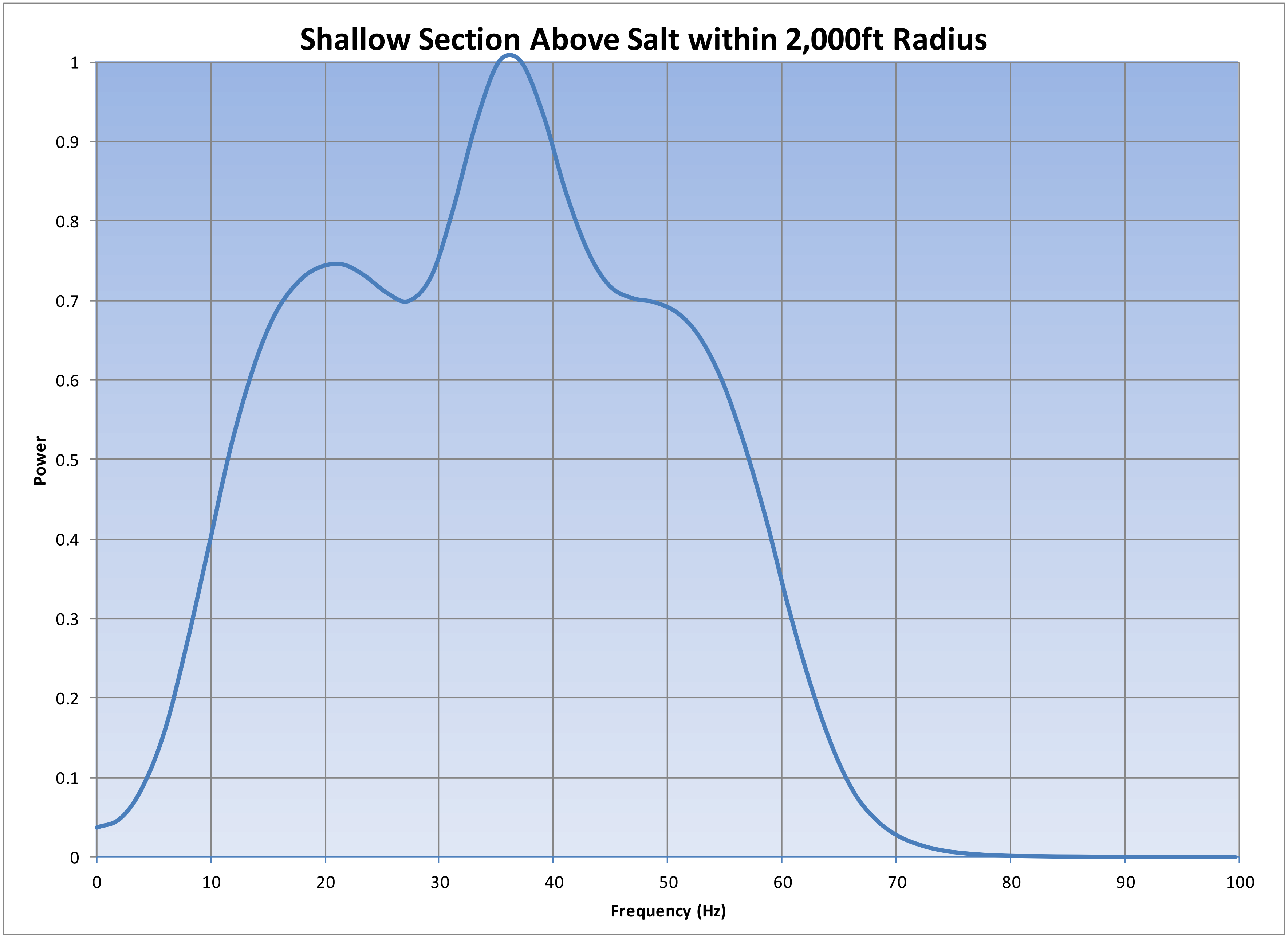
-3705 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

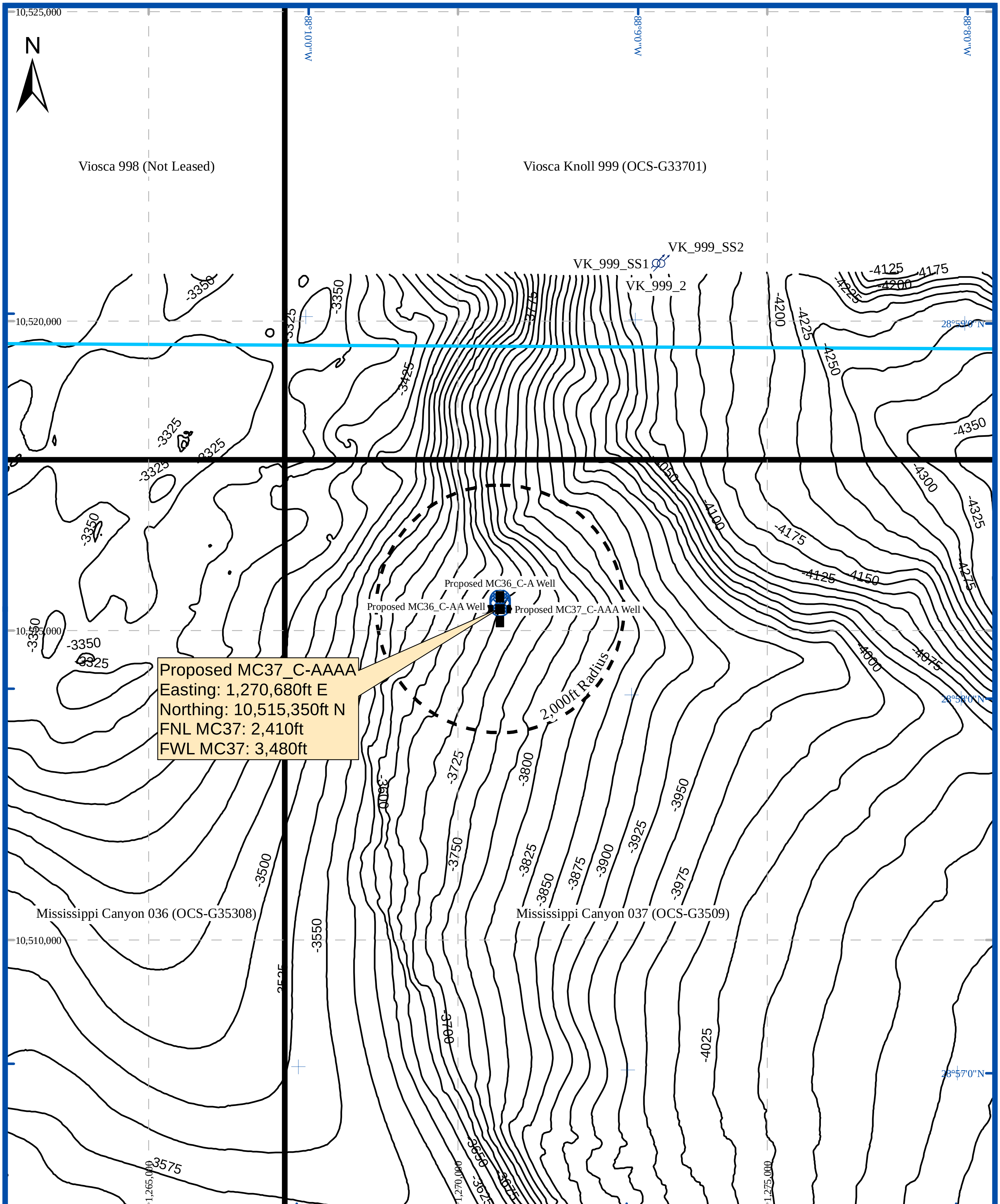
0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC37_C-AAAA)

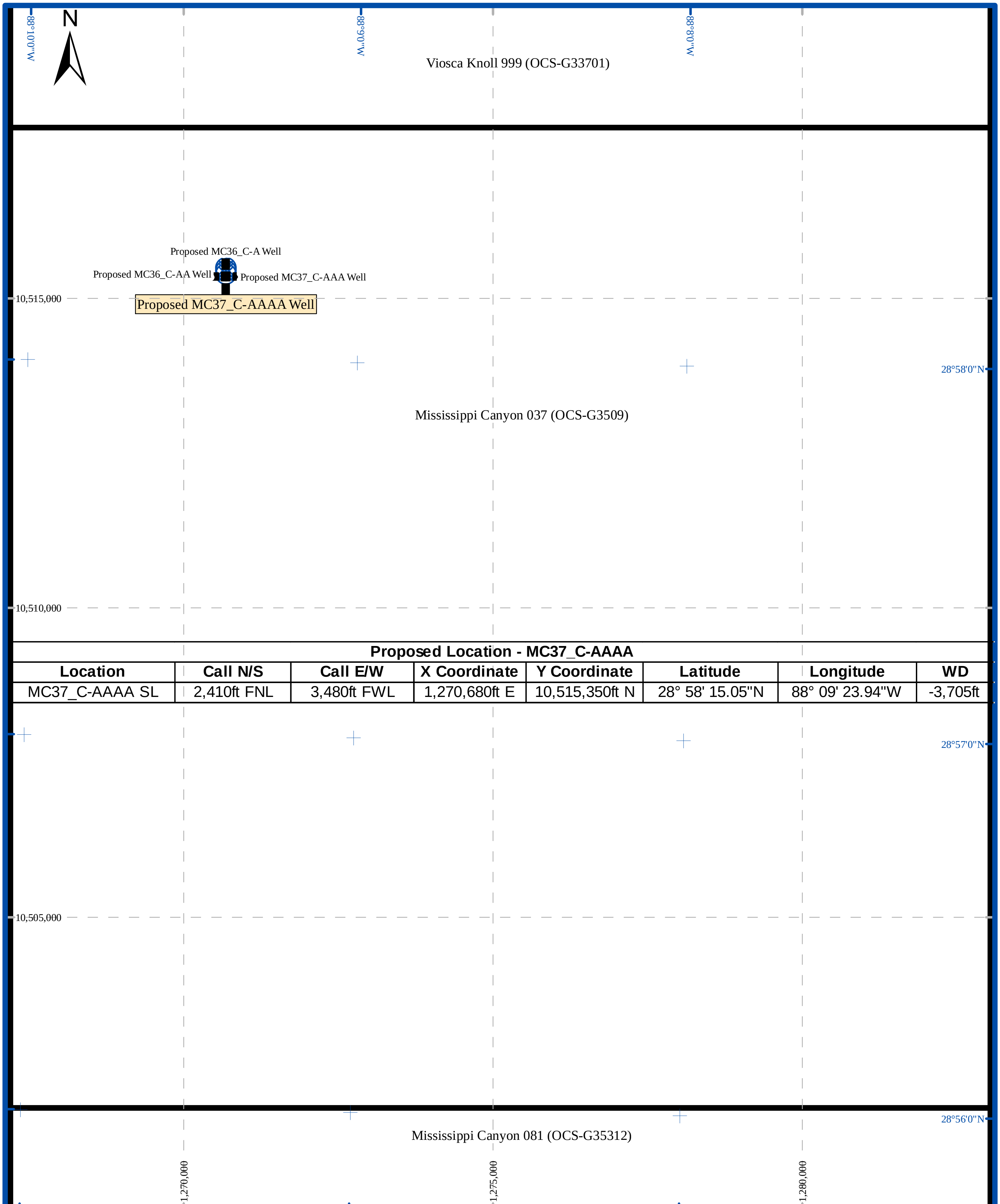


MC37_C-AAAA	Power Spectrum	Figure 10



Bathymetry Plat

Figure 11



Proposed Location - MC37_C-AAAA

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC37_C-AAAA SL	2,410ft FNL	3,480ft FWL	1,270,680ft E	10,515,350ft N	28° 58' 15.05"N	88° 09' 23.94"W	-3,705ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

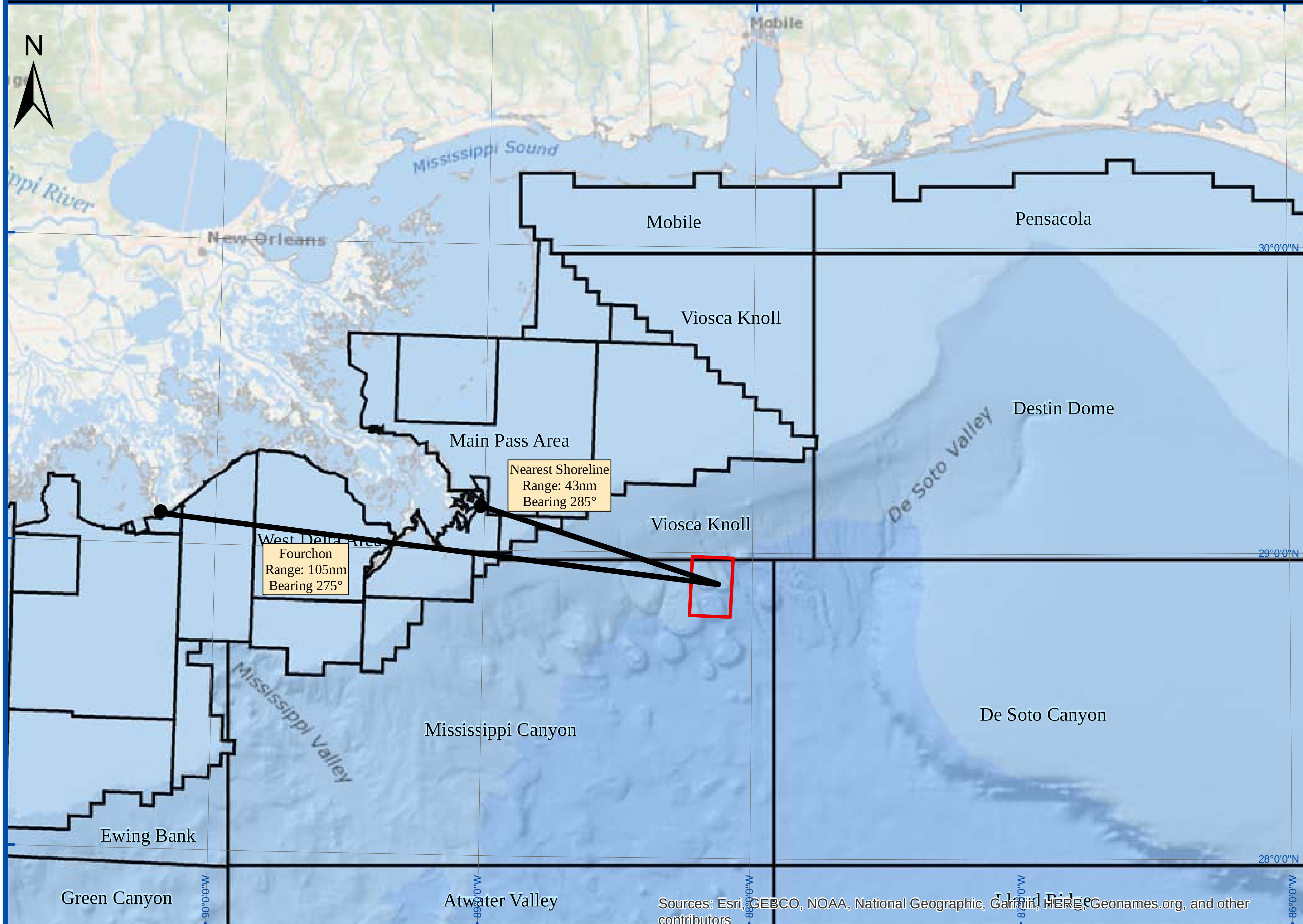
0 150 300 600 Meters

Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 37

Figure 13



Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 37

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC37_C-AAAA Well Location

October 05, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 37
(OCS-G OCS-G-35309)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-AAAA well location with surface location in Block 37, Mississippi Canyon Area (OCS-G-35309). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.5 seconds two-way time (TWT), -10,263ft below sea surface (6,558ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 3.6° to the southeast No seabed faults occur within 2,000ft of the proposed well.

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

No exsiting wells occur within 2,000ft radius of the proposed well. Two northwest to southeast trending pipelines occur to the southwest of the proposed well. The closest being 915ft to the southwest.

Sub-Seabed Hazards. No risk of gas is assigned at the propsoed well or within 2,000ft.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, Unit E and throughout Unit F.

The well-path will intersect a fault within Unit G.

Proposed MC37_C-AAAA Location (Surface)								
Location Coordinates								
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West			
Latitude	28°	58’	13.560”	North	Easting	1,270,680	US ft. E	
Longitude	88°	09’	23.939”	West	Northing	10,515,350	US ft. N	
Latitude Decimal	28.9704334							
Longitude Decimal	-88.1566498							
FWL Mississippi Canyon 037	3,480ft	US ft.	Inline	12864				
FNL Mississippi Canyon 037	2,410ft	US ft.	Crossline	17945				
Water Depth: -3,705ft	Slope: 3.6° SE							
Nearest Shoreline	43 Nautical Miles @ 285°							
Port of Operation	Fourchon	105 Nautical Miles @ 275°						
Nearest Manned Platform	A Ram-Powell in VK956	7.4 Miles @ 32.9°						

Proposed MC36_C-A Location (MC 37 Surface)								
Location Coordinates								
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West			
Latitude	28°	58’	15.046”	North	Easting	1,270,680	US ft. E	
Longitude	88°	09’	23.956”	West	Northing	10,515,500	US ft. N	
Latitude Decimal	28.970846							
Longitude Decimal	-88.1566544							
FWL Mississippi Canyon 037	3,480ft	US ft.	Inline	12865				
FNL Mississippi Canyon 037	2,260ft	US ft.	Crossline	17953				
Water Depth: -3,699ft	Slope: 3.6° SE							
Nearest Shoreline	43 Nautical Miles @ 285°							
Port of Operation	Fourchon	105 Nautical Miles @ 275°						
Nearest Manned Platform	A Ram-Powell in VK956	7.4 Miles @ 32.9°						

Proposed MC36_C-AA Location (MC 37 Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	14.551"	North	Easting	1,270,680	US ft. E
Longitude	88°	09'	23.950"	West	Northing	10,515,450	US ft. N
Latitude Decimal		28.9707085					
Longitude Decimal		-88.1566529					
FWL Mississippi Canyon 037		3,480ft		US ft.	Inline	12865	
FNL Mississippi Canyon 037		2,310ft		US ft.	Crossline	17949	
Water Depth: -3,701ft		Slope: 3.6° SE					
Nearest Shoreline		43 Nautical Miles @ 285°					
Port of Operation		Fourchon			105 Nautical Miles @ 275°		
Nearest Manned Platform		A Ram-Powell in VK956			7.4 Miles @ 32.9°		

Proposed MC37_C-AAA Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	14.055"	North	Easting	1,270,680	US ft. E
Longitude	88°	09'	23.945"	West	Northing	10,515,400	US ft. N
Latitude Decimal		28.9705709					
Longitude Decimal		-88.1566513					
FWL Mississippi Canyon 037		3,480ft		US ft.	Inline	12864	
FNL Mississippi Canyon 037		2,360ft		US ft.	Crossline	17949	
Water Depth: -3,703ft		Slope: 3.6° SE					
Nearest Shoreline		43 Nautical Miles @ 285°					
Port of Operation		Fourchon			105 Nautical Miles @ 275°		
Nearest Manned Platform		A Ram-Powell in VK956			7.4 Miles @ 32.9°		

Conclusions and Recommendations. No major problems are anticipated at the seabed. Two ppelines occur within 2,000ft of the proposed well.

No risk of gas is assigned at the proposed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, and throughout Unit E and Unit F.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC37_C-AAAA Well Location

Anadarko Petroleum Corporation

October 05, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC37_C-AAAA Well Location (OCS-G-35309)

Ladies/Gentlemen:

Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-AAAA with surface location in Block 36, Mississippi Canyon Area (OCS-G-35309). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities

Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 4,061ft to the northwest.

Proposed MC37_C-AAAA Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	13.560"	North	Easting	1,270,680	US ft. E
Longitude	88°	09'	23.939"	West	Northing	10,515,350	US ft. N
Latitude Decimal	28.9704334						
Longitude Decimal	-88.1566498						
FWL Mississippi Canyon 037	3,480ft			US ft.	Inline	12864	
FNL Mississippi Canyon 037	2,410ft			US ft.	Crossline	17945	
Water Depth: -3,705ft	Slope: 3.6° SE						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon				105 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				7.4 Miles @ 32.9°		

Proposed MC36_C-A Location (MC 37 Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	15.046"	North	Easting	1,270,680	US ft. E
Longitude	88°	09'	23.956"	West	Northing	10,515,500	US ft. N
Latitude Decimal	28.970846						
Longitude Decimal	-88.1566544						
FWL Mississippi Canyon 037	3,480ft			US ft.	Inline	12865	
FNL Mississippi Canyon 037	2,260ft			US ft.	Crossline	17953	
Water Depth: -3,699ft	Slope: 3.6° SE						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon				105 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				7.4 Miles @ 32.9°		

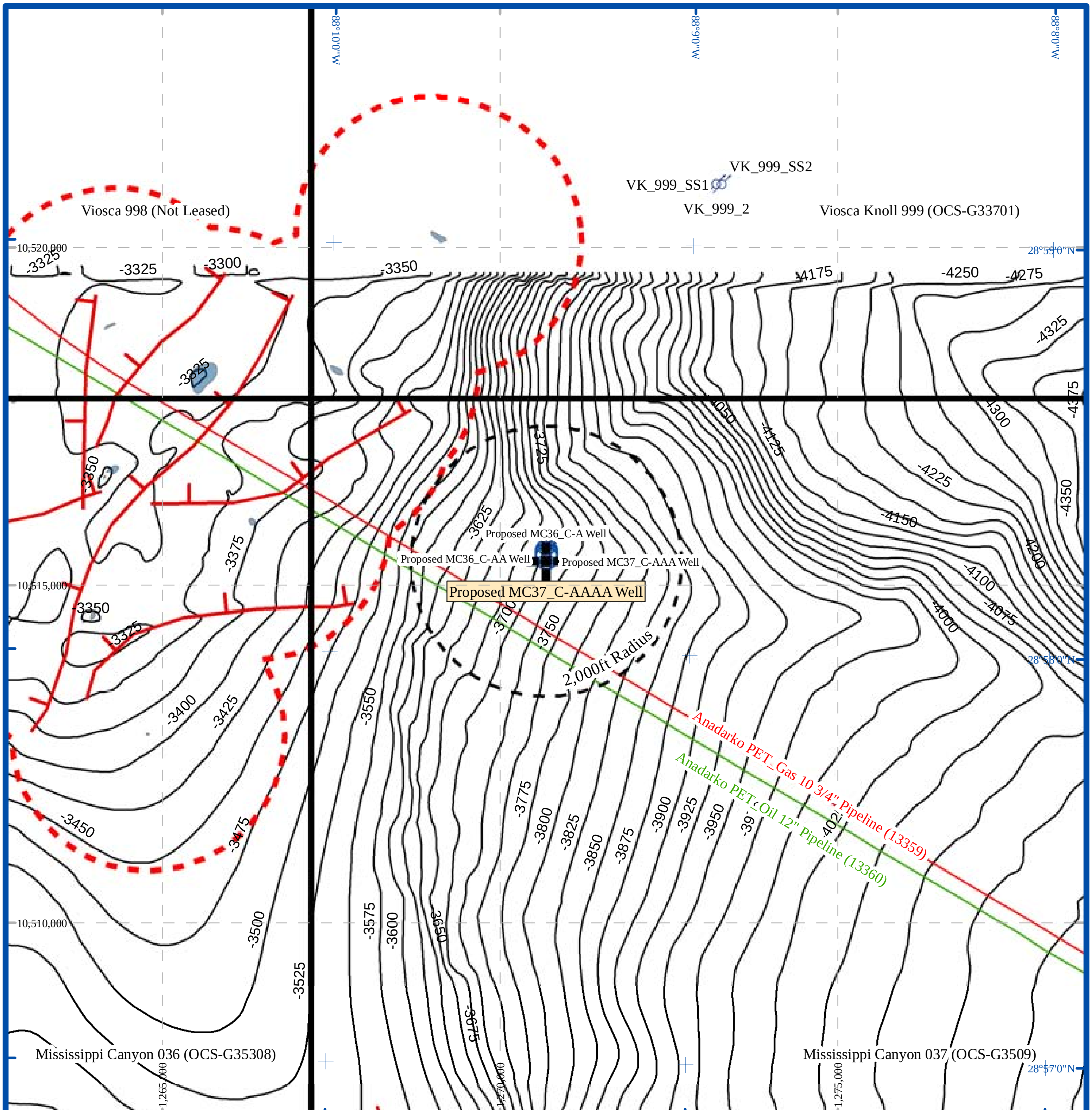
Proposed MC36_C-AA Location (MC 37 Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					**UTM Zone 16 - CM 87° West**		
Latitude	28°	58'	14.551"	North	Easting	1,270,680	US ft. E
Longitude	88°	09'	23.950"	West	Northing	10,515,450	US ft. N
Latitude Decimal	28.9707085						
Longitude Decimal	-88.1566529						
FWL Mississippi Canyon 037	3,480ft			US ft.	Inline	12865	
FNL Mississippi Canyon 037	2,310ft			US ft.	Crossline	17949	
Water Depth: -3,701ft	Slope: 3.6° SE						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon				105 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				7.4 Miles @ 32.9°		

Proposed MC37_C-AAA Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					**UTM Zone 16 - CM 87° West**		
Latitude	28°	58'	14.055"	North	Easting	1,270,680	US ft. E
Longitude	88°	09'	23.945"	West	Northing	10,515,400	US ft. N
Latitude Decimal	28.9705709						
Longitude Decimal	-88.1566513						
FWL Mississippi Canyon 037	3,480ft			US ft.	Inline	12864	
FNL Mississippi Canyon 037	2,360ft			US ft.	Crossline	17949	
Water Depth: -3,703ft	Slope: 3.6° SE						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon				105 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				7.4 Miles @ 32.9°		

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

Conclusions and Recommendations: The proposed MC37_C-AAAA, proposed MC36_C-A (MC 37 surface), proposed MC36_C-AA (MC 37 surface), and MC37_C-AAA well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC37_C-AAAA Well Location (1,270,680ft E / 10,515,350ft N)

Proposed MC36_C-A Well Location

Proposed MC36_C-AA Well Location

Proposed MC37_C-AAA Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

-3705 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Cactus Prospect
Mississippi Canyon, Block MC37,
Offshore Gulf of Mexico

Description:
Proposed MC37_C-DD Well Location

Project Number:
2020-320

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	………………… A Haigh
	Quality Assurance	………………… D Haigh

Revision	**Date**	**Title**
0	September 03, 2020	Draft
1	October 02, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

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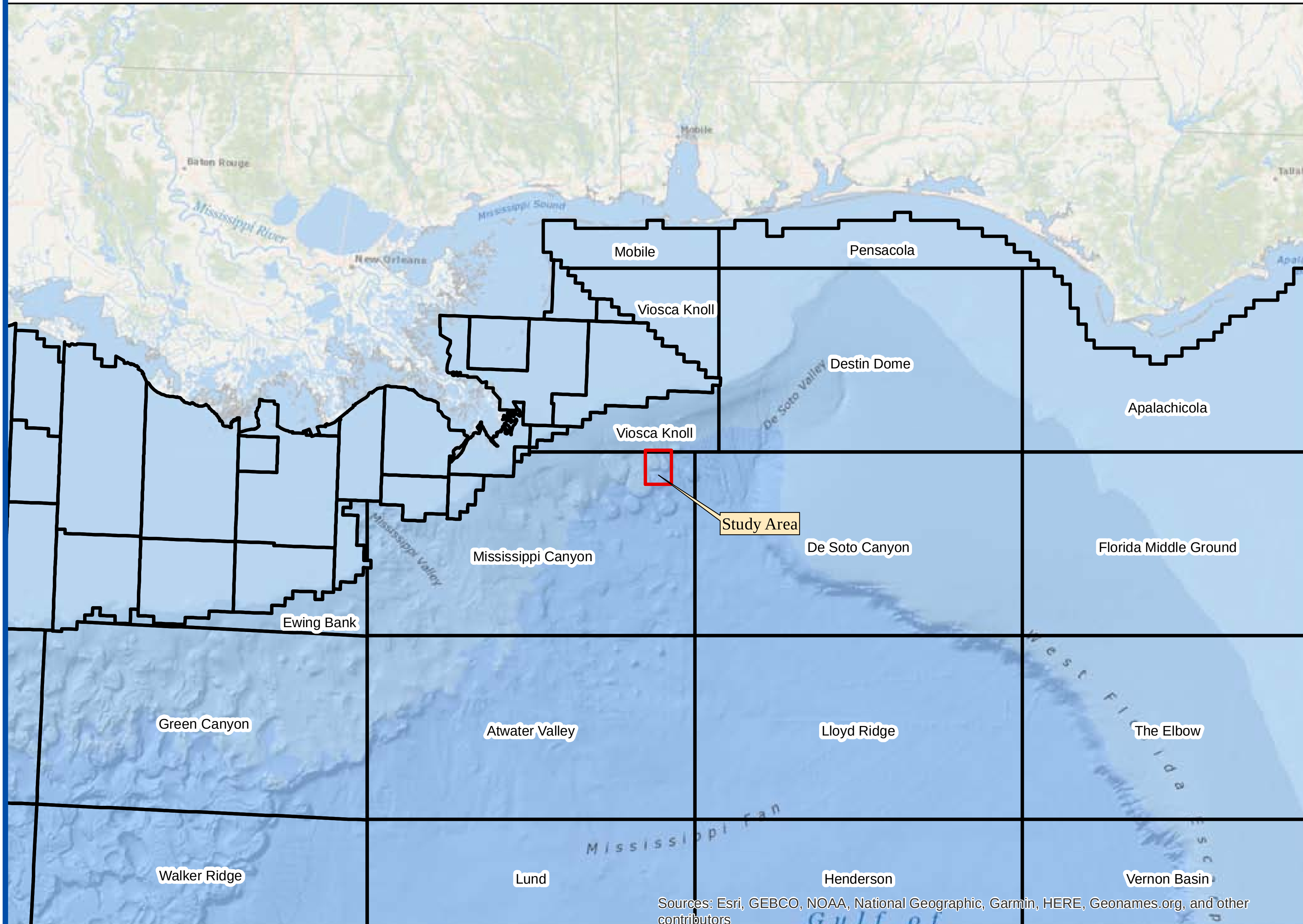
OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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LIST OF FIGURES

WELL CLEARANCE LETTER – PROPOSED MC37_C-DD WELL LOCATION

October 02, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC37_C-DD Well Location
Mississippi Canyon Block MC37
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC37_C-DD Well Location, Mississippi Canyon Area (OCS-G-35309). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,420ft below sea surface (6,897ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC37_C-DD well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC37_C-DD Well Location lies in the west-central part of Block MC37 (OCS-G-35309).

Proposed MC37_C-DD Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	29.037"	North	Easting	1,267,300	US ft. E
Longitude	88°	10'	01.502"	West	Northing	10,510,887	US ft. N
Latitude Decimal	28.9580659						
Longitude Decimal	-88.167084						
FWL Mississippi Canyon 037	100ft	US ft.	Inline	12808			
FNL Mississippi Canyon 037	6,873ft	US ft.	Crossline	17909			
Water Depth: -3,523ft	Slope: 3.0° East						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.4 Miles @ 33.4°					

Proposed MC36_C-D Location (MC 37 Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	29.532"	North	Easting	1,267,300	US ft. E
Longitude	88°	10'	01.508"	West	Northing	10,510,937	US ft. N
Latitude Decimal	28.9582034						
Longitude Decimal	-88.1670855						
FWL Mississippi Canyon 037	100ft	US ft.	Inline	12808			
FNL Mississippi Canyon 037	6,823ft	US ft.	Crossline	17909			
Water Depth: -3,523ft	Slope: 3.0° ESE						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.4 Miles @ 33.4°					

Proposed MC36_C-DDD Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	29.008”	North	Easting	1,267,000	US ft. E
Longitude	88°	10’	04.88”	West	Northing	10,510,887	US ft. N
Latitude Decimal	28.9580577						
Longitude Decimal	-88.1680222						
FEL Mississippi Canyon 036	200ft			US ft.	Inline	12806	
FNL Mississippi Canyon 036	6,873ft			US ft.	Crossline	17921	
Water Depth: -3,504ft	Slope: 2.6° ESE						
Nearest Shoreline	43 Nautical Miles @ 285.56°						
Port of Operation	Fourchon				105 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				8.4 Miles @ 32.9°		

Proposed MC36_C-DDDD Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	28.513”	North	Easting	1,267,000	US ft. E
Longitude	88°	10’	04.874”	West	Northing	10,510,837	US ft. N
Latitude Decimal	28.9579202						
Longitude Decimal	-88.1680206						
FEL Mississippi Canyon 036	200ft			US ft.	Inline	12805	
FNL Mississippi Canyon 036	6,923ft			US ft.	Crossline	17917	
Water Depth: -3,507ft	Slope: 2.7° ESE						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon				105 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				8.5 Miles @ 32.9°		

Location MC36_C-D (MC 37 surface) is 50ft from MC37_C-DD on a bearing of 0.0°.
Location MC36_C-DDD is 300ft from MC37_C-DD on a bearing of 270°.
Location MC36_C-DDDD is 303ft from MC37_C-DD on a bearing of 261°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC37_C-DD well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC37_C-DD well location is -3,523ft below sea surface (Figure 1). The seafloor slopes to the southeast at 3.0°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC37_C-DD well location is in the west-central part of block MC37. The proposed well is located in an area of relatively smooth seabed located on the eastern part of Horn Dome.

The proposed location is located approximately 565ft to the west of a retrogressive cuspate, cut back slump scarp and associated debris flow to the east that occurs on the west flank of the Dorsey Canyon. These failures are retrogressive seabed failures. Maximum observed retrogressive cut backs in this area appear to be around 1,000ft. Given the closest approach is to a well defined cut-back, it is considered a reduced risk that slope failure would cut back further towards the well location.

No seabed faults occur within 2,000ft of the proposed well.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,734ft below sea surface (211ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,734ft below sea surface (211ft below seabed).

4.3 Unit B

The upper part of Unit B from -3,734ft to -3,976ft below sea surface (211ft to 453ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The proposed location is on the updip part of these deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -3,976ft below sea surface (453ft below seabed) to -4,296ft below sea surface (773ft below seabed) presents acoustically as well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft.

Horizon H10 marks the base of Unit B, occurring at -4,296ft below sea surface (773ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

The upper part of Unit C from -4,296ft to -4,674ft below sea surface (773ft to 1,151ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

The lower part of Unit C from -4,674ft to -4,800ft below sea surface (1,151ft to 1,277ft below seabed) is characterized by slightly-chaotic, slightly higher energy, low-and occasional moderate-amplitude reflectors interpreted as clays, silts, and several sands. Due to the possibility for more sand prone sediments with downdip connectivity to deeper buried sediments to the east a **Slight Shallow Water Flow Risk** is interpreted. In addition, minor wellbore stability and drilling fluid circulation problems may occur within this lower interval.

No risk of gas is predicted within Unit C at the proposed well or within 2,000ft radius.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -4,800ft below sea surface (1,277ft below seabed).

4.5 Unit D

The upper part of Unit D from -4,800ft to -5,015ft below sea surface (1,277ft to 1,492ft below seabed) is characterized by slightly-chaotic and well-layered, low and isolated moderate-amplitude reflectors interpreted as clays, silts and occasional sands.

Unit D from -5,015ft to -5,461ft below sea surface (1,492ft to 1,938ft below seabed) is characterized by slightly-chaotic and well-layered, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sand. This interval appears presents an acoustic character suggestive of a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~800ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit D from -5,461ft to -5,794ft below sea surface (1,938ft to 2,271ft below seabed) is characterized by well layered low amplitude reflectors interpreted as clays and silts.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -5,794ft below sea surface (2,271ft below seabed).

4.6 Unit E

Unit E from -5,794ft to -7,560ft below sea surface (2,271ft to 4,037ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,700ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft.

The well-path will traverse a fault within Unit E at –7,510ft below sea surface (3,987ft below seabed). This fault is downthrown approximatley 20ft to the west. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

Horizon H40 marks the base of Unit E at -7,560ft below sea surface (4,037ft below seabed).

4.7 Unit F

Unit F from -7,560ft to -8,124ft below sea surface (4,037ft to 4,601ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~2,000ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit F.

Horizon H50 marks the base of Unit F at -8,124ft below sea surface (4,601ft below seabed).

4.8 Unit G

Unit G from -8,124ft to -10,420ft below sea surface (4,601ft to 6,897ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted with possibility of downdip connectivity to deeper parts of the mini-basin (~2,100ft). This geological setting can on occasions for some minor over-pressure. As such a **Slight Shallwo Water Flow Risk** is assigned to Unit G.

No risk of gas is predicted within Unit G at the proposed well. The nearest risk of gas anomaly is located 357ft to the north with no direct connectivity to the proposed well-path.

The well-path will traverse a fault within Unit G at -8,679ft below sea surface (5,149ft below seabed). This fault is downthrown approximatley 30ft to the west. Minor wellbore stability and drilling fluid circulation problmes may occur at the level of the fault.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,420ft below sea surface (6,897ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,734ft to -3,976ft below sea surface (211ft to 453ft below seabed).

Within Unit C, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,674ft to -4,800ft below sea surface (1,151ft to 1,277ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,015ft to -5,461ft below sea surface (1,492ft to 1,938ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,794ft to -7,560ft below sea surface (2,271ft to 4,037ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,560ft to -8,124ft below sea surface (2,271ft to 4,037ft below seabed).

Throughout Unit G, a **Slight Shallow Water Flow Risk** is interpreted from -8,124ft to -10,420ft below sea surface (4,601ft to 6,897ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None hazards or problems interpreted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,734ft to -3,976ft below sea surface (211ft to 453ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  A **Slight Shallow Water Flow Risk** and minor wellbore stability and drilling fluid circulation pronblems may occur from -4,674ft to -4,800ft below sea surface (1,151ft to 1,277ft below seabed).

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,015ft to -5,461ft below sea surface (1,492ft to 1,938ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,794ft to -7,560ft below sea surface (2,271ft to 4,037ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  The well-path will traverse a fault within Unit E at -7,510ft below sea surface (3,987ft below seabed). Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,560ft to -8,124ft below sea surface (2,271ft to 4,037ft below seabed). Appropriate drilling methodology is

recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit G

Throughout Unit G, a **Slight Shallow Water Flow Risk** is interpreted from -8,124ft to -10,420ft below sea surface (4,601ft to 6,897ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible

The well-path will traverse a fault within Unit G at -8,679ft below sea surface (5,149ft below seabed). Minor wellbore stability and drilling fluid circulation problmes may occur at the level of the fault.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

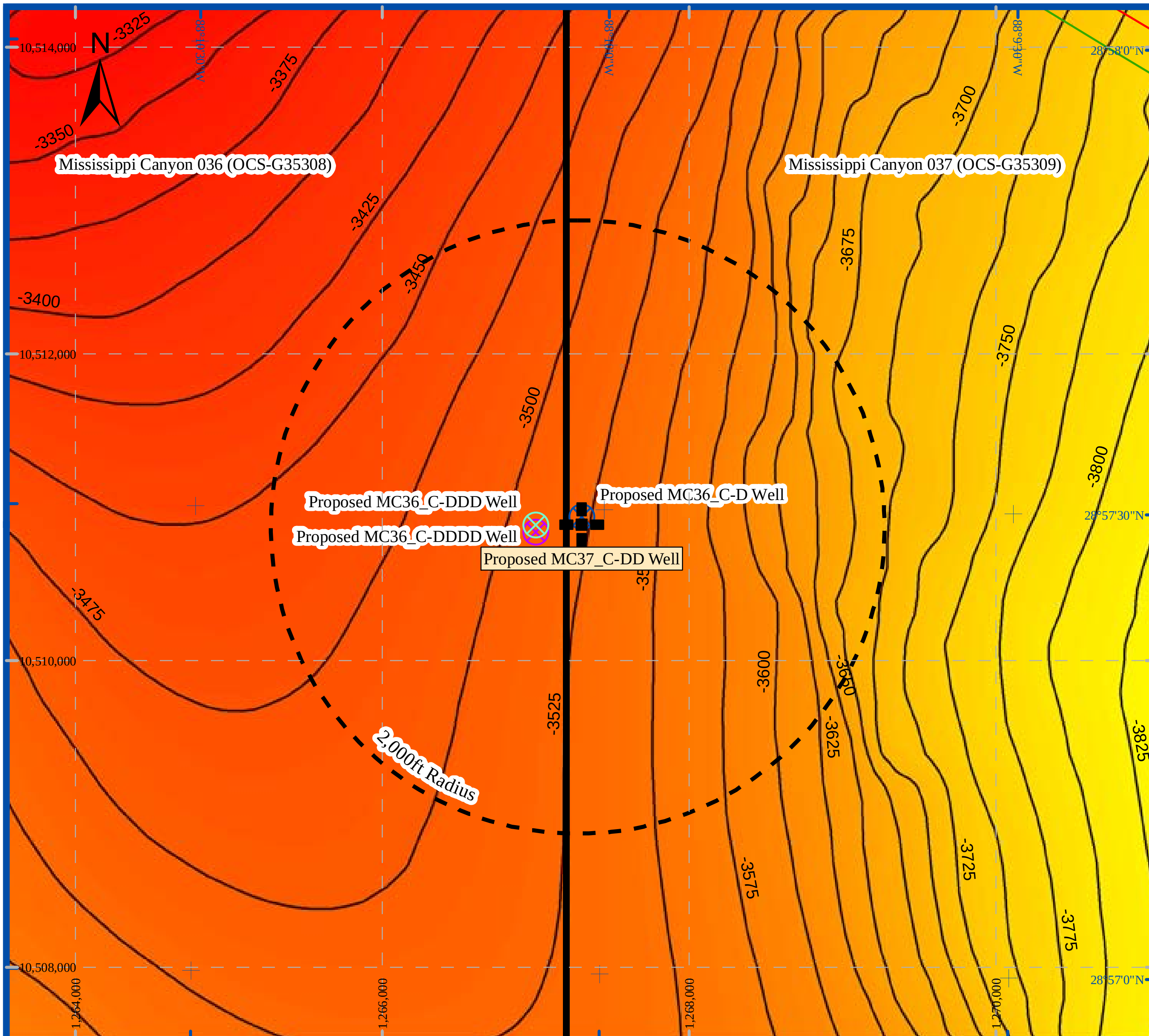
Andrew Haigh
Geophysical Manager

Denise Haigh
Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC37_C-DD Well Location

Seabed Depth Extract
Seabed Morphology Extract
Seabed Amplitude Extract
Geohazard Summary Extract
Sand Lithology Summary Extract
Inline Data Example
Crossline Data Example
Top Hole Prognosis
ROV Plat
Power Spectrum
Bathymetry Plat
Public Information Plat
Vicinity Plat
10-Mile Radius Plat



Seabed Depth Extract

Proposed MC37_C-DD Well Location (1,267,300ft E / 10,510,887ft N)

Proposed MC36_C-D Well Location

Proposed MC36_C-DDD Well Location

Proposed MC36_C-DDDD Well Location

Block boundaries

-3523 Depth in feet below sea surface to seabed, contoured at 25ft intervals

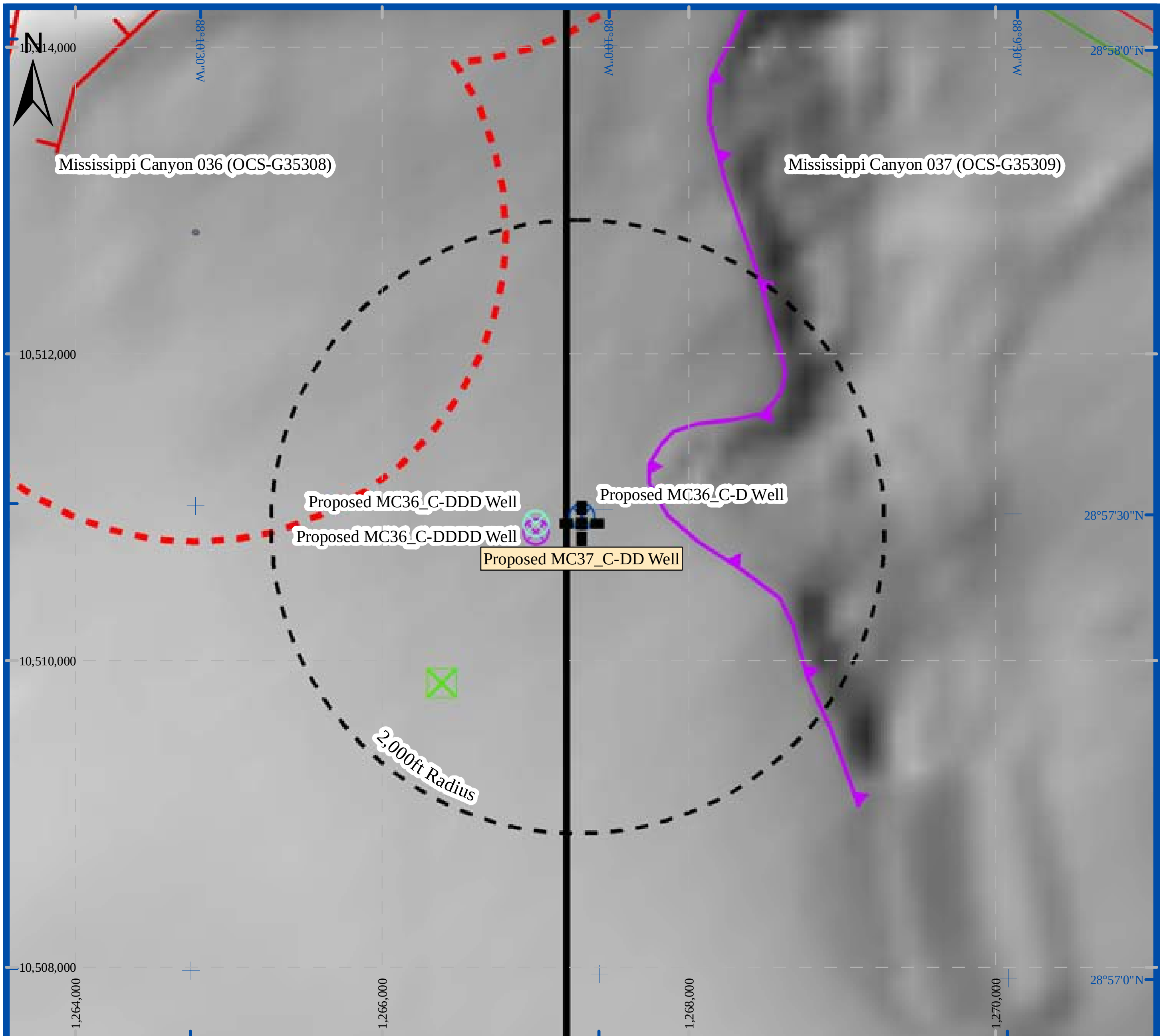
Seabed Depth (Feet)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 1
(MC37_C-DD)



Seabed Morphology Extract

Proposed MC37_C-DD Well Location (1,267,300ft E / 10,510,887ft N)

Proposed MC36_C-D Well Location

Proposed MC36_C-DDD Well Location

Proposed MC36_C-DDDD Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

Slump scar

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

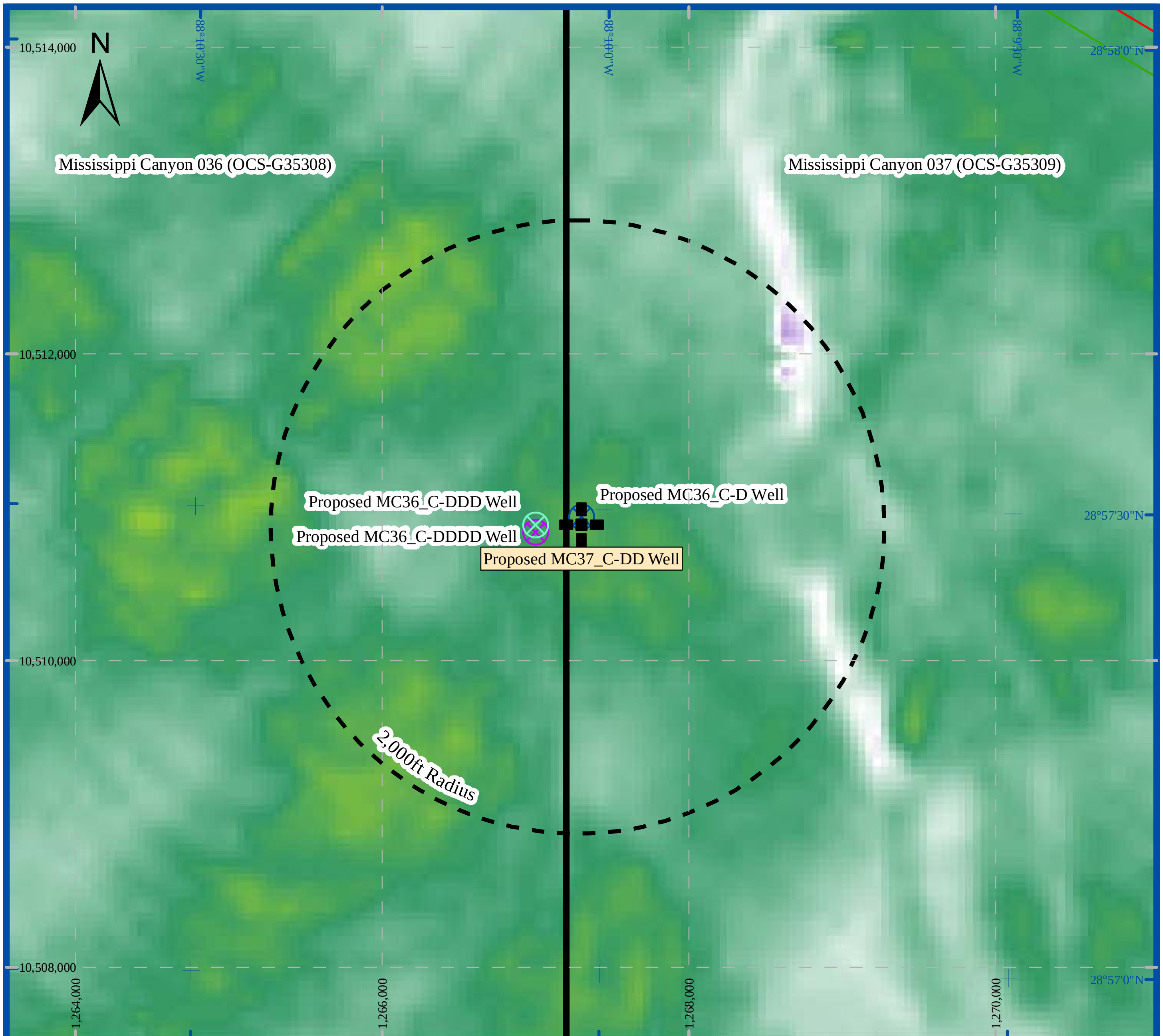
Sonar contacts, interpreted modern debris

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

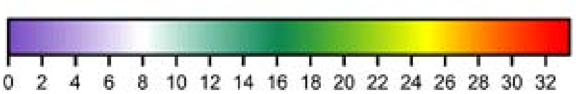
0 150 300 600 Meters

Figure 2 (MC37_C-DD)



Seabed Amplitude Extract

- Proposed MC37_C-DD Well Location (1,267,300ft E / 10,510,887ft N)
- Proposed MC37_C-D Well Location
- Proposed MC36_C-DDD Well Location
- Proposed MC36_C-DDDD Well Location
- Block boundaries



Relative Seabed Amplitude

Chart Scale 1" = 1,000'

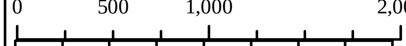
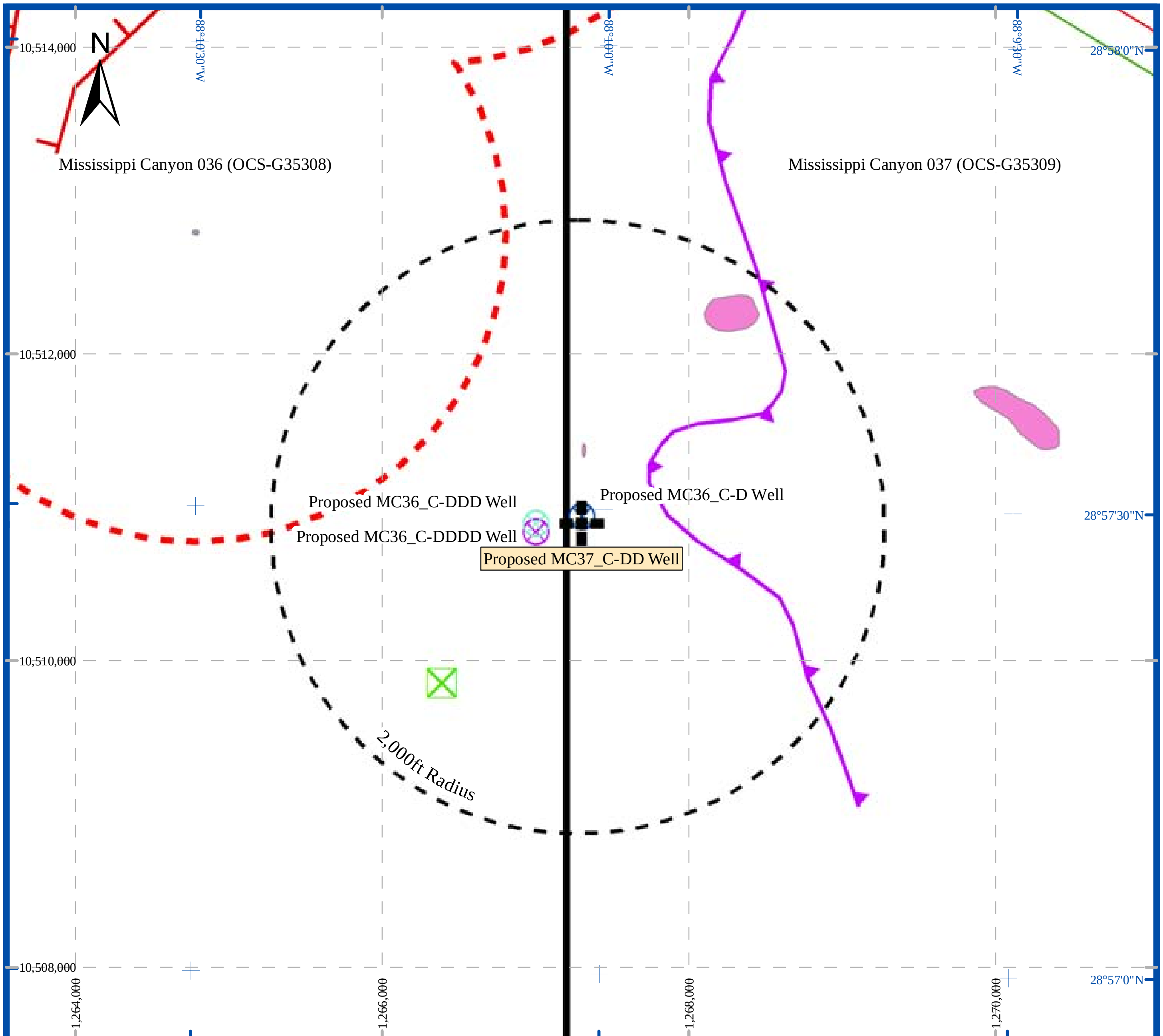


Figure 3
(MC37_C-DD)



Geohazard Summary Extract

Proposed MC37_C-DD Well Location (1,267,300ft E / 10,510,887ft N)

Proposed MC36_C-D Well Location

Proposed MC36_C-DDD Well Location

Proposed MC36_C-DDDD Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

Slump scar

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Sonar contacts, interpreted modern debris

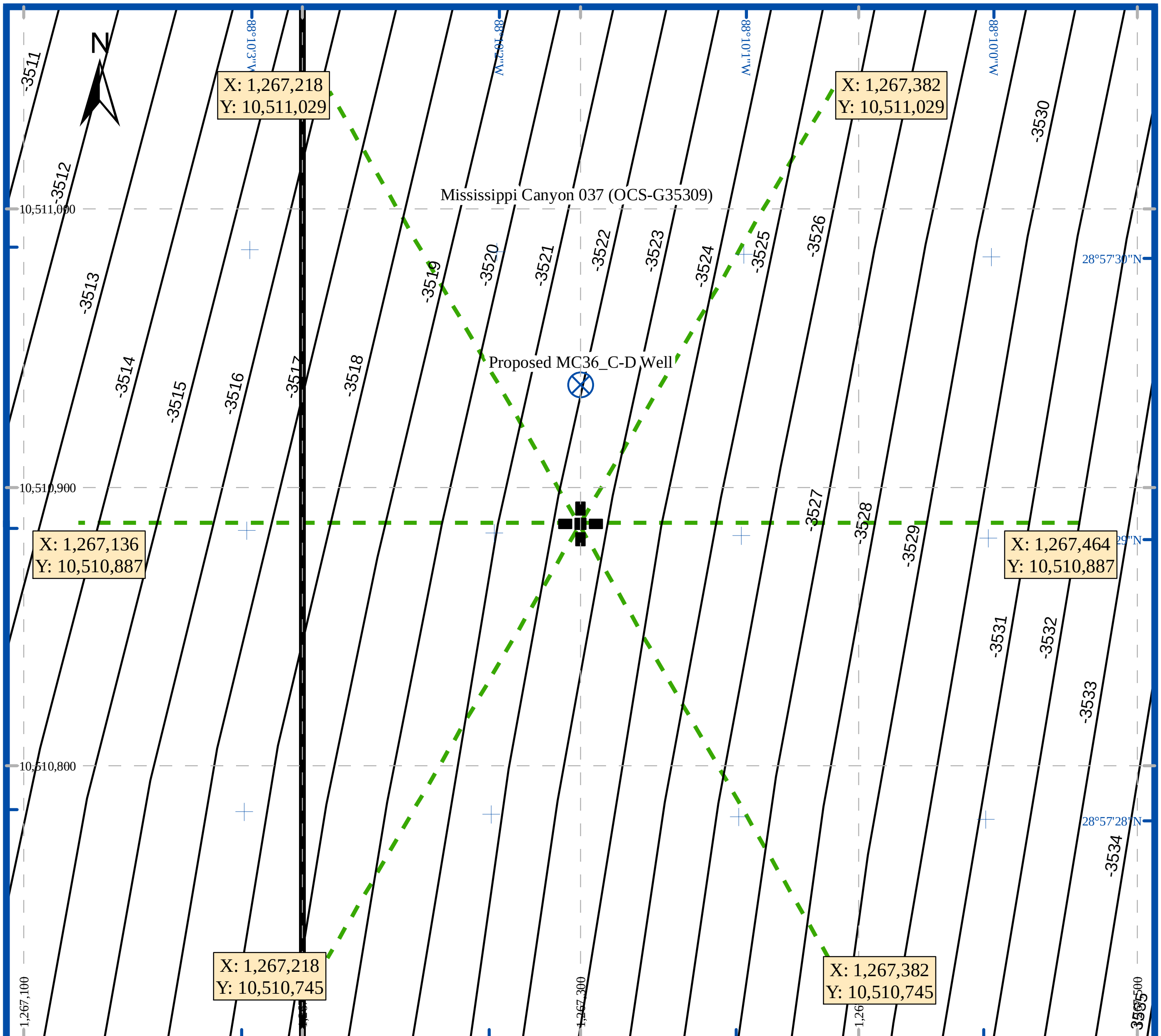
Slight and Moderate Risk of Gas within Unit G

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC37_C-DD)



ROV Plat (MC37_C-DD)

Proposed MC37_C-DD Well Location (1,267,300ft E / 10,510,887ft N)

Proposed MC36_C-D Well Location

Block boundaries

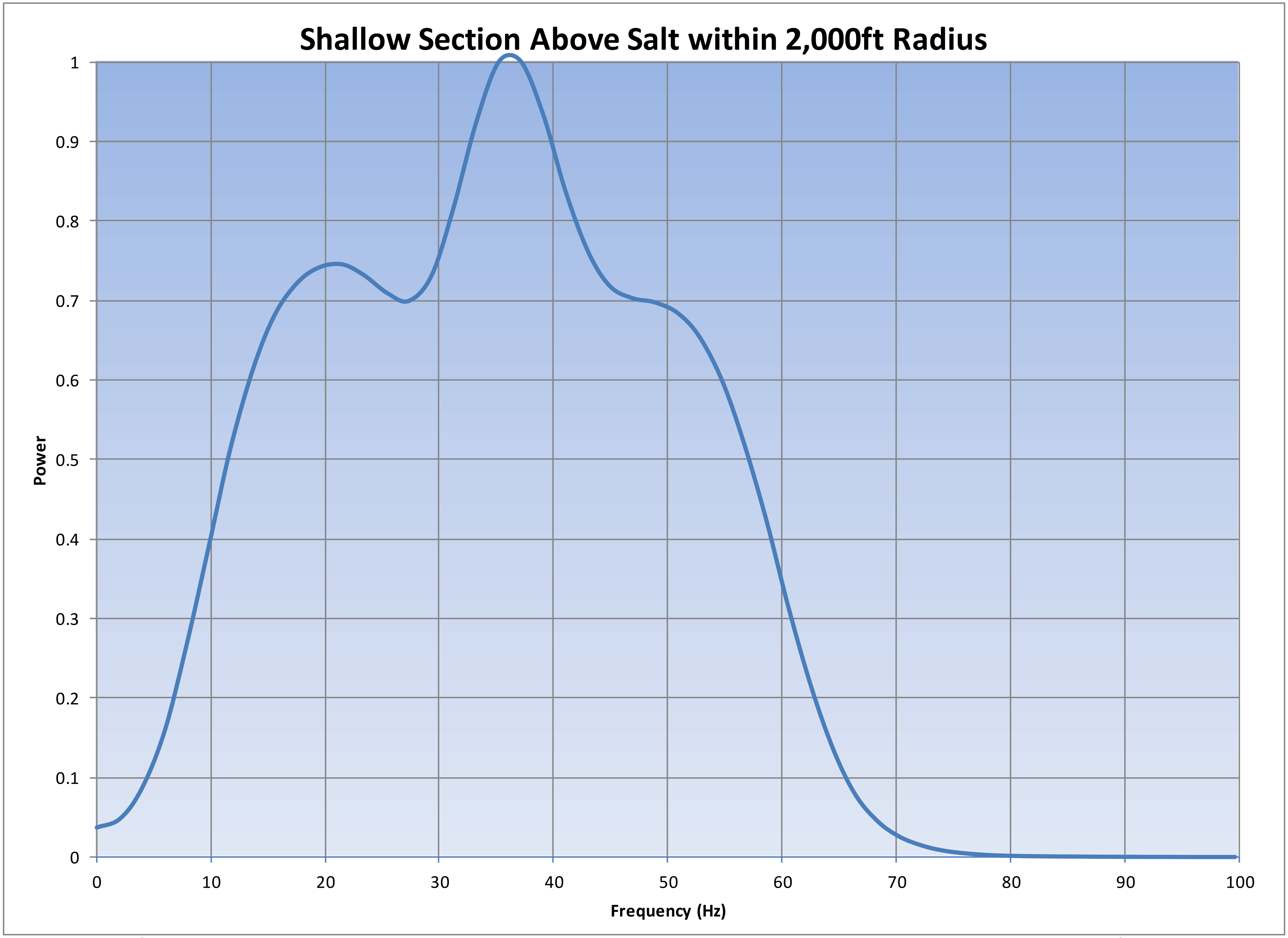
-3523 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

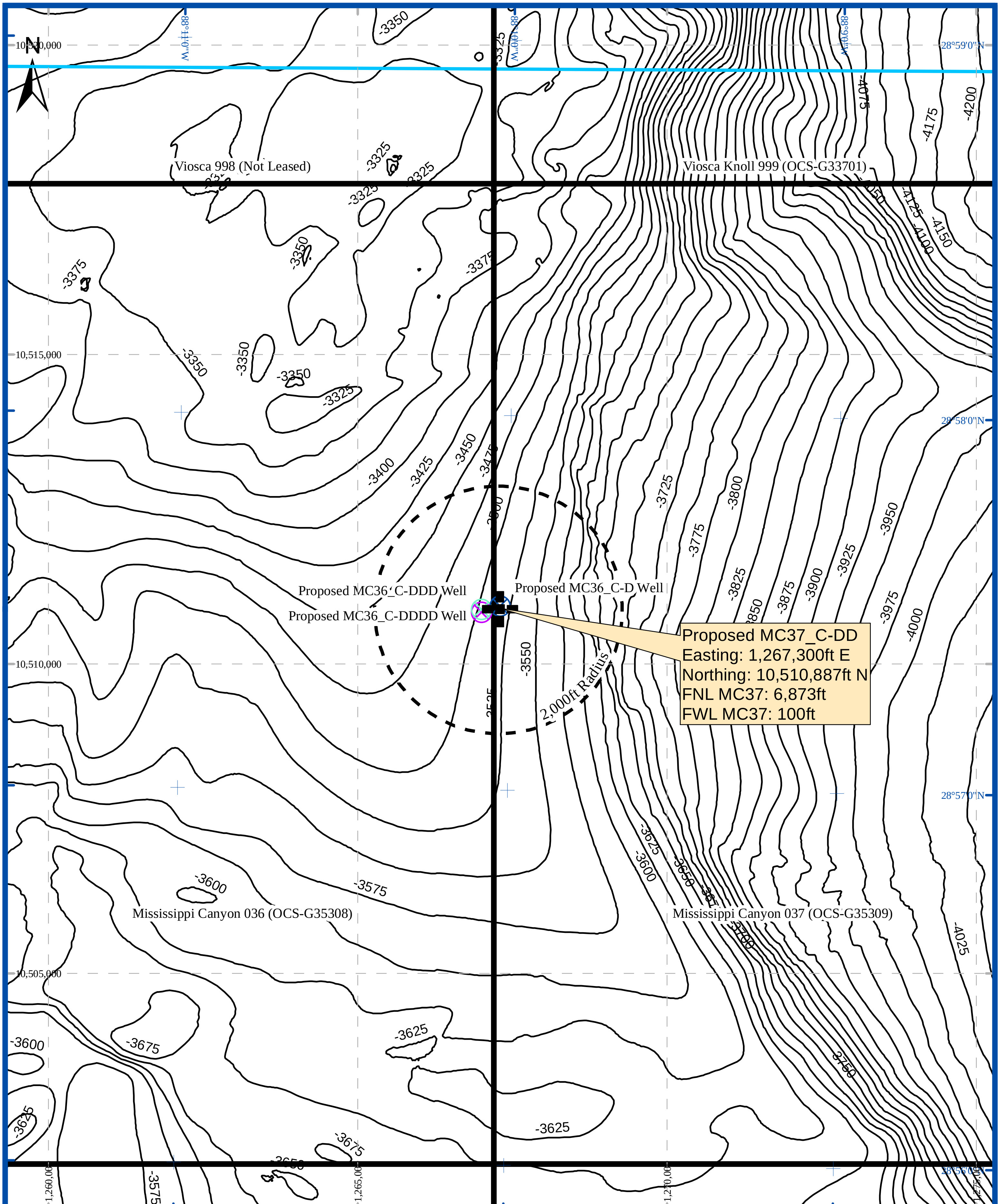
0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC37_C-DD)

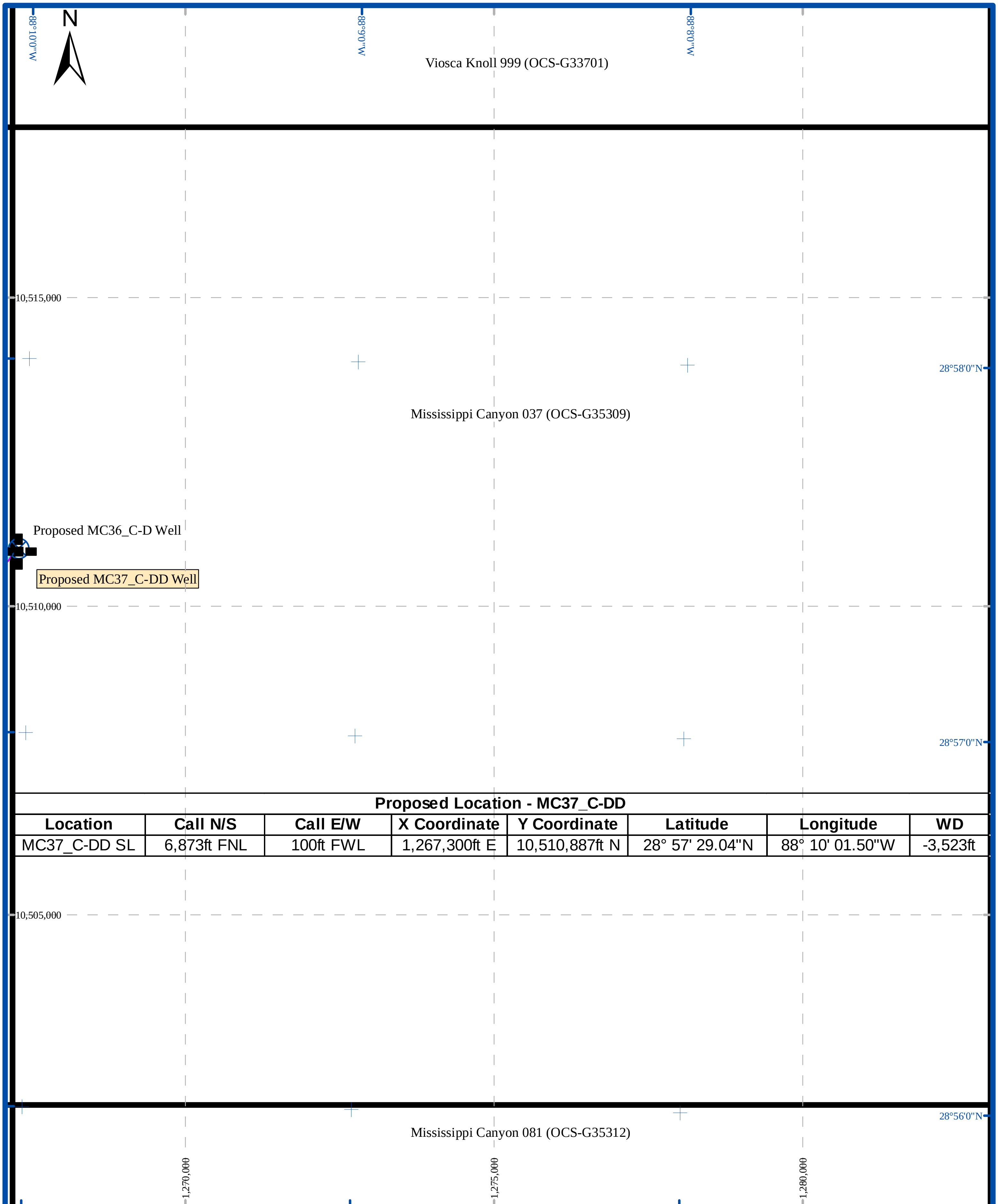


MC37_C-DD	Power Spectrum	Figure 10



Bathymetry Plat

Figure 11



Proposed Location - MC37_C-DD

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC37_C-DD SL	6,873ft FNL	100ft FWL	1,267,300ft E	10,510,887ft N	28° 57' 29.04"N	88° 10' 01.50"W	-3,523ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

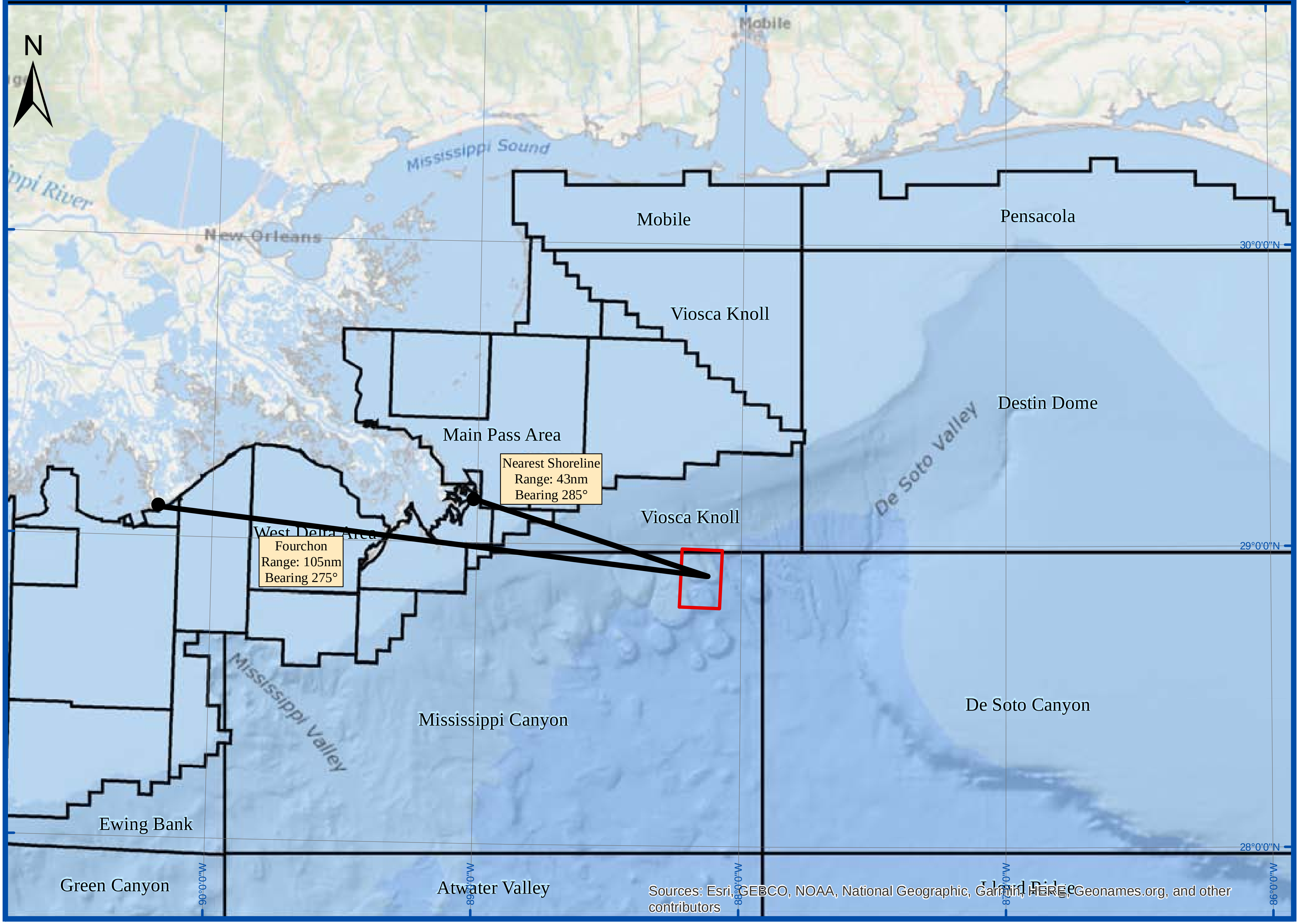
0 150 300 600 Meters

Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 37

Figure 13



Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 37

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC37_C-DD Well Location

October 02, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 37
(OCS-G OCS-G-35309)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-DD well location with surface location in Block 37, Mississippi Canyon Area (OCS-G-35308). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,420ft below sea surface (6,897ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 3.4° to the ESE The proposed location is located approximately 565ft to the west of a retrogressive cuspate, cut back slump scarp and associated debris flow to the east that occurs on the west flank of the Dorsey Canyon. No seabed faults occur at the proposed well or within 2,000ft of the proposed well.

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

No exsiting wells or pipelines occur within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas is assigned at the proposed well. Anomalies occur within 2,000ft in Unit G, but are not connected to the proposed well-path.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit C, Unit D, and throughout Unit E, Unit F, and Unit G.

The well-path will intersect a fault within Unit E and G.

Proposed MC37_C-DD Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	29.037"	North	Easting	1,267,300	US ft. E
Longitude	88°	10'	01.502"	West	Northing	10,510,887	US ft. N
Latitude Decimal			28.9580659				
Longitude Decimal			-88.167084				
FWL Mississippi Canyon 037			100ft	US ft.	Inline	12808	
FNL Mississippi Canyon 037			6,873ft	US ft.	Crossline	17909	
Water Depth: -3,523ft			Slope: 3.0° East				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.4 Miles @ 33.4°		

Proposed MC36_C-D Location (MC 37 Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	29.532"	North	Easting	1,267,300	US ft. E
Longitude	88°	10'	01.508"	West	Northing	10,510,937	US ft. N
Latitude Decimal			28.9582034				
Longitude Decimal			-88.1670855				
FWL Mississippi Canyon 037			100ft	US ft.	Inline	12808	
FNL Mississippi Canyon 037			6,823ft	US ft.	Crossline	17909	
Water Depth: -3,523ft			Slope: 3.0° ESE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.4 Miles @ 33.4°		

Proposed MC36_C-DDD Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					**UTM Zone 16 - CM 87° West**		
Latitude	28°	57'	29.008"	North	Easting	1,267,000	US ft. E
Longitude	88°	10'	04.88"	West	Northing	10,510,887	US ft. N
Latitude Decimal			28.9580577				
Longitude Decimal			-88.1680222				
FEL Mississippi Canyon 036			200ft	US ft.	Inline	12806	
FNL Mississippi Canyon 036			6,873ft	US ft.	Crossline	17921	
Water Depth: -3,504ft			Slope: 2.6° ESE				
Nearest Shoreline			43 Nautical Miles @ 285.56°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.4 Miles @ 32.9°		

Proposed MC36_C-DDDD Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					**UTM Zone 16 - CM 87° West**		
Latitude	28°	57'	28.513"	North	Easting	1,267,000	US ft. E
Longitude	88°	10'	04.874"	West	Northing	10,510,837	US ft. N
Latitude Decimal			28.9579202				
Longitude Decimal			-88.1680206				
FEL Mississippi Canyon 036			200ft	US ft.	Inline	12805	
FNL Mississippi Canyon 036			6,923ft	US ft.	Crossline	17917	
Water Depth: -3,507ft			Slope: 2.7° ESE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.5 Miles @ 32.9°		

Conclusions and Recommendations. No major problems are anticipated at the seabed.

No risk of gas is assigned at the proposed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit C, Unit D, and throughout Unit E, Unit F, and Unit G.

The well-path will intersect two faults.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC37_C-DD Well Location

Anadarko Petroleum Corporation

October 2, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC37_C-DD Well Location (OCS-G-35309)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-DD with surface location in Block 36, Mississippi Canyon Area (OCS-G-35309). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 4,890ft to the northwest.

Proposed MC37_C-DD Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	29.037”	North	Easting	1,267,300	US ft. E
Longitude	88°	10’	01.502”	West	Northing	10,510,887	US ft. N
Latitude Decimal			28.9580659				
Longitude Decimal			-88.167084				
FWL Mississippi Canyon 037			100ft		US ft.	Inline	12808
FNL Mississippi Canyon 037			6,873ft		US ft.	Crossline	17909
Water Depth: -3,523ft			Slope: 3.0° East				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon			105 Nautical Miles @ 275°	
Nearest Manned Platform			A Ram-Powell in VK956			8.4 Miles @ 33.4°	

Proposed MC36_C-D Location (MC 37 Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	29.532”	North	Easting	1,267,300	US ft. E
Longitude	88°	10’	01.508”	West	Northing	10,510,937	US ft. N
Latitude Decimal			28.9582034				
Longitude Decimal			-88.1670855				
FWL Mississippi Canyon 037			100ft		US ft.	Inline	12808
FNL Mississippi Canyon 037			6,823ft		US ft.	Crossline	17909
Water Depth: -3,523ft			Slope: 3.0° ESE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon			105 Nautical Miles @ 275°	
Nearest Manned Platform			A Ram-Powell in VK956			8.4 Miles @ 33.4°	

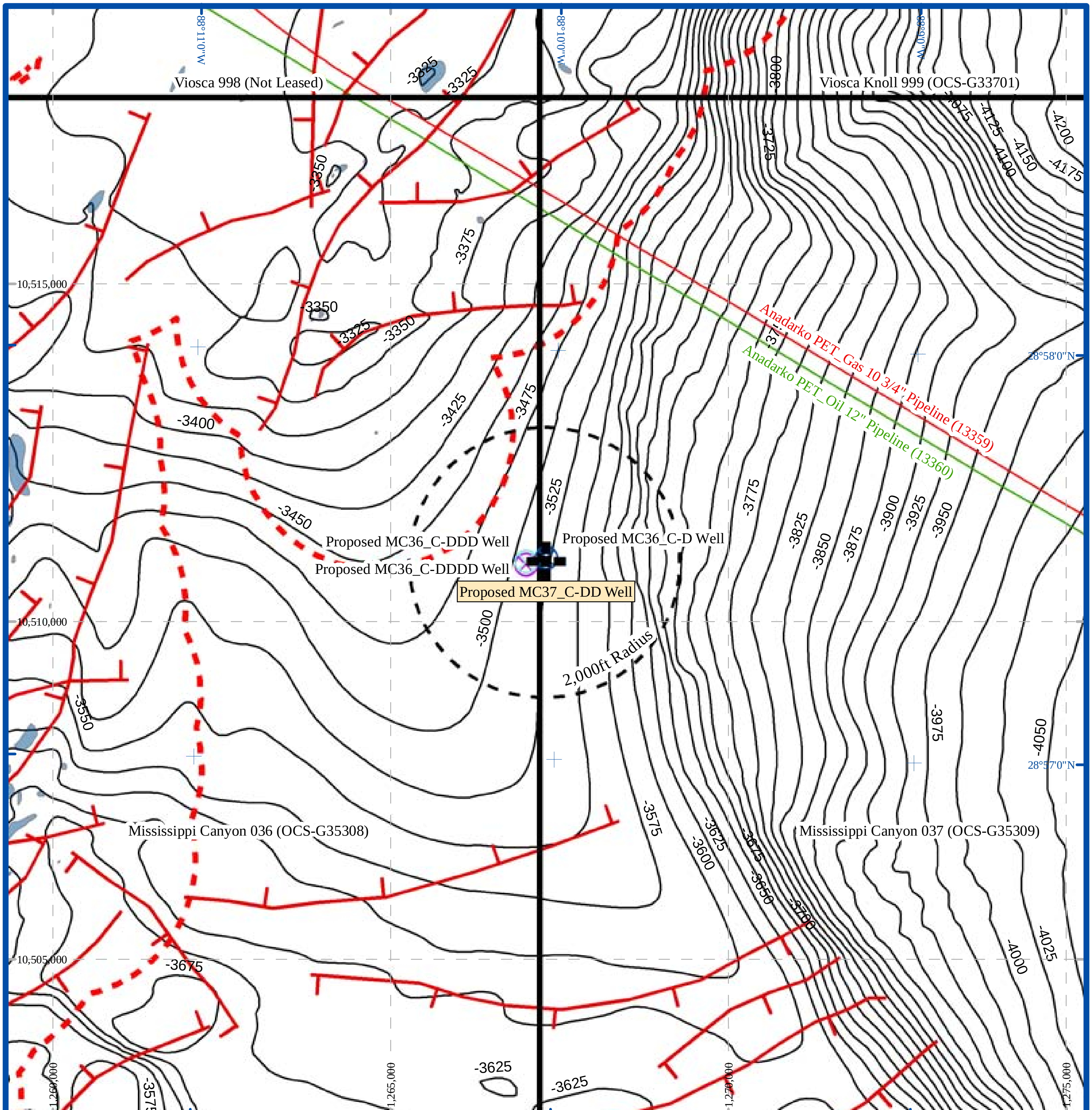
Proposed MC36_C-DDD Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	29.008"	North	Easting	1,267,000	US ft. E
Longitude	88°	10'	04.88"	West	Northing	10,510,887	US ft. N
Latitude Decimal	28.9580577						
Longitude Decimal	-88.1680222						
FEL Mississippi Canyon 036	200ft	US ft.	Inline	12806			
FNL Mississippi Canyon 036	6,873ft	US ft.	Crossline	17921			
Water Depth: -3,504ft	Slope: 2.6° ESE						
Nearest Shoreline	43 Nautical Miles @ 285.56°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.4 Miles @ 32.9°					

Proposed MC36_C-DDDD Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	28.513"	North	Easting	1,267,000	US ft. E
Longitude	88°	10'	04.874"	West	Northing	10,510,837	US ft. N
Latitude Decimal	28.9579202						
Longitude Decimal	-88.1680206						
FEL Mississippi Canyon 036	200ft	US ft.	Inline	12805			
FNL Mississippi Canyon 036	6,923ft	US ft.	Crossline	17917			
Water Depth: -3,507ft	Slope: 2.7° ESE						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	8.5 Miles @ 32.9°					

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

Conclusions and Recommendations: The proposed MC37_C-DD, MC36_C-D (MC 37 surface), MC36_C-DDD, and MC36_C-DDDD well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



✚	Proposed MC37_C-DD Well Location (1,267,300ft E / 10,510,887ft N)
⊗	Proposed MC36_C-D Well Location
⊗	Proposed MC36_C-DDD Well Location
⊗	Proposed MC36_C-DDDD Well Location
	Oil Pipeline
	Gas Pipeline
	Block boundaries
-3523	Depth in feet below sea surface to seabed,contoured at 25ft intervals
	Seafloor faults intersection. Tick doenotes downthrown block
	2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar
	Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for
Anadarko Petroleum Corporation

Project:
Cactus Prospect
Mississippi Canyon, Block MC37,
Offshore Gulf of Mexico

Description:
Proposed MC37_C-FF Well Location

Project Number:
2020-322

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	A.A.H. ………………… A Haigh
	Quality Assurance	D Haigh ………………… D Haigh

Revision	Date	Title
0	September 14, 2020	Draft
1	October 02, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

Please be aware that further distribution of this report, in whole or part, or the use of the data for a purpose not expressly stated within the contractual work scope is at the client's sole risk, and Ocean Geo Solutions, Inc recommends that this disclaimer is included in any such distribution.

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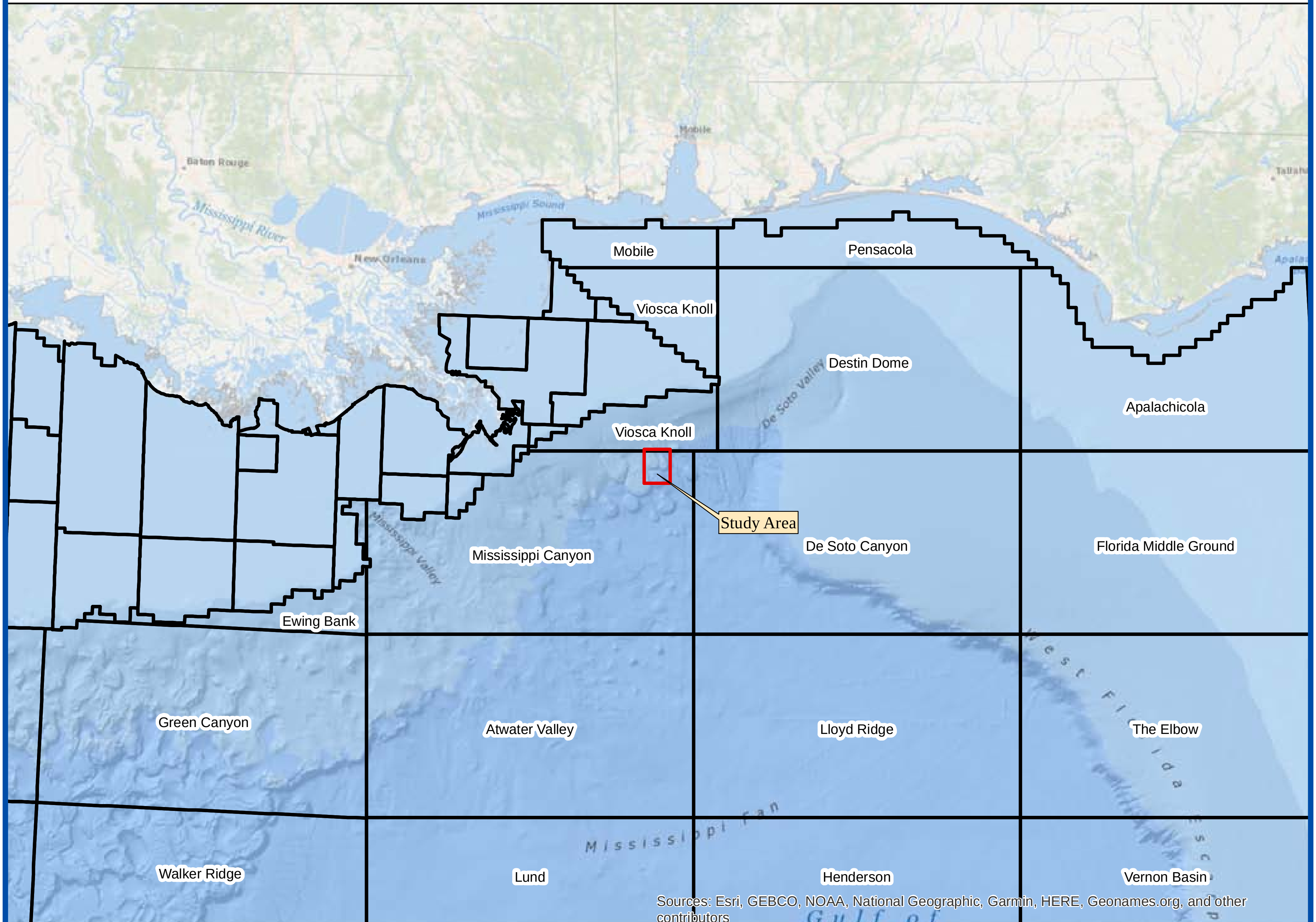
Location Map



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WELL CLEARANCE LETTER – PROPOSED MC37_C-FF WELL LOCATION

October 02, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC37_C-FF Well Location
Mississippi Canyon Block MC37
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC37_C-FF Well Location, Mississippi Canyon Area (OCS-G-35309). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,373ft below sea surface (6,807ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC37_C-FF well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC37_C-FF Well Location lies in the southwest part of Block MC37 (OCS-G-35309).

Proposed MC37_C-FF Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56’	50.515”	North	Easting	1,268,500	US ft. E
Longitude	88°	09’	47.560”	West	Northing	10,506,985	US ft. N
Latitude Decimal			28.9473652				
Longitude Decimal			-88.1632111				
FWL Mississippi Canyon 037			1,300ft	US ft.	Inline	12788	
FSL Mississippi Canyon 037			5,065ft	US ft.	Crossline	17733	
Water Depth: -3,566ft			Slope: 2.2° ENE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.9 Miles @ 29.6°		

Proposed MC37_C-F Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56’	50.020”	North	Easting	1,268,500	US ft. E
Longitude	88°	09’	47.555”	West	Northing	10,506,935	US ft. N
Latitude Decimal			28.9472277				
Longitude Decimal			-88.1632096				
FWL Mississippi Canyon 037			1,300ft	US ft.	Inline	12788	
FSL Mississippi Canyon 037			5,015ft	US ft.	Crossline	17733	
Water Depth: -3,566ft			Slope: 2.2° ENE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.9 Miles @ 29.6°		

Location MC37_C-F is 50ft from MC37_C-FF on a bearing of 180°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC37_C-FF well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC37_C-FF well location is -3,566ft below sea surface (Figure 1). The seafloor slopes to the ENE at 2.2°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC37_C-FF well location is in the southwest part of block MC37. The proposed well is located in an area of relatively smooth seabed located on the eastern part of Horn Dome.

The proposed location is located approximately 1,165ft to the southwest of a retrogressive cuspate, cut back slump scarp and associated debris flow to the east that occurs on the west flank of the Dorsey Canyon. These failures are retrogressive seabed failures. Maximum observed retrogressive cut backs in this area appear to be around 1,000ft. Given the closest approach is to a well defined cut-back that is over 1,000ft from the proposed location, it is considered a reduced risk that slope failure would cut back further towards the well location.

The terminal end of a minor seabed fault occur within 2,000ft of the proposed well approximately 125ft to the west.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,766ft below sea surface (200ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,766ft below sea surface (200ft below seabed).

4.3 Unit B

The upper part of Unit B from -3,766ft to -4,011ft below sea surface (200ft to 445ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The proposed location is on the updip part of these deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -4,011ft below sea surface (445ft below seabed) to -4,319ft below sea surface (753ft below seabed) presents acoustically as well-layered, low-amplitude reflectors interpreted as clays and silts.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft.

Horizon H10 marks the base of Unit B, occurring at -4,319ft below sea surface (753ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,319ft to -4,754ft below sea surface (753ft to 1,188ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas or shallow water flwo risk is predicted within Unit C at the proposed well or within 2,000ft radius.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -4,754ft below sea surface (1,188ft below seabed).

4.5 Unit D

The upper part of Unit D from -4,754ft to -4,970ft below sea surface (1,188ft to 1,404ft below seabed) is characterized by slightly-chaotic and well-layered, low and isolated moderate-amplitude reflectors interpreted as clays, silts and occasional sands.

The lower part of Unit D from -4,970ft to -5,516ft below sea surface (1,404ft to 1,950ft below seabed) is characterized by slightly-chaotic and well-layered, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sand. This interval appears presents an acoustic character suggestive of a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can on occasions form some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,300ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft.

The well-path will traverse a fault within Unit D at -5,096ft below sea surface (1,530ft below seabed). Minor wellbore stability and drilling fluid circulation problmes may occur at the level of the fault.

Horizon H30 marks the base of Unit D at -5,516ft below sea surface (1,950ft below seabed).

4.6 Unit E

Unit E from -5,516ft to -6,904ft below sea surface (1,950ft to 3,338ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~2,000ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft.

The well-path will traverse a fault within Unit E at –6,526ft below sea surface (2,960ft below seabed). This fault is downthrown approximatley 20ft to the west. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

Horizon H40 marks the base of Unit E at -6,904ft below sea surface (3,338ft below seabed).

4.7 Unit F

Unit F from -6,904ft to -7,532ft below sea surface (3,338ft to 3,966ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~2,000ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft.

The well-path will traverse a fault within Unit F at -7,379ft below sea surface (3,813ft below seabed). Minor wellbore stability and drilling fluid circulation probelms may occur at the level of then fault.

Horizon H50 marks the base of Unit F at -7,532ft below sea surface (3,966ft below seabed).

4.8 Unit G

Unit G from -7,532ft to -10,373ft below sea surface (3,966ft to 6,807ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted with possibility of downdip connectivity to deeper parts of the mini-basin (~2,100ft). This geological setting can on occasions for some minor over-pressure. As such a **Slight Shallwo Water Flow Risk** is assigned to Unit G.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft radius.

The well-path will not traverse any faults within Unit G at the propsoed well.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,373ft below sea surface (6,807ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,766ft to -4,011ft below sea surface (200ft to 445ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -4.970ft to -5,516ft below sea surface (1,404ft to 1,950ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,516ft to -6,904ft below sea surface (1,950ft to 3,338ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -6,904ft to -7,532ft below sea surface (3,338ft to 3,966ft below seabed).

Throughout Unit G, a **Slight Shallow Water Flow Risk** is interpreted from -7,532ft to -10,373ft below sea surface (3,966ft to 6,807ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None hazards or problems interpreted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,766ft to -4,011ft below sea surface (200ft to 445ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  None Predicted.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -4.970ft to -5,516ft below sea surface (1,404ft to 1,950ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  The well-path will traverse a fault within Unit D at -5,096ft below sea surface (1,530ft below seabed). Minor wellbore stability and drilling fluid circulation problmes may occur at the level of the fault. Casing seats should avoid all fault intersections as formation integrity could be compromised.

- Unit E

  Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,516ft to -6,904ft below sea surface (1,950ft to 3,338ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  The well-path will traverse a fault within Unit E at –6,526ft below sea surface (2,960ft below seabed). This fault is downthrown approximately 20ft to the west. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault. Casing seats should avoid all fault intersections as formation integrity could be compromised.

- Unit F

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -6,904ft to -7,532ft below sea surface (3,338ft to 3,966ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

The well-path will traverse a fault within Unit F at -7,379ft below sea surface (3,813ft below seabed). Minor wellbore stability and drilling fluid circulation problems may occur at the level of then fault. Casing seats should avoid all fault intersections.

- Unit G

Throughout Unit G, a **Slight Shallow Water Flow Risk** is interpreted from -7,532ft to -10,373ft below sea surface (3,966ft to 6,807ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

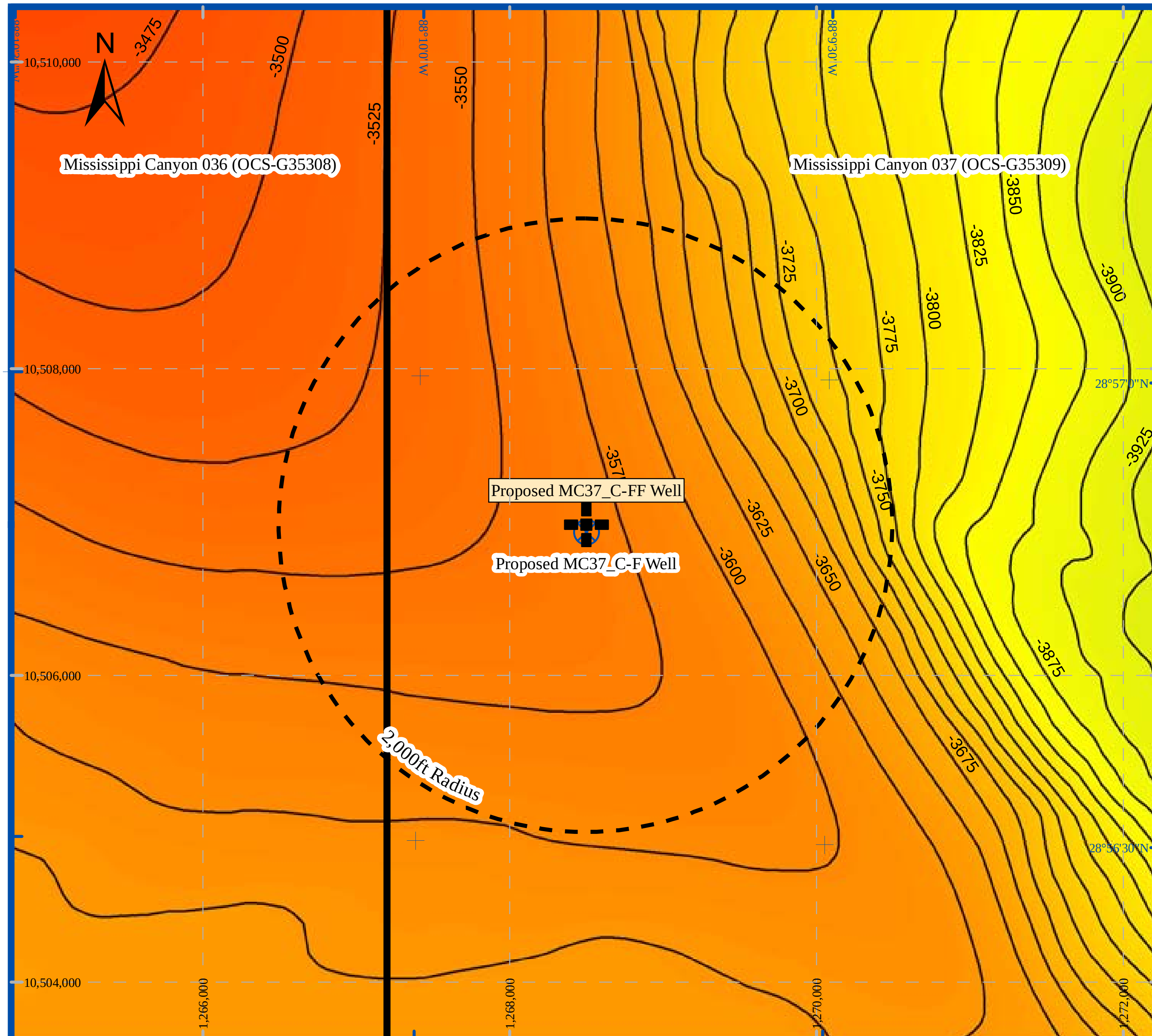
Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh
Geophysical Manager

Denise Haigh
Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC37_C-FF Well Location
Seabed Depth Extract
Seabed Morphology Extract
Seabed Amplitude Extract
Geohazard Summary Extract
Sand Lithology Summary Extract
Inline Data Example
Crossline Data Example
Top Hole Prognosis
ROV Plat
Power Spectrum
Bathymetry Plat
Public Information Plat
Vicinity Plat
10-Mile Radius Plat



Seabed Depth Extract

Proposed MC37_C-FF Well Location (1,268,500ft E / 10,506,985ft N)

Proposed MC37_C-F Well Location

Block boundaries

-3566 Depth in feet below sea surface to seabed, contoured at 25ft intervals

Seabed Depth (Feet)

Chart Scale 1" = 1,000'

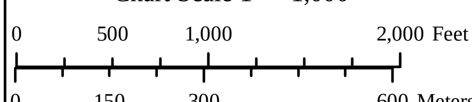
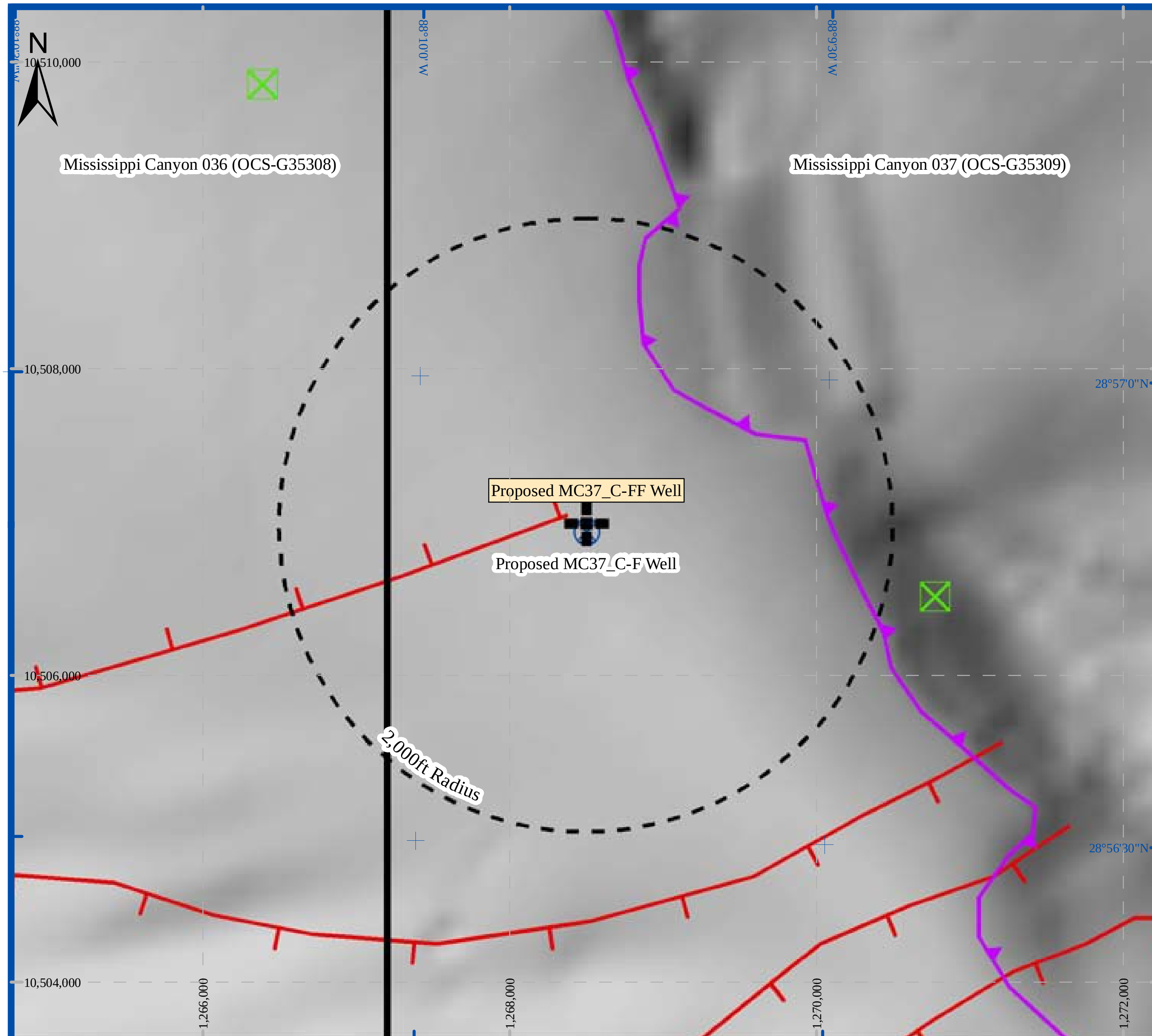


Figure 1 (MC37_C-FF)



Seabed Morphology Extract

Proposed MC37_C-FF Well Location (1,268,500ft E / 10,506,985ft N)

Proposed MC37_C-F Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

Slump scar

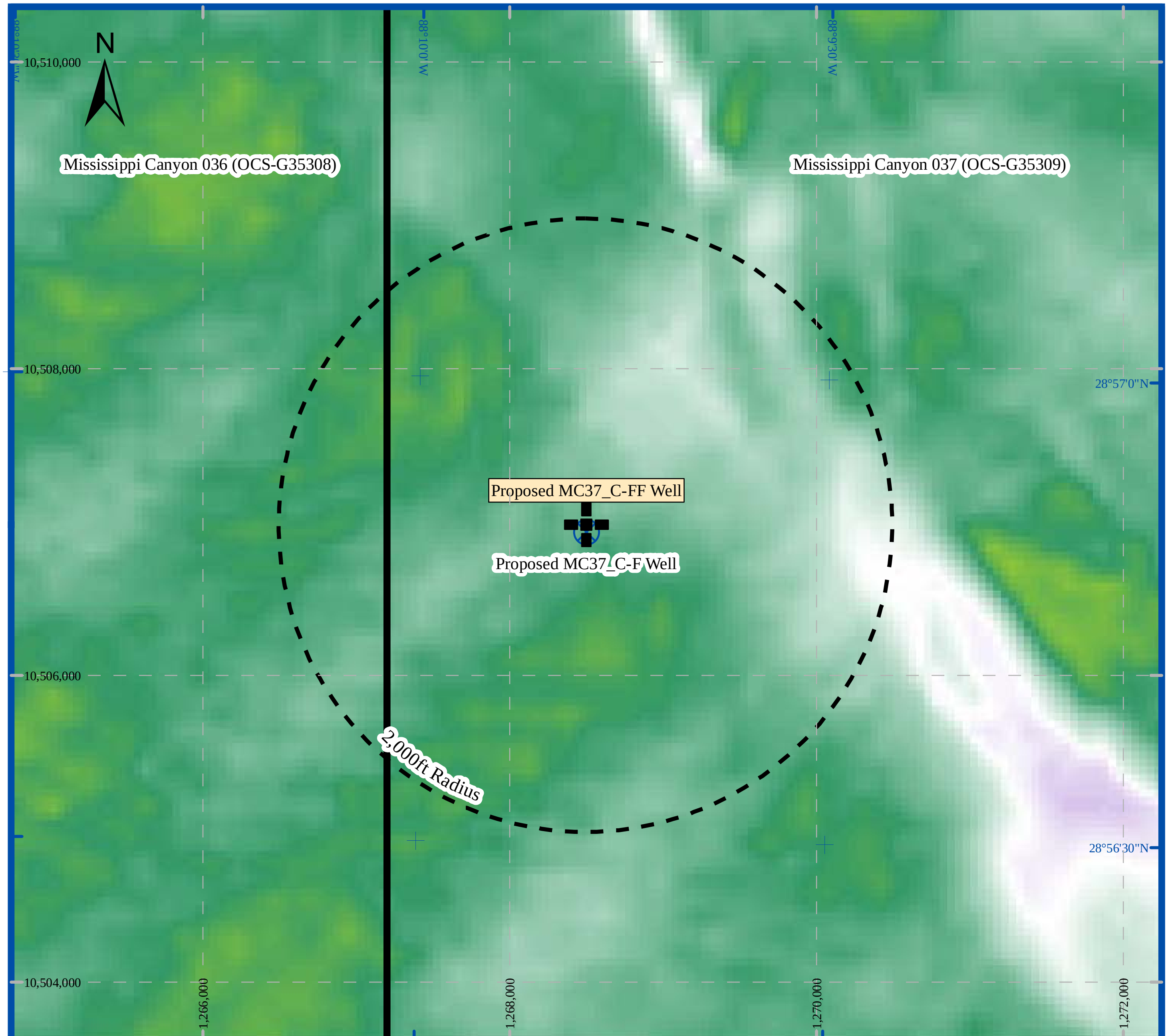
Sonar contacts, interpreted modern debris

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC37_C-FF)



Seabed Amplitude Extract

Proposed MC37_C-FF Well Location
(1,268,500ft E / 10,506,985ft N)

Proposed MC37_C-F Well Location

Block boundaries

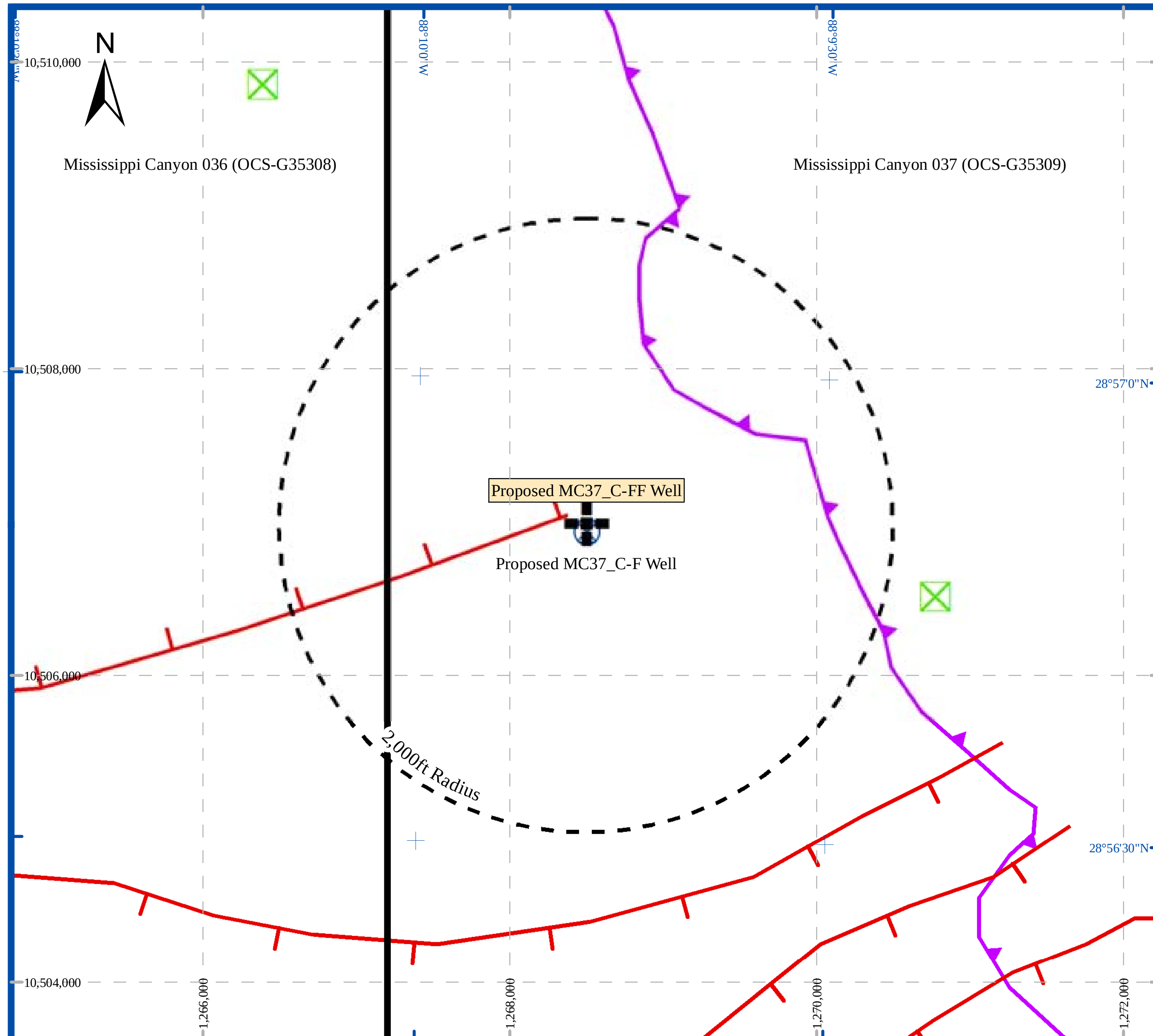
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC37_C-FF)



Geohazard Summary Extract

Proposed MC37_C-FF Well Location
(1,268,500ft E / 10,506,985ft N)

Proposed MC37_C-F Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

Slump scar

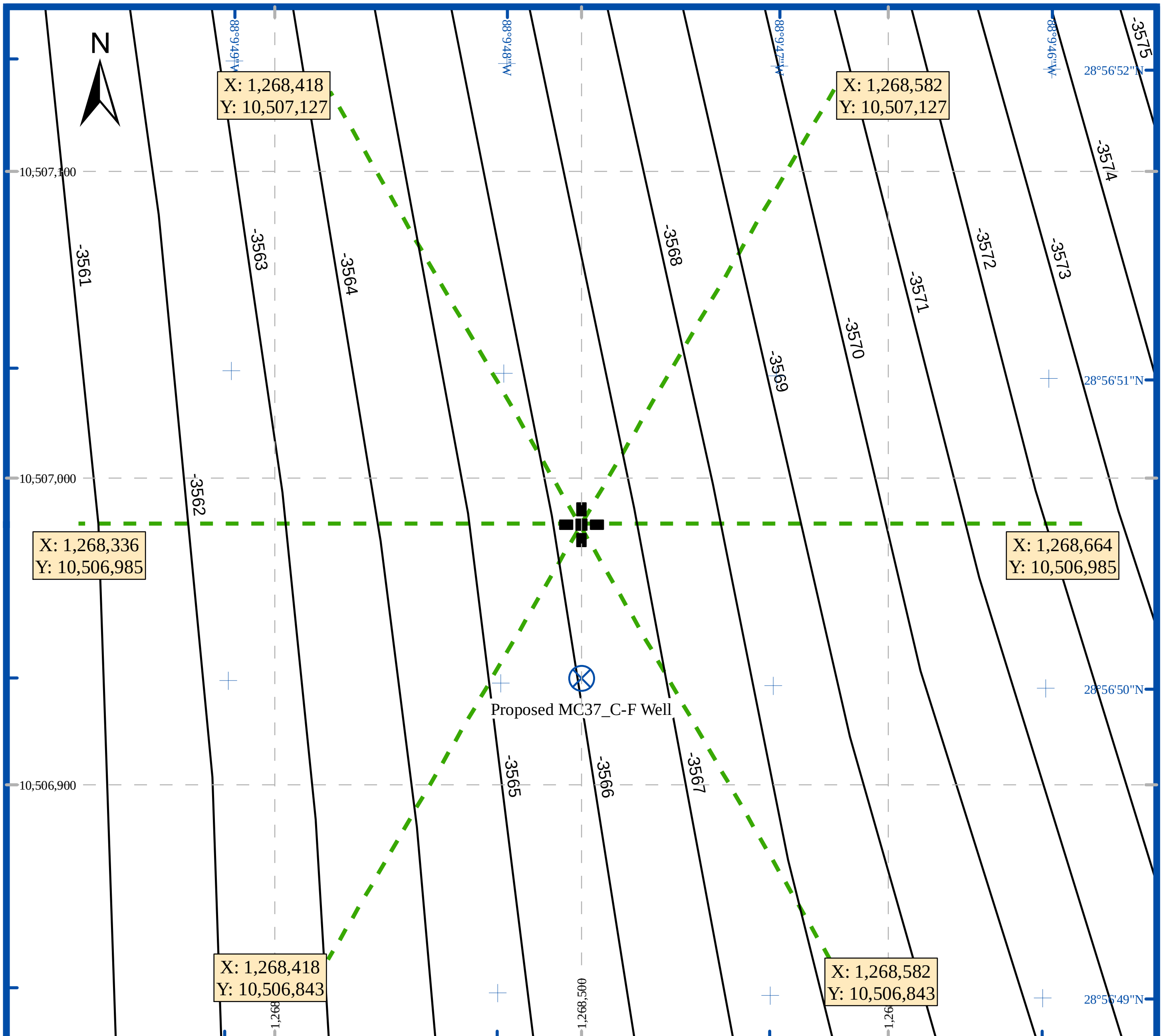
Sonar contacts, interpreted modern debris

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC37_C-FF)



ROV Plat (MC37_C-FF)

Proposed MC37_C-FF Well Location (1,268,500ft E / 10,506,985ft N)

Proposed MC37_C-F Well Location

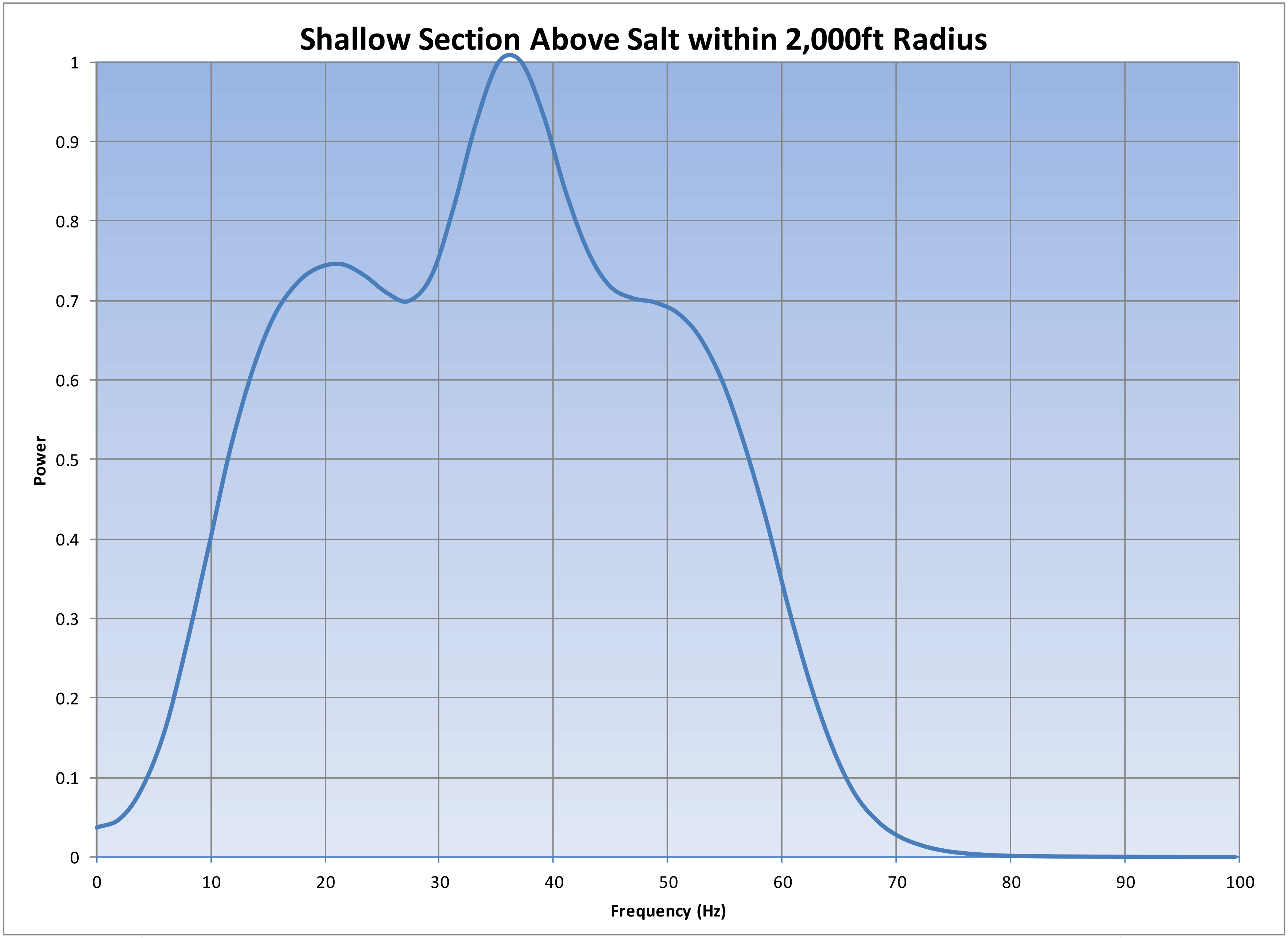
-3566 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC37_C-FF)



MC37_C-FF	Power Spectrum	Figure 10

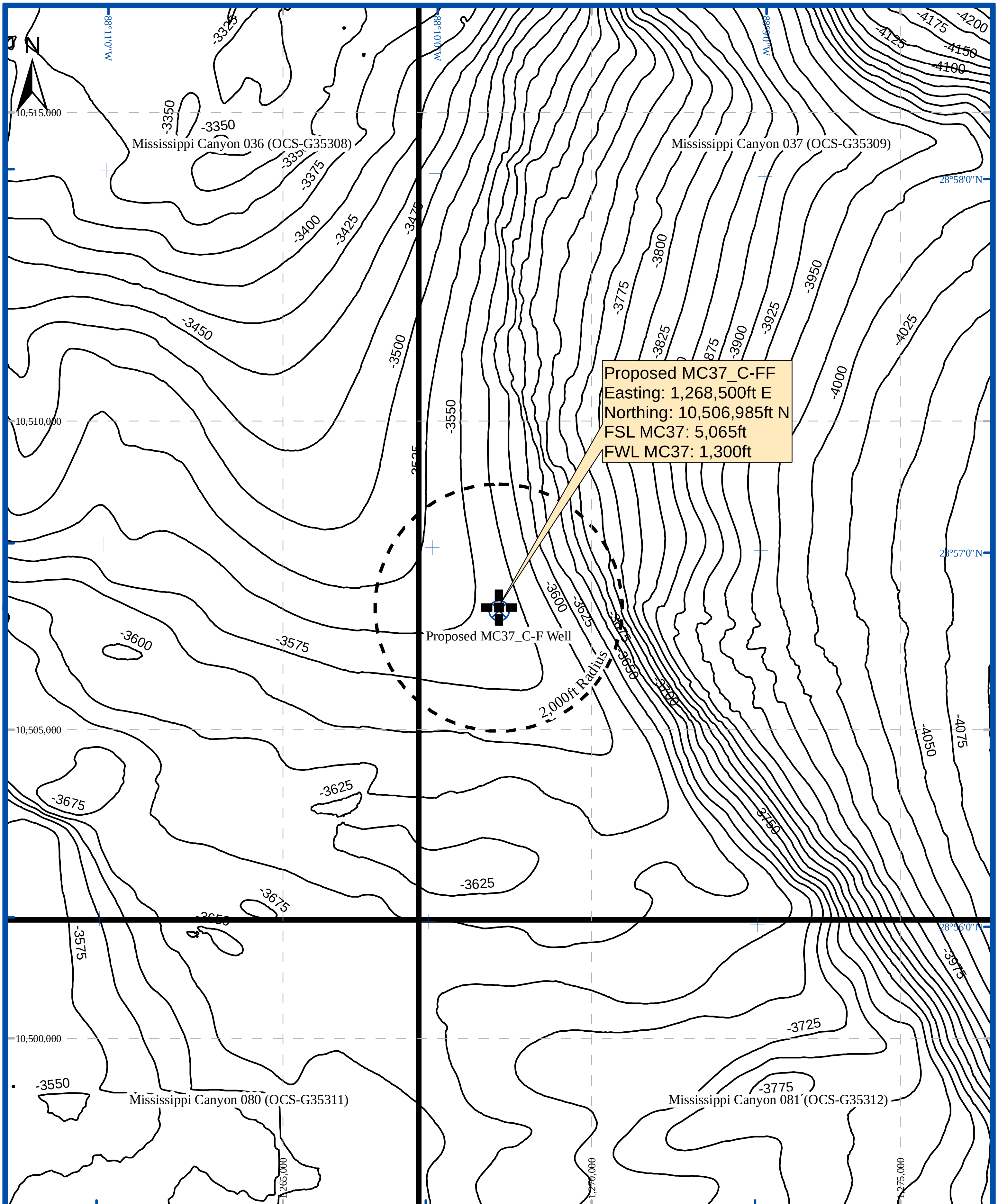


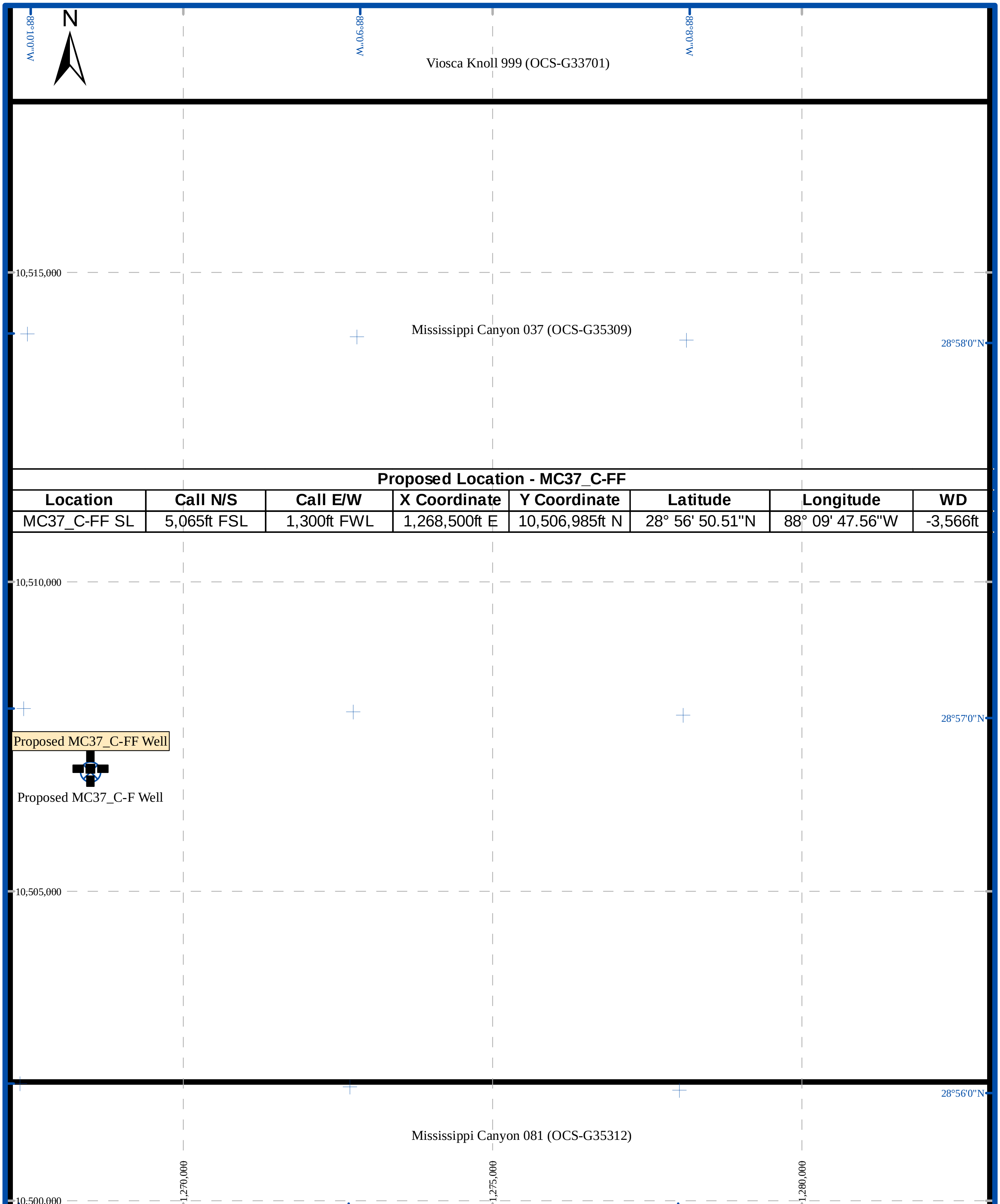
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC37_C-FF

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC37_C-FF SL	5,065ft FSL	1,300ft FWL	1,268,500ft E	10,506,985ft N	28° 56' 50.51"N	88° 09' 47.56"W	-3,566ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

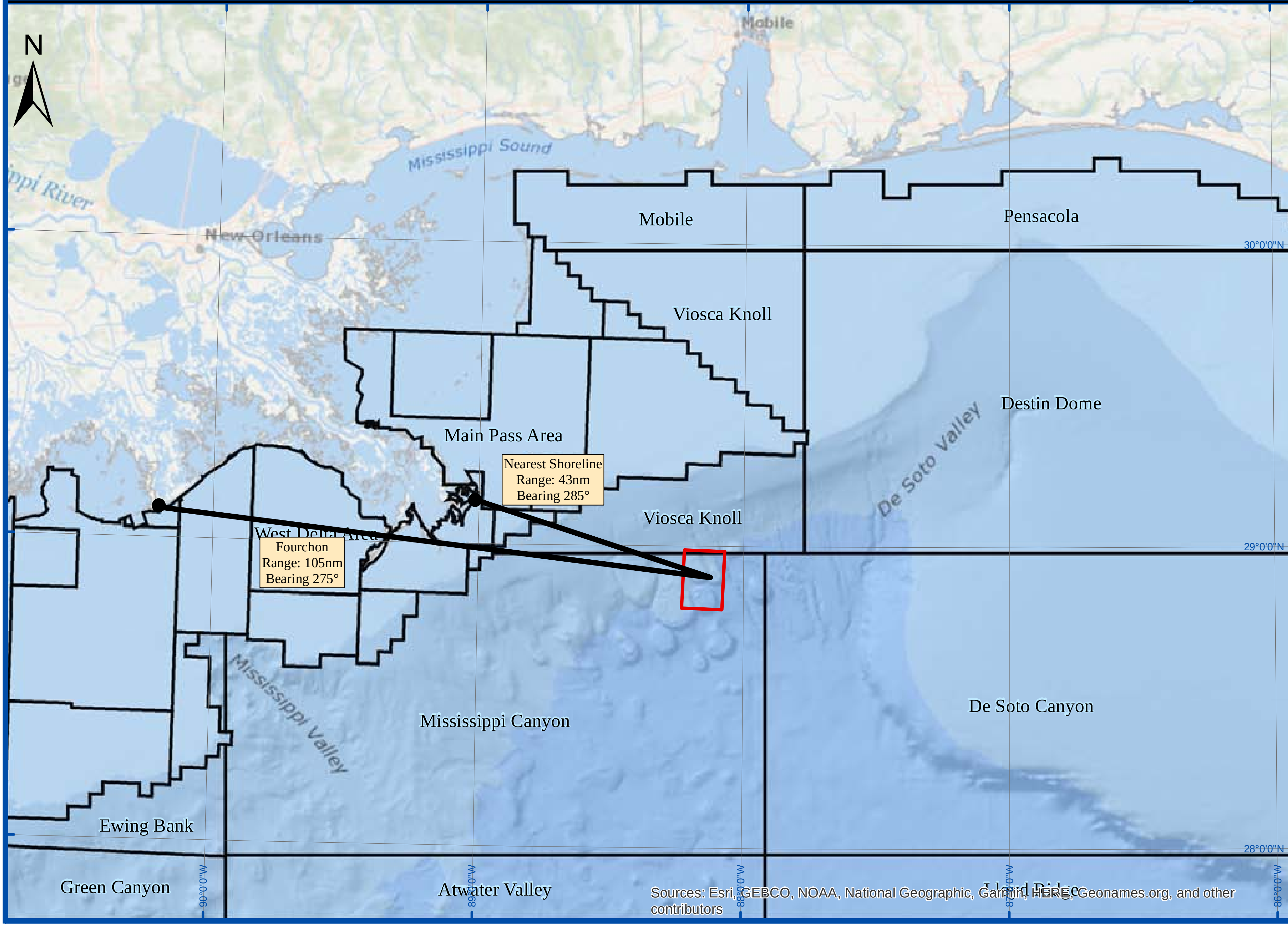
0 150 300 600 Meters

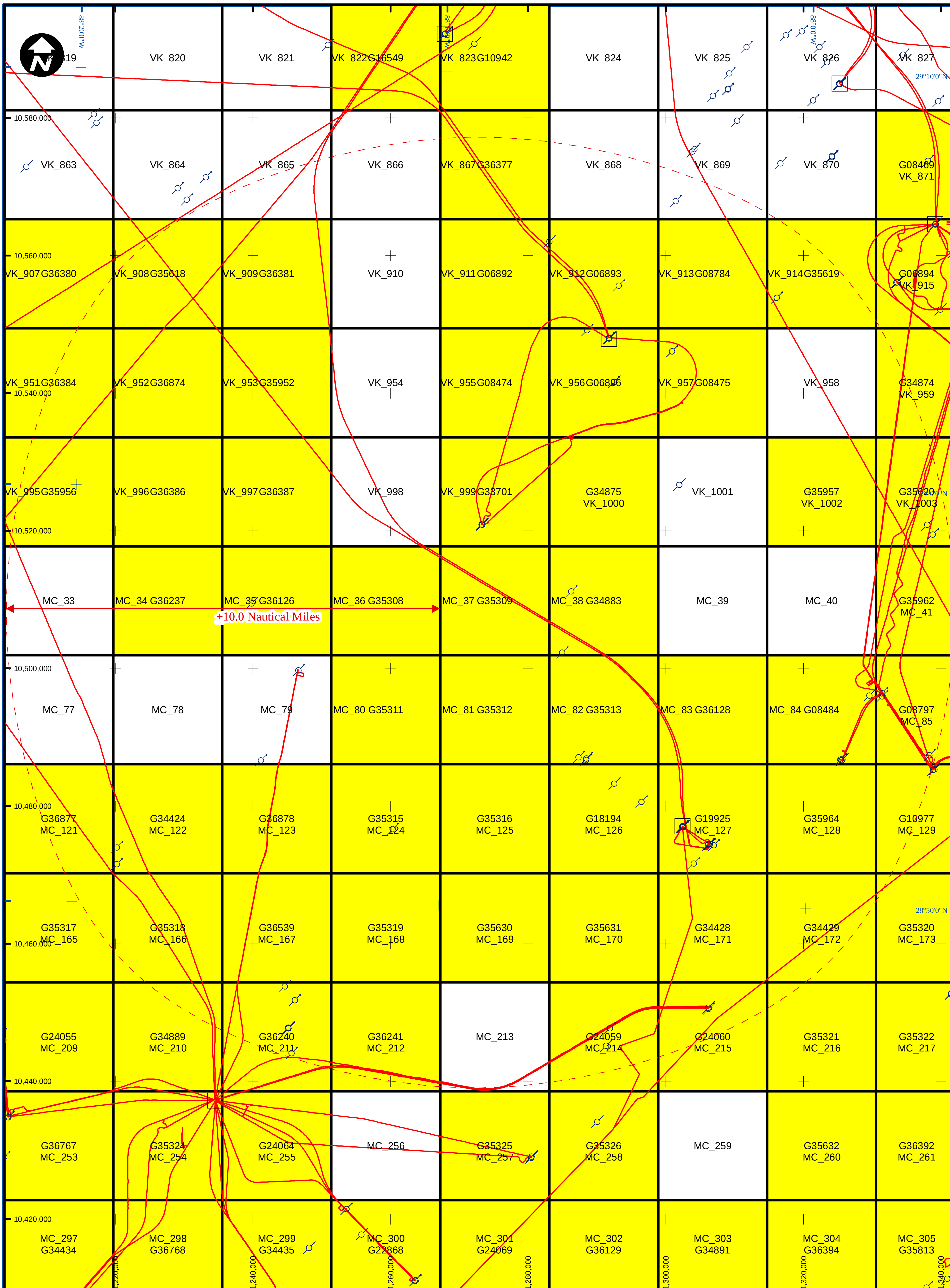
Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 37

Figure 13





Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 37

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC37_C-FF Well Location

October 02, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 37
(OCS-G OCS-G-35309)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-FF well location with surface location in Block 37, Mississippi Canyon Area (OCS-G-35309). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,373ft below sea surface (6,807ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 2.2° to the ENE The proposed location is located approximately 1,165ft to the southwest of a retrogressive cuspate, cut back slump scarp and associated debris flow to the east that occurs on the west flank of the Dorsey Canyon. A minor seabed fault occurs 125ft to the west of the proposed well. .

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

No existing wells or pipelines occur within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas is assigned at the proposed well or within 2,000ft of the proposed well.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, and throughout Unit E, Unit F, and Unit G.

The well-path will intersect a fault within Unit D, Unit E and F.

Proposed MC37_C-FF Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	50.515"	North	Easting	1,268,500	US ft. E
Longitude	88°	09'	47.560"	West	Northing	10,506,985	US ft. N
Latitude Decimal				28.9473652			
Longitude Decimal				-88.1632111			
FWL Mississippi Canyon 037				1,300ft	US ft.	Inline	12788
FSL Mississippi Canyon 037				5,065ft	US ft.	Crossline	17733
Water Depth: -3,566ft			Slope: 2.2° ENE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.9 Miles @ 29.6°		

Proposed MC37_C-F Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	50.020"	North	Easting	1,268,500	US ft. E
Longitude	88°	09'	47.555"	West	Northing	10,506,935	US ft. N
Latitude Decimal				28.9472277			
Longitude Decimal				-88.1632096			
FWL Mississippi Canyon 037				1,300ft	US ft.	Inline	12788
FSL Mississippi Canyon 037				5,015ft	US ft.	Crossline	17733
Water Depth: -3,566ft			Slope: 2.2° ENE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.9 Miles @ 29.6°		

Conclusions and Recommendations. No major problems are anticipated at the seabed.

No risk of gas is assigned at the proposed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, Unit E, Unit F, and Unit G.

The well-path will intersect three faults.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC37_C-FF Well Location

Anadarko Petroleum Corporation

October 02, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC37_C-FF Well Location (OCS-G-35309)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-FF with surface location in Block 37, Mississippi Canyon Area (OCS-G-35309). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 6,955ft to the northwest.

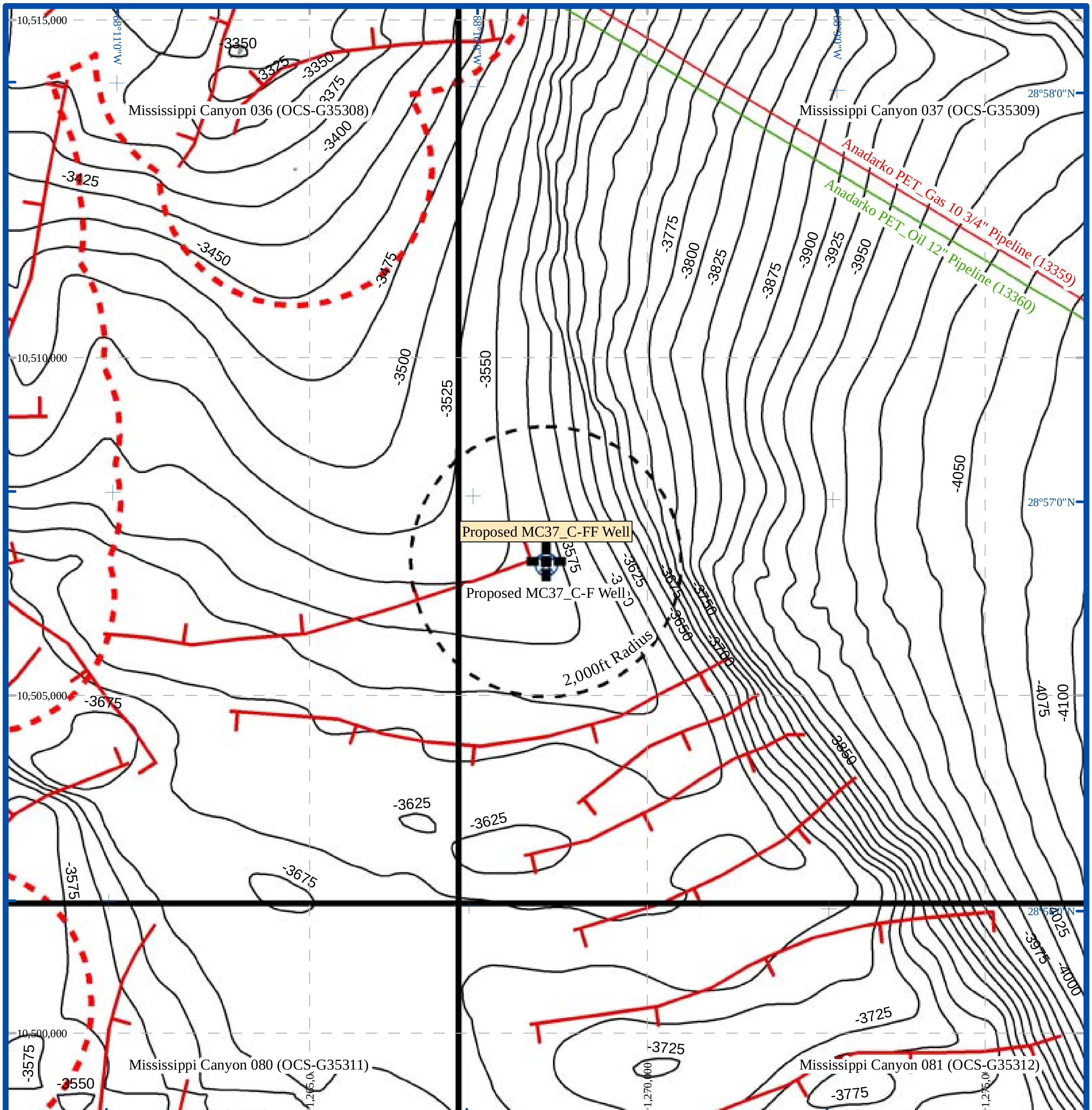
Proposed MC37_C-FF Location (Surface)								
Location Coordinates								
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West			
Latitude	28°	56'	50.515"	North	Easting	1,268,500	US ft. E	
Longitude	88°	09'	47.560"	West	Northing	10,506,985	US ft. N	
Latitude Decimal	28.9473652							
Longitude Decimal	-88.1632111							
FWL Mississippi Canyon 037	1,300ft	US ft.	Inline	12788				
FSL Mississippi Canyon 037	5,065ft	US ft.	Crossline	17733				
Water Depth: -3,566ft	Slope: 2.2° ENE							
Nearest Shoreline	43 Nautical Miles @ 285°							
Port of Operation	Fourchon	105 Nautical Miles @ 275°						
Nearest Manned Platform	A Ram-Powell in VK956	8.9 Miles @ 29.6°						

Proposed MC37_C-F Location (Surface)								
Location Coordinates								
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West			
Latitude	28°	56'	50.020"	North	Easting	1,268,500	US ft. E	
Longitude	88°	09'	47.555"	West	Northing	10,506,935	US ft. N	
Latitude Decimal	28.9472277							
Longitude Decimal	-88.1632096							
FWL Mississippi Canyon 037	1,300ft	US ft.	Inline	12788				
FSL Mississippi Canyon 037	5,015ft	US ft.	Crossline	17733				
Water Depth: -3,566ft	Slope: 2.2° ENE							
Nearest Shoreline	43 Nautical Miles @ 285°							
Port of Operation	Fourchon	105 Nautical Miles @ 275°						
Nearest Manned Platform	A Ram-Powell in VK956	8.9 Miles @ 29.6°						

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

Conclusions and Recommendations: The proposed MC37_C-FF and MC37_C-F well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



✚	Proposed MC37_C-FF Well Location (1,268,500ft E / 10,506,985ft N)
⊗	Proposed MC37_C-F Well Location
	Oil Pipeline
	Gas Pipeline
	Block boundaries
-3566	Depth in feet below sea surface to seabed,contoured at 25ft intervals
	Seafloor faults intersection. Tick doenotes downthrown block
	2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar
	Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Cactus Prospect
Mississippi Canyon, Block MC37,
Offshore Gulf of Mexico

Description:
Proposed MC37_C-GG Well Location

Project Number:
2020-323

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	A Haigh
	Quality Assurance	D Haigh

Revision	**Date**	**Title**
0	September 16, 2020	Draft
1	October 02, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

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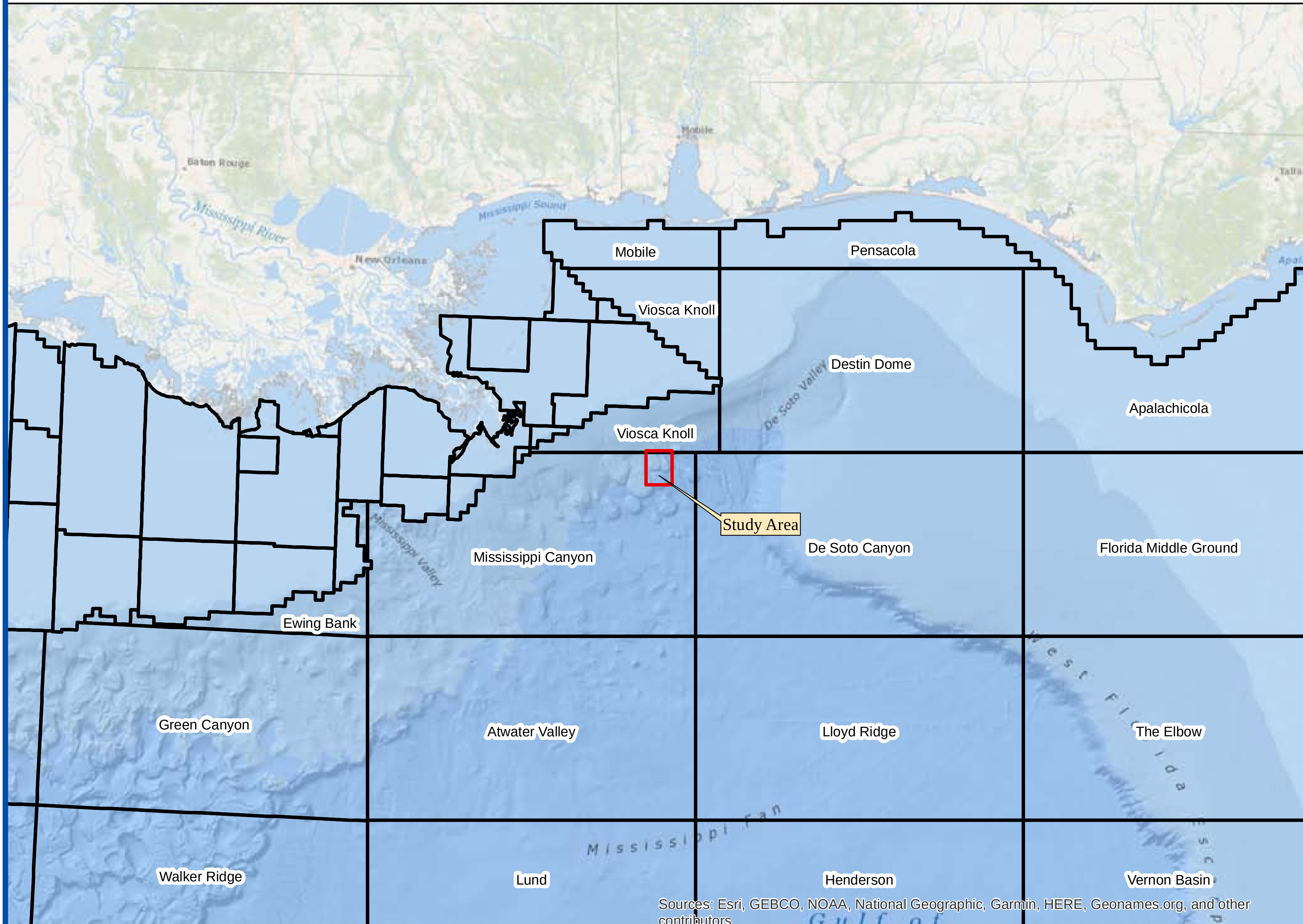
OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors

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LIST OF FIGURES

WELL CLEARANCE LETTER – PROPOSED MC37_C-GG WELL LOCATION

October 02, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC37_C-GG Well Location
Mississippi Canyon Block MC37
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC37_C-GG Well Location, Mississippi Canyon Area (OCS-G-35309). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is the Top of Salt at 2.229 seconds two-way time (TWT), -5,778ft below sea surface (2,193ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC37_C-GG well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC37_C-GG Well Location lies in the southwest part of Block MC37 (OCS-G-35309).

Proposed MC37_C-GG Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56’	30.768”	North	Easting	1,269,000	US ft. E
Longitude	88°	09’	41.711”	West	Northing	10,504,986	US ft. N
Latitude Decimal			28.9418801				
Longitude Decimal			-88.1615863				
FWL Mississippi Canyon 037			1,800ft		US ft.	Inline	12777
FSL Mississippi Canyon 037			3,066ft		US ft.	Crossline	17649
Water Depth: -3,595ft			Slope: 1.6° SSW				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon			105 Nautical Miles @ 275°	
Nearest Manned Platform			A Ram-Powell in VK956			9.2 Miles @ 27.9°	

Proposed MC37_C-G Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56’	30.273”	North	Easting	1,269,000	US ft. E
Longitude	88°	09’	41.705”	West	Northing	10,504,936	US ft. N
Latitude Decimal			28.9417426				
Longitude Decimal			-88.1615847				
FWL Mississippi Canyon 037			1,800ft		US ft.	Inline	12777
FSL Mississippi Canyon 037			3,016ft		US ft.	Crossline	17645
Water Depth: -3,596ft			Slope: 1.6° SSW				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon			105 Nautical Miles @ 275°	
Nearest Manned Platform			A Ram-Powell in VK956			9.2 Miles @ 27.9°	

Location MC37_C-G is 50ft from MC37_C-GG on a bearing of 180°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC37_C-FF well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC37_C-GG well location is -3,595ft below sea surface (Figure 1). The seafloor slopes to the SSW at 1.6°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC37_C-GG well location is in the southwest part of block MC37. The proposed well is located in an area of relatively smooth seabed located on the eastern part of Horn Dome.

The proposed location is located approximately 1,960ft to the southwest of a retrogressive cuspate, cut back slump scarp and associated debris flow to the east that occurs on the west flank of the Dorsey Canyon. These failures are retrogressive seabed failures. Maximum observed retrogressive cut backs in this area appear to be around 1,000ft. Given the closest approach is to a well defined cut-back that is over 1,000ft from the proposed location, it is considered a reduced risk that slope failure would cut back further towards the well location.

Three minor seabed fault intersections, trending ENE / WSW occur within south of the 2,000ft radius. These faults do not impact the proposed well location.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, and E. These are separated by Horizons H05, H10, H20, H30, and Top of Salt (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,769ft below sea surface (174ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,769ft below sea surface (174ft below seabed).

4.3 Unit B

The upper part of Unit B from -3,769ft to -3,884ft below sea surface (174ft to 289ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low-amplitude reflectors with clays, silts, and occasional sands.

Unit B from -3,884ft to -4,080ft below sea surface (289ft to 485ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The proposed location is on the up-dip part of these deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -4,080ft below sea surface (485ft below seabed) to -4,220ft below sea surface (625ft below seabed) presents acoustically as well-layered, low-amplitude reflectors interpreted as clays and silts with occasional sands.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft.

Horizon H10 marks the base of Unit B, occurring at -4,220ft below sea surface (625ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,220ft to -4,456ft below sea surface (625ft to 861ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas or shallow water flow risk is predicted within Unit C at the proposed well or within 2,000ft radius.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -4,456ft below sea surface (861ft below seabed).

4.5 Unit D

Unit D from -4,456ft to -5,108ft below sea surface (861ft to 1,513ft below seabed) is characterized by slightly-chaotic and well-layered, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sand. This interval appears presents an acoustic character suggestive of a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can on occasions form some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,800ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft.

The well-path will traverse a fault within Unit D at -4,740ft below sea surface (1,145ft below seabed). Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

Horizon H30 marks the base of Unit D at -5,108ft below sea surface (1,513ft below seabed).

4.6 Unit E

Unit E from -5,108ft to -5,788ft below sea surface (1,513ft to 2,193ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section on the side of the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~3,000ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft.

The well-path will traverse a fault within Unit E at –5,149ft below sea surface (1,554ft below seabed). This fault is downthrown approximately 20ft to the west. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

Top of Salt marks the base of Unit E and the base of the interpretation at -5,788ft below sea surface (2,193ft below seabed).

4.7 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.8 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,884ft to -4,080ft below sea surface (289ft to 485ft below seabed).

Throughout Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -4.456ft to -5,108ft below sea surface (861ft to 1,513ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,108ft to -5,788ft below sea surface (1,513ft to 2,193ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None hazards or problems interpreted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,884ft to -4,080ft below sea surface (289ft to 485ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  None Predicted.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -4.456ft to -5,108ft below sea surface (861ft to 1,513ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  The well-path will traverse a fault within Unit D at -4,740ft below sea surface (1,145ft below seabed). Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault. Casing seats should avoid all fault intersections as formation integrity could be compromised.

- Unit E

  Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,108ft to -5,788ft below sea surface (1,513ft to 2,193ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  The well-path will traverse a fault within Unit E at –5,149ft below sea surface (1,554ft below seabed). This fault is downthrown approximately 20ft to the west. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault. Casing seats should avoid all fault intersections as formation integrity could be compromised.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh Geophysical Manager	Denise Haigh Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:

Proposed MC37_C-GG Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

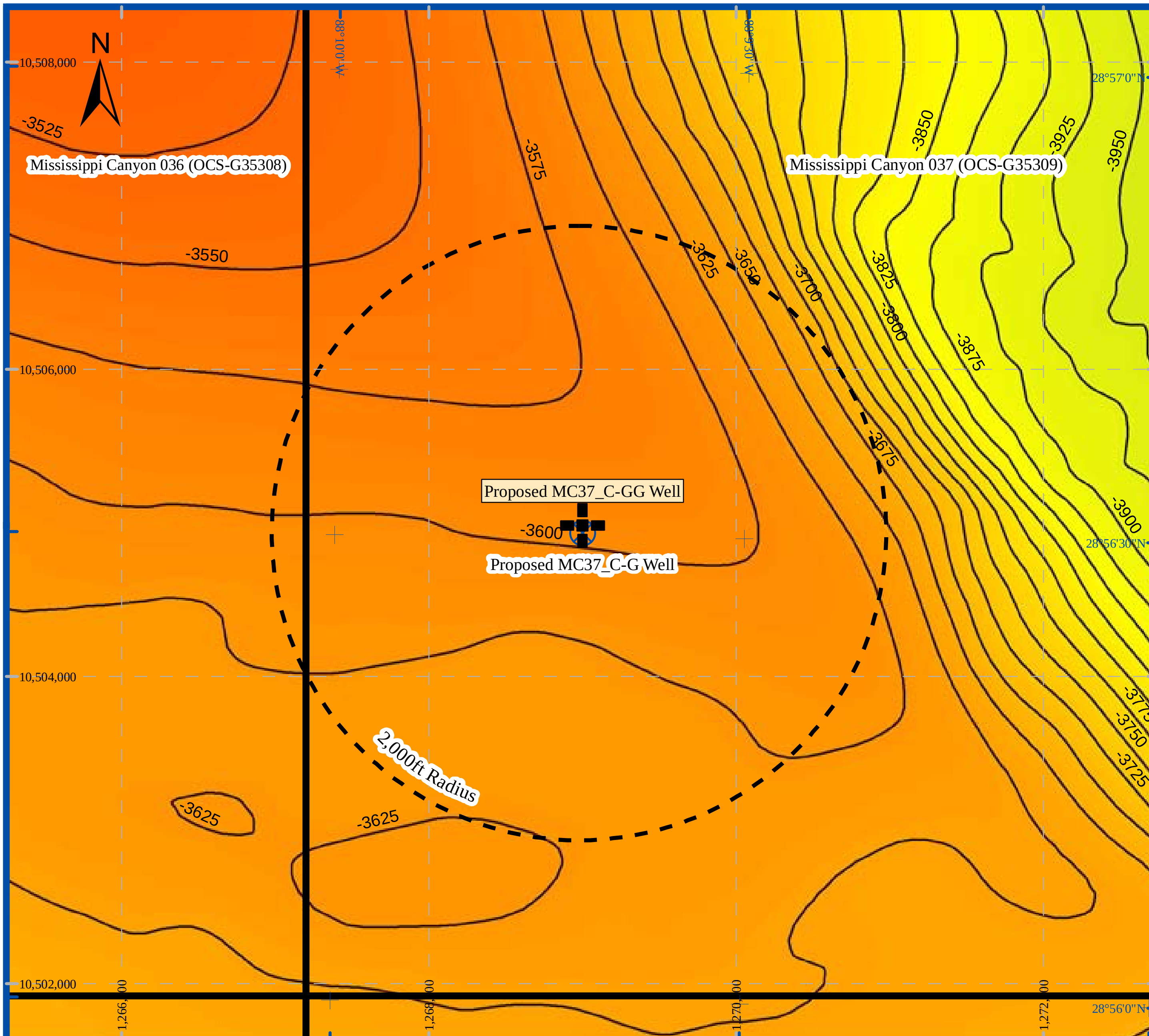
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC37_C-GG Well Location (1,269,000ft E / 10,504,986ft N)

Proposed MC37_C-G Well Location

Block boundaries

-3595 Depth in feet below sea surface to seabed, contoured at 25ft intervals

-5400 -5000 -4600 -4200 -3800 -3400

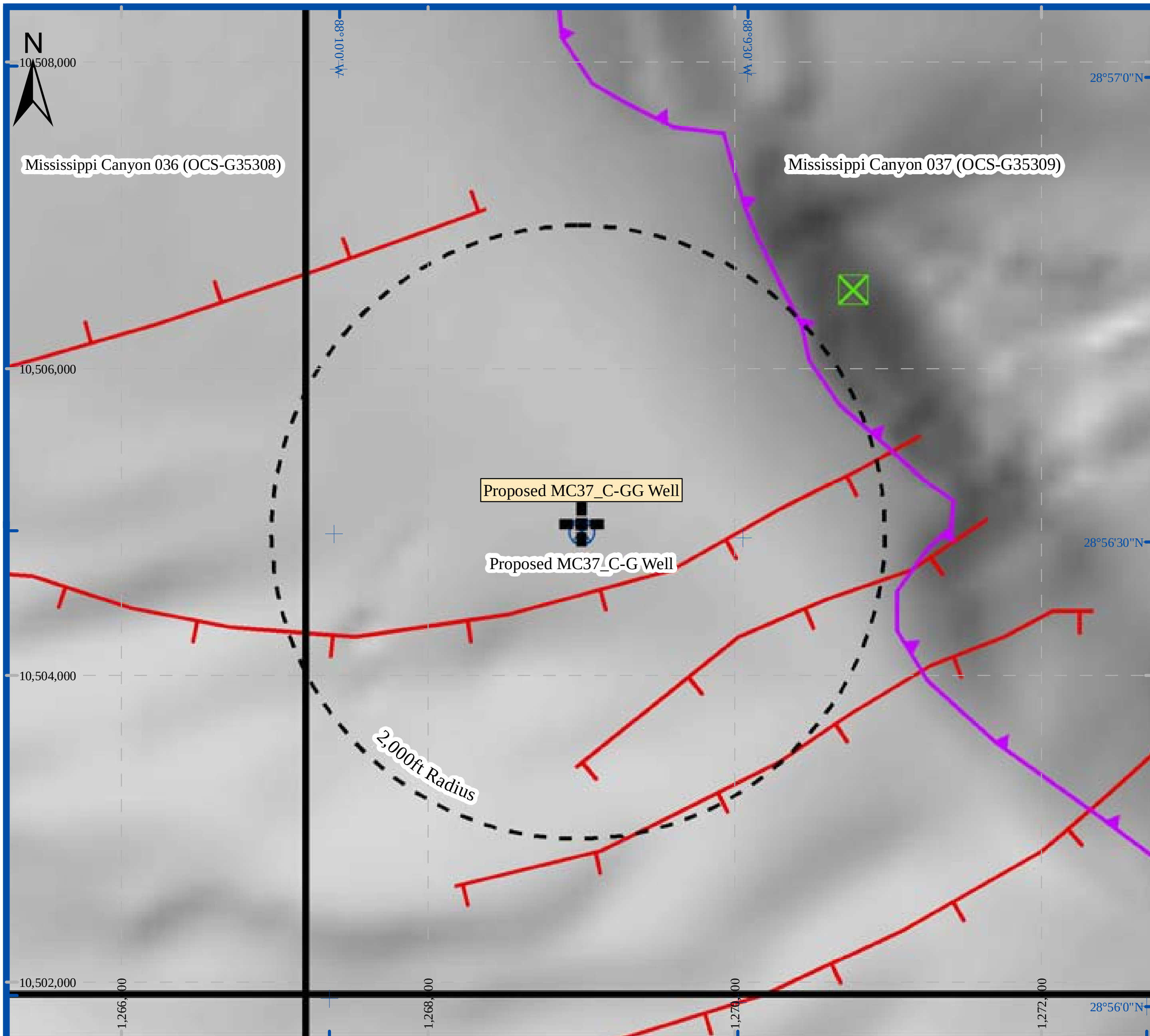
Seabed Depth (Feet)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 1
(MC37_C-GG)



Seabed Morphology Extract

Proposed MC37_C-GG Well Location (1,269,000ft E / 10,504,986ft N)

Proposed MC37_C-G Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

Slump scar

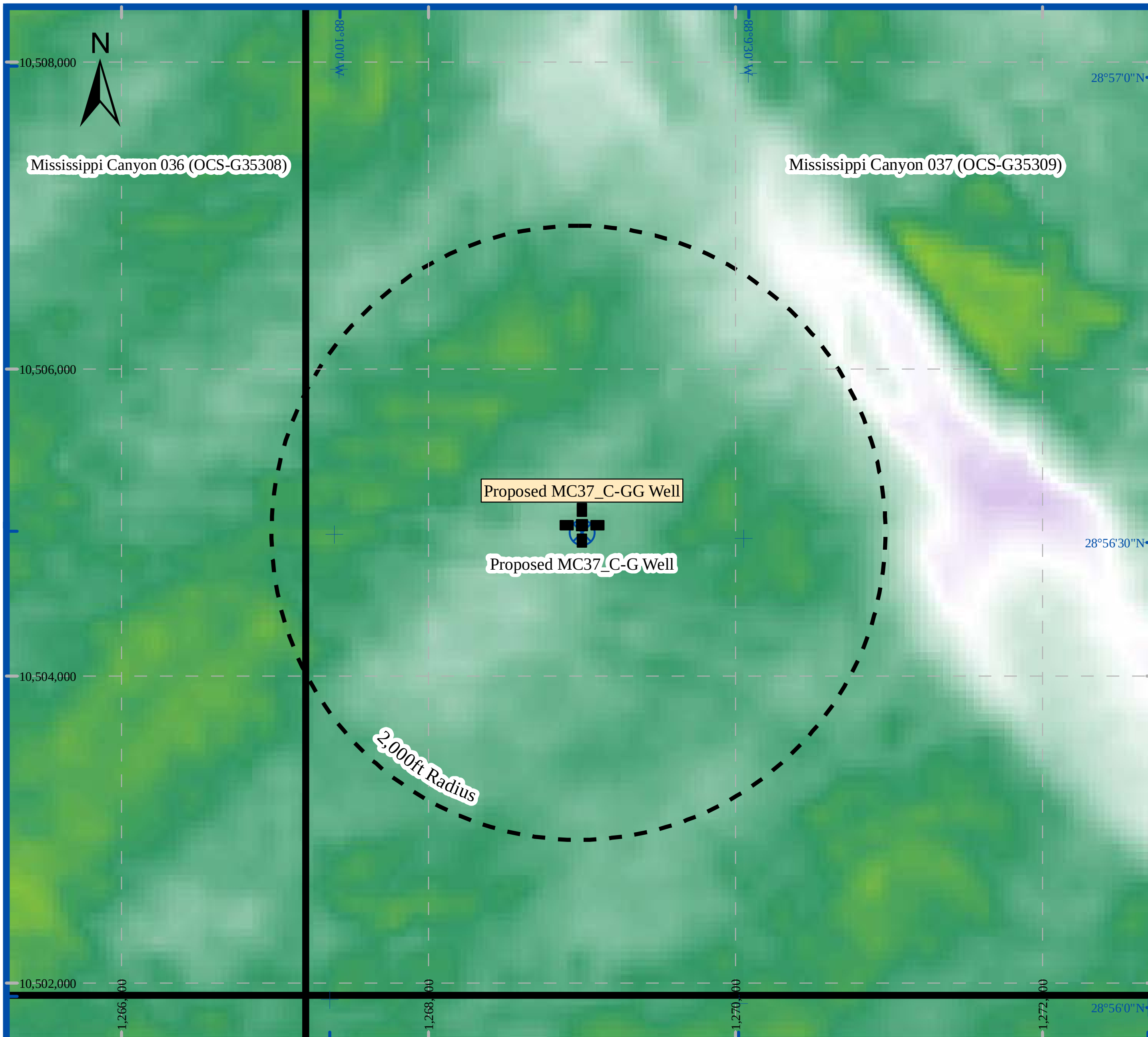
Sonar contacts, interpreted modern debris

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC37_C-GG)

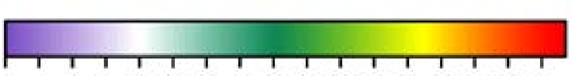


Seabed Amplitude Extract

Proposed MC37_C-GG Well Location
(1,269,000ft E / 10,504,986ft N)

Proposed MC37_C-G Well Location

Block boundaries



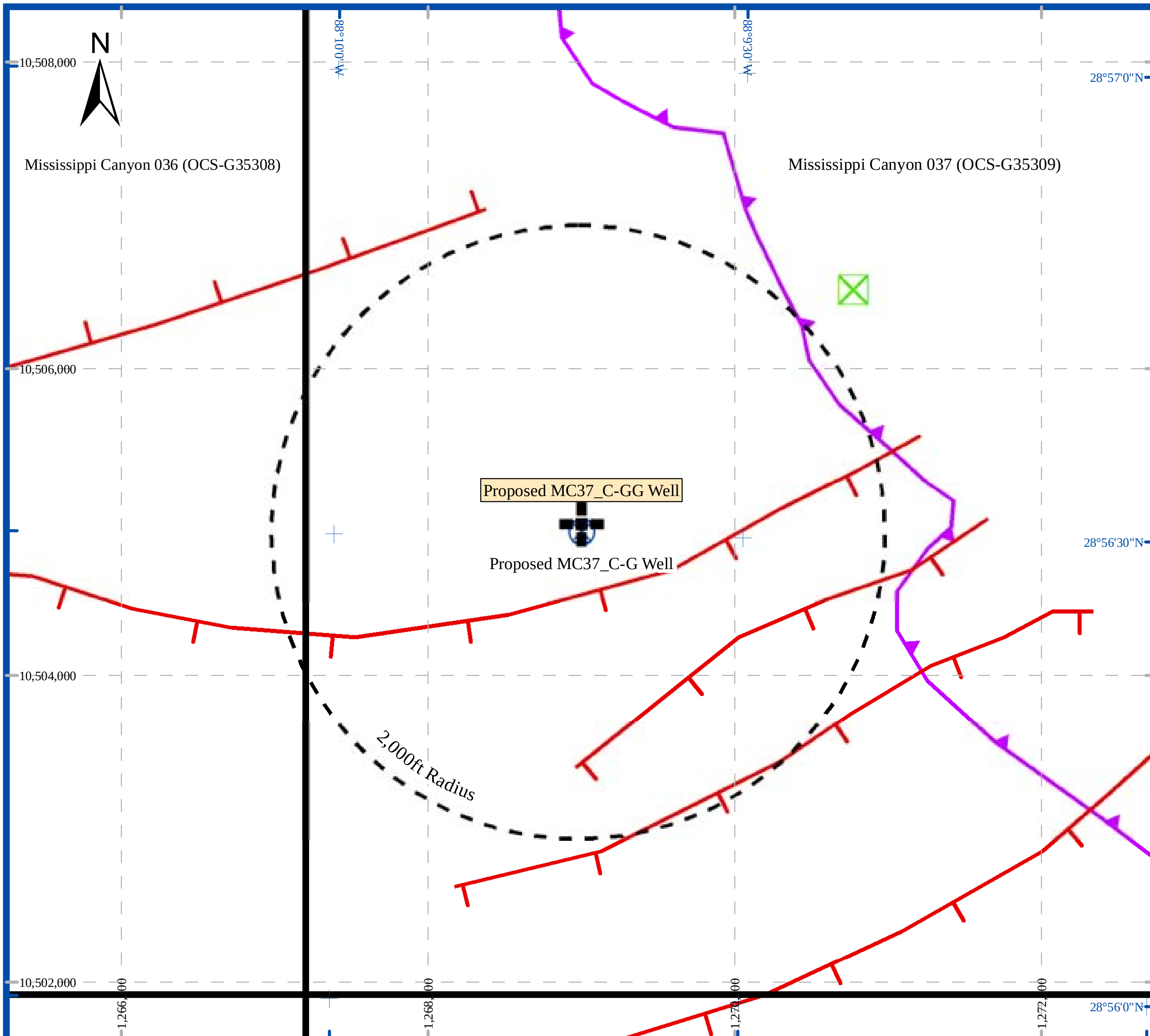
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC37_C-GG)



Geohazard Summary Extract

Proposed MC37_C-GG Well Location (1,269,000ft E / 10,504,986ft N)

Proposed MC37_C-G Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

Slump scar

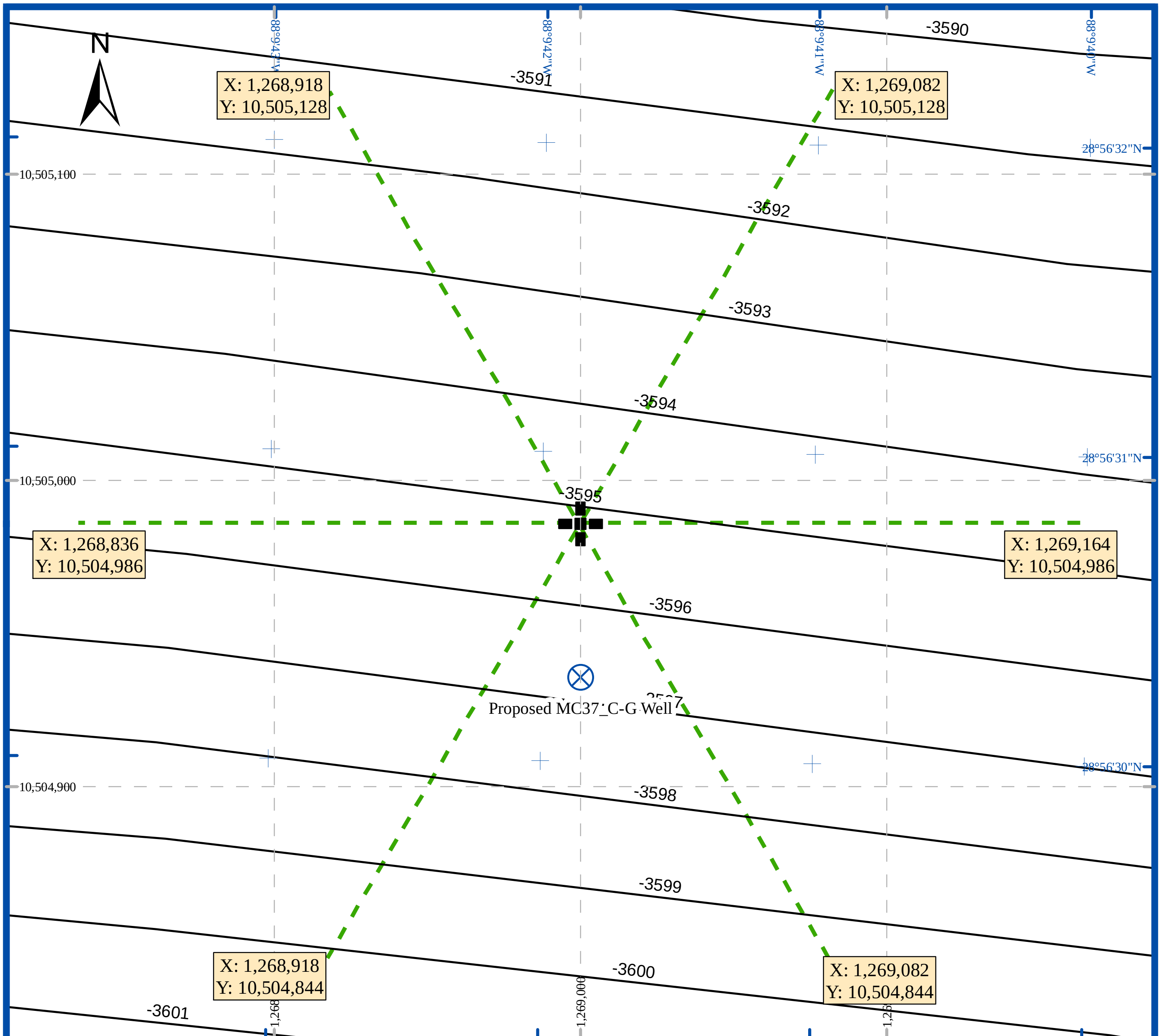
Sonar contacts, interpreted modern debris

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4 (MC37_C-GG)



ROV Plat (MC37_C-GG)

Proposed MC37_C-GG Well Location (1,269,000ft E / 10,504,986ft N)

Proposed MC37_C-G Well Location

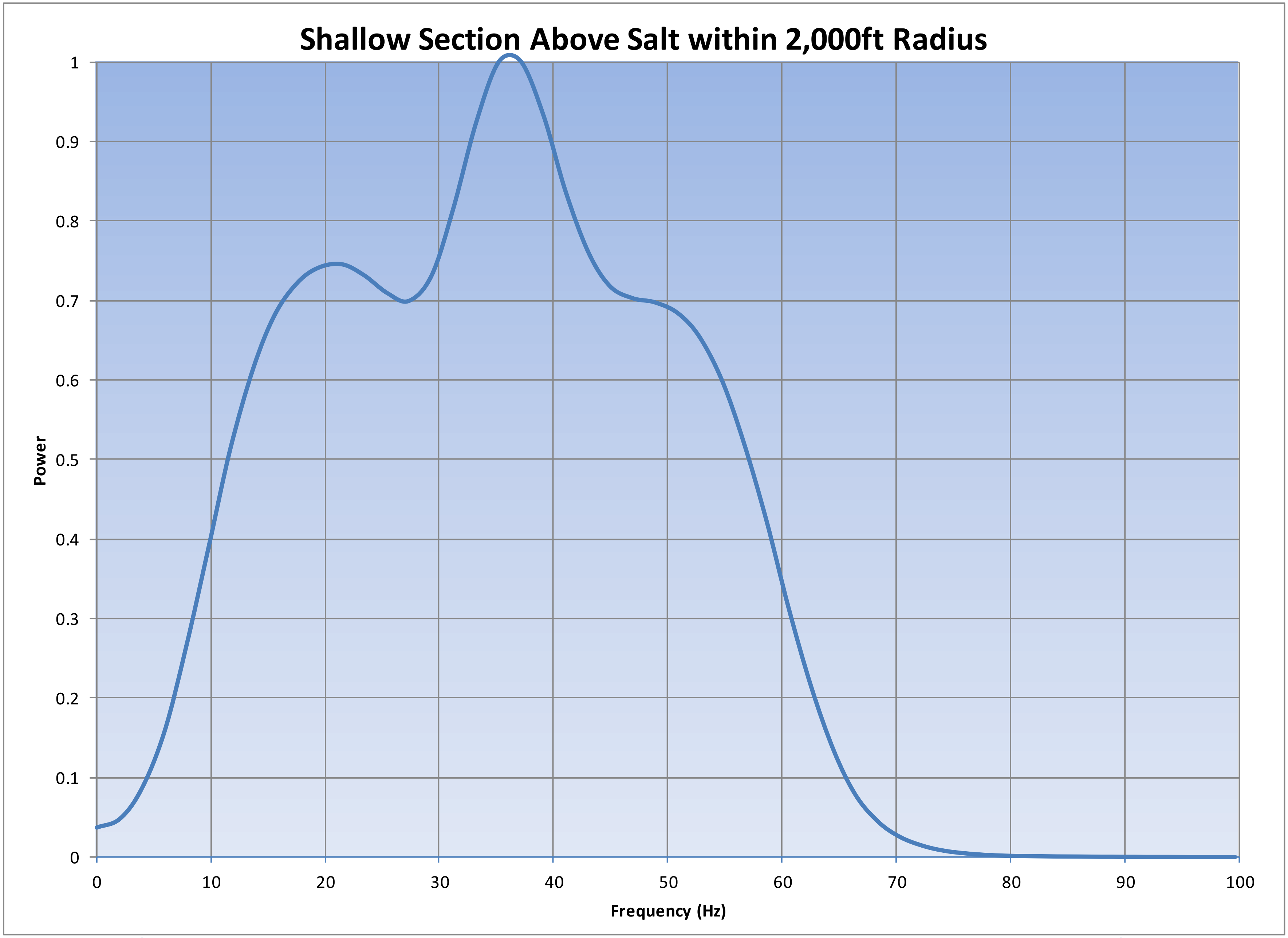
-3595 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9 (MC37_C-GG)



MC37_C-GG	Power Spectrum	Figure 10

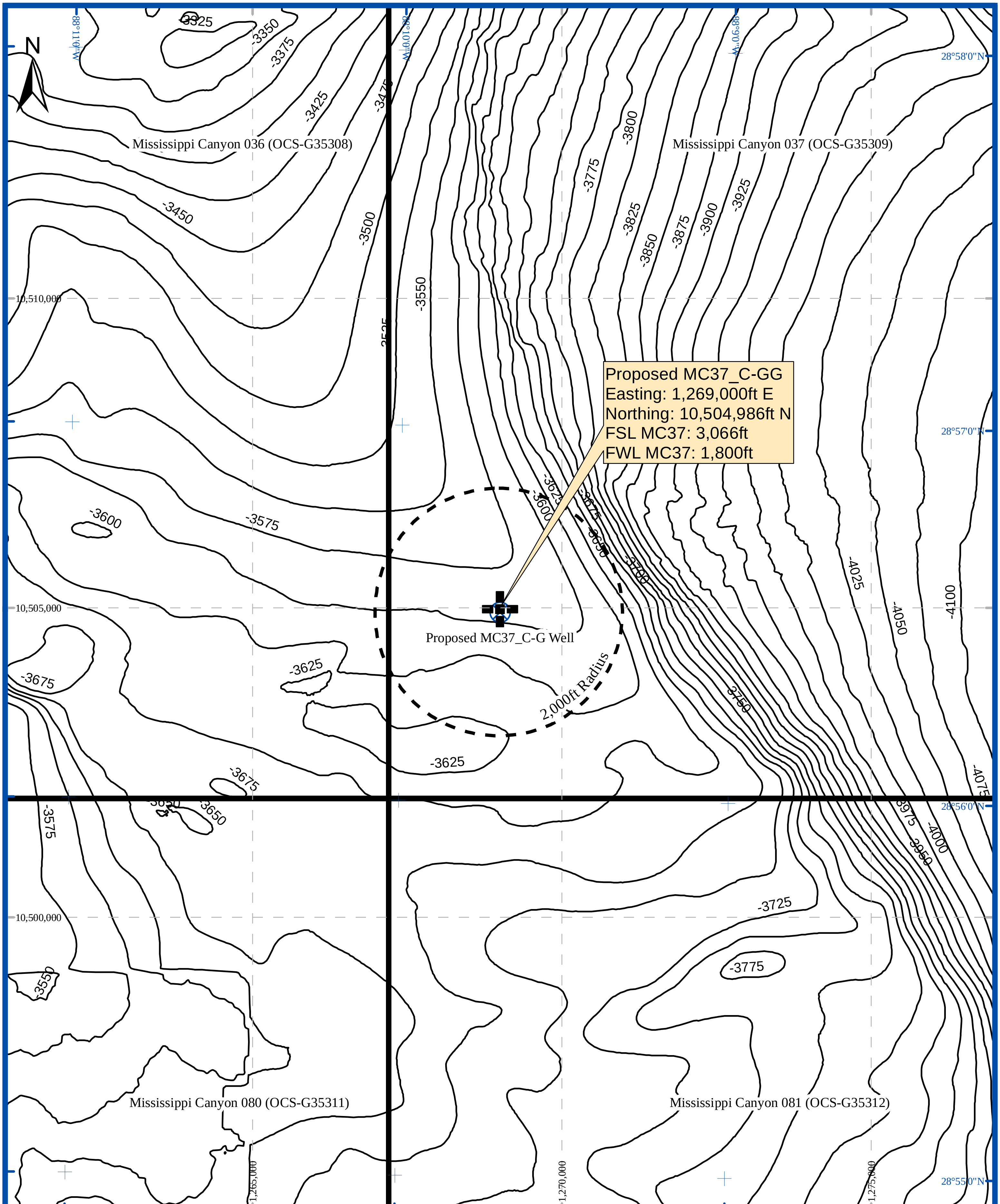


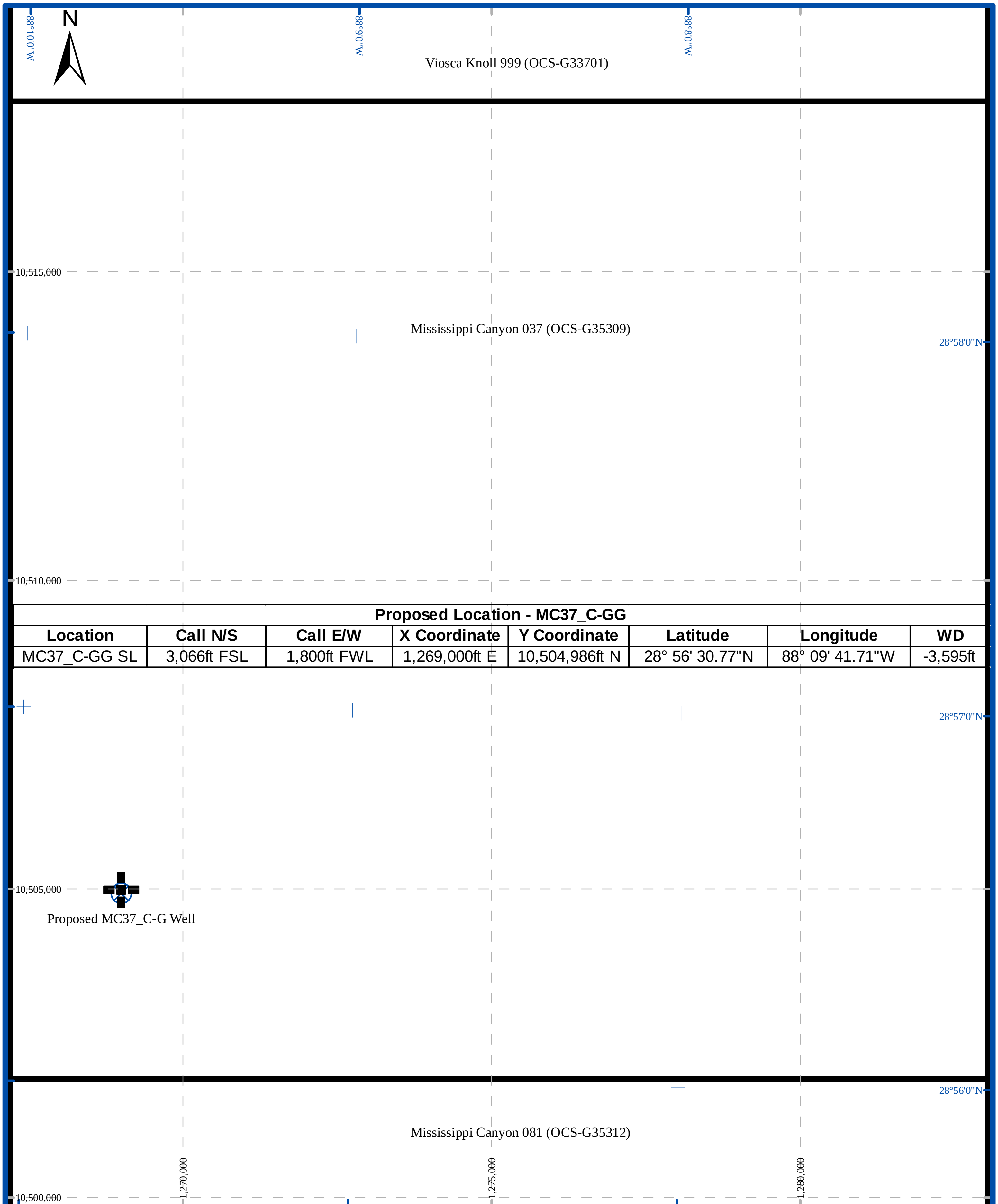
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC37_C-GG

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC37_C-GG SL	3,066ft FSL	1,800ft FWL	1,269,000ft E	10,504,986ft N	28° 56' 30.77"N	88° 09' 41.71"W	-3,595ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

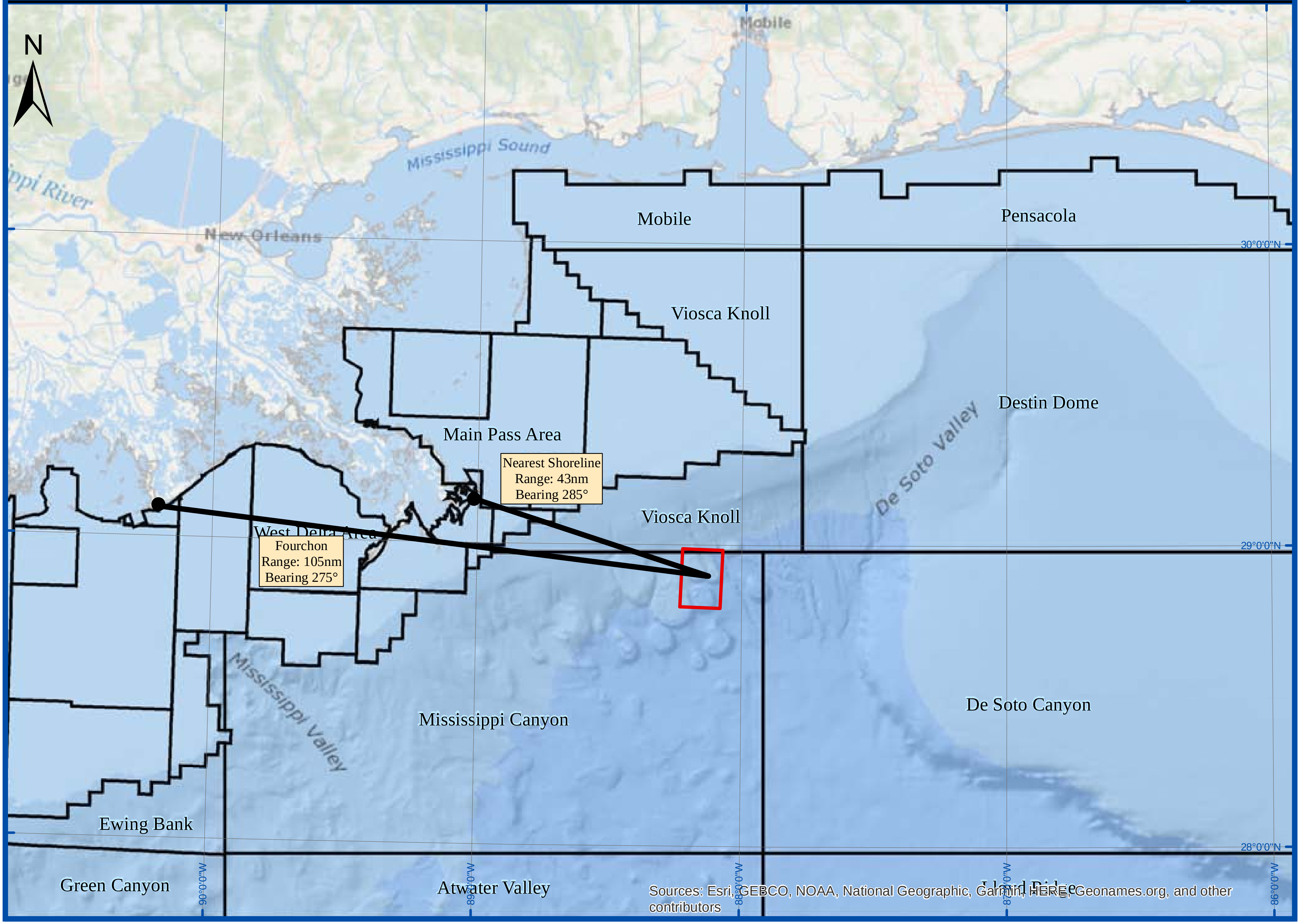
0 150 300 600 Meters

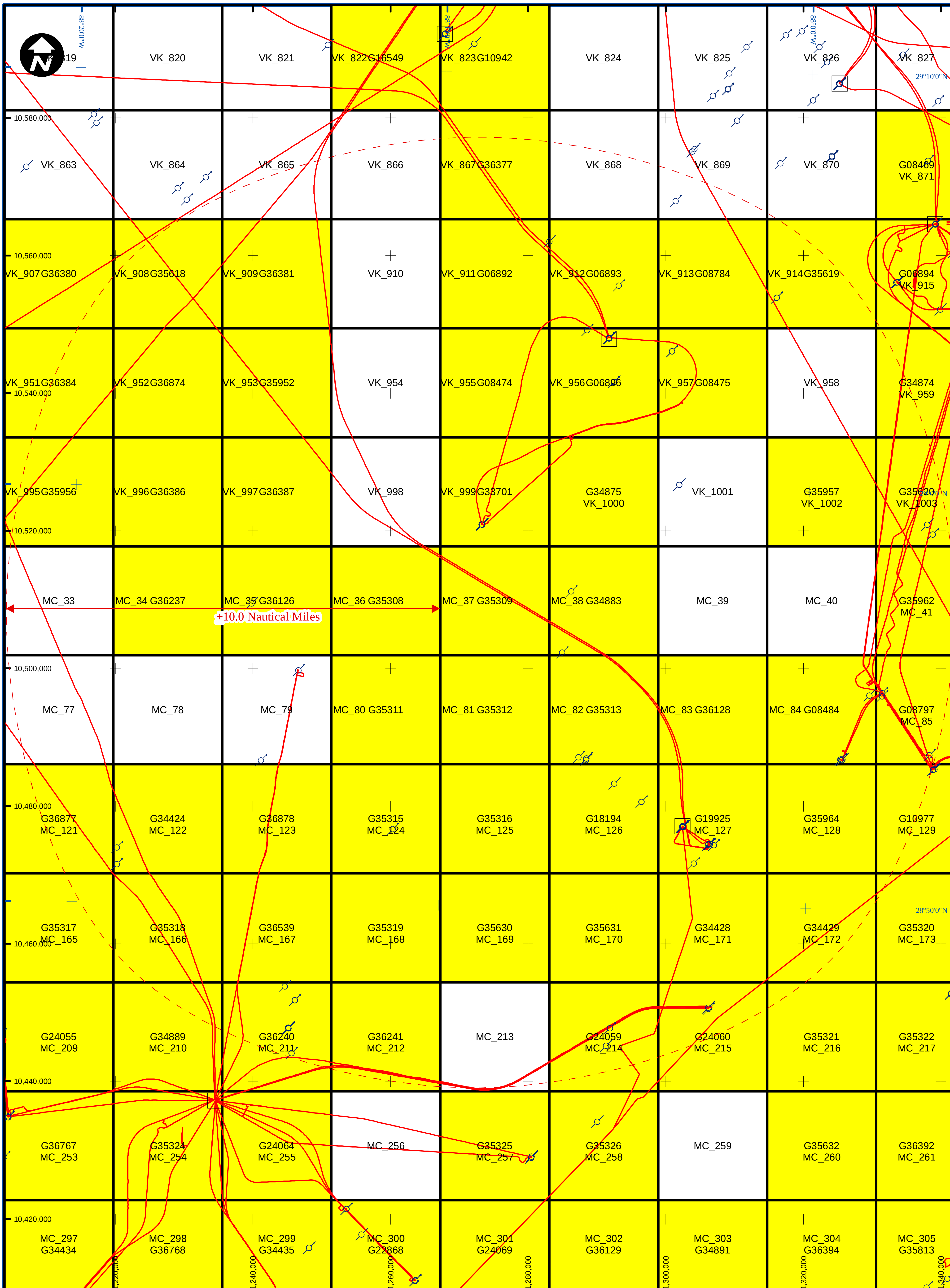
Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 37

Figure 13





Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 37

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC37_C-GG Well Location

October 02, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 37
(OCS-G OCS-G-35309)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-GG well location with surface location in Block 37, Mississippi Canyon Area (OCS-G-35309). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is the Top of Salt at 2.229 seconds two-way time (TWT), -5,788ft below sea surface (2,193ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 1.6° to the SSW The proposed location is located approximately 1,960ft to the southwest of a retrogressive cuspate, cut back slump scarp and associated debris flow to the east that occurs on the west flank of the Dorsey Canyon. Three minor seabed faults occur to the south of, but do not impact the proposed well. .

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

No existing wells or pipelines occur within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas is assigned at the proposed well or within 2,000ft of the proposed well.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, and Unit E.

The well-path will intersect a fault within Unit D and Unit E.

Proposed MC37_C-GG Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	30.768"	North	Easting	1,269,000	US ft. E
Longitude	88°	09'	41.711"	West	Northing	10,504,986	US ft. N
Latitude Decimal	28.9418801						
Longitude Decimal	-88.1615863						
FWL Mississippi Canyon 037	1,800ft			US ft.	Inline	12777	
FSL Mississippi Canyon 037	3,066ft			US ft.	Crossline	17649	
Water Depth: -3,595ft	Slope: 1.6° SSW						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon				105 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				9.2 Miles @ 27.9°		

Proposed MC37_C-G Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	30.273"	North	Easting	1,269,000	US ft. E
Longitude	88°	09'	41.705"	West	Northing	10,504,936	US ft. N
Latitude Decimal	28.9417426						
Longitude Decimal	-88.1615847						
FWL Mississippi Canyon 037	1,800ft			US ft.	Inline	12777	
FSL Mississippi Canyon 037	3,016ft			US ft.	Crossline	17645	
Water Depth: -3,596ft	Slope: 1.6° SSW						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon				105 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				9.2 Miles @ 27.9°		

Conclusions and Recommendations. No major problems are anticipated at the seabed.

No risk of gas is assigned at the proposed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, and Unit E.

The well-path will intersect two faults.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC37_C-GG Well Location

Anadarko Petroleum Corporation

October 02, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC37_C-GG Well Location (OCS-G-35309)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-GG with surface location in Block 37, Mississippi Canyon Area (OCS-G-35309). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 9,130ft to the WNW.

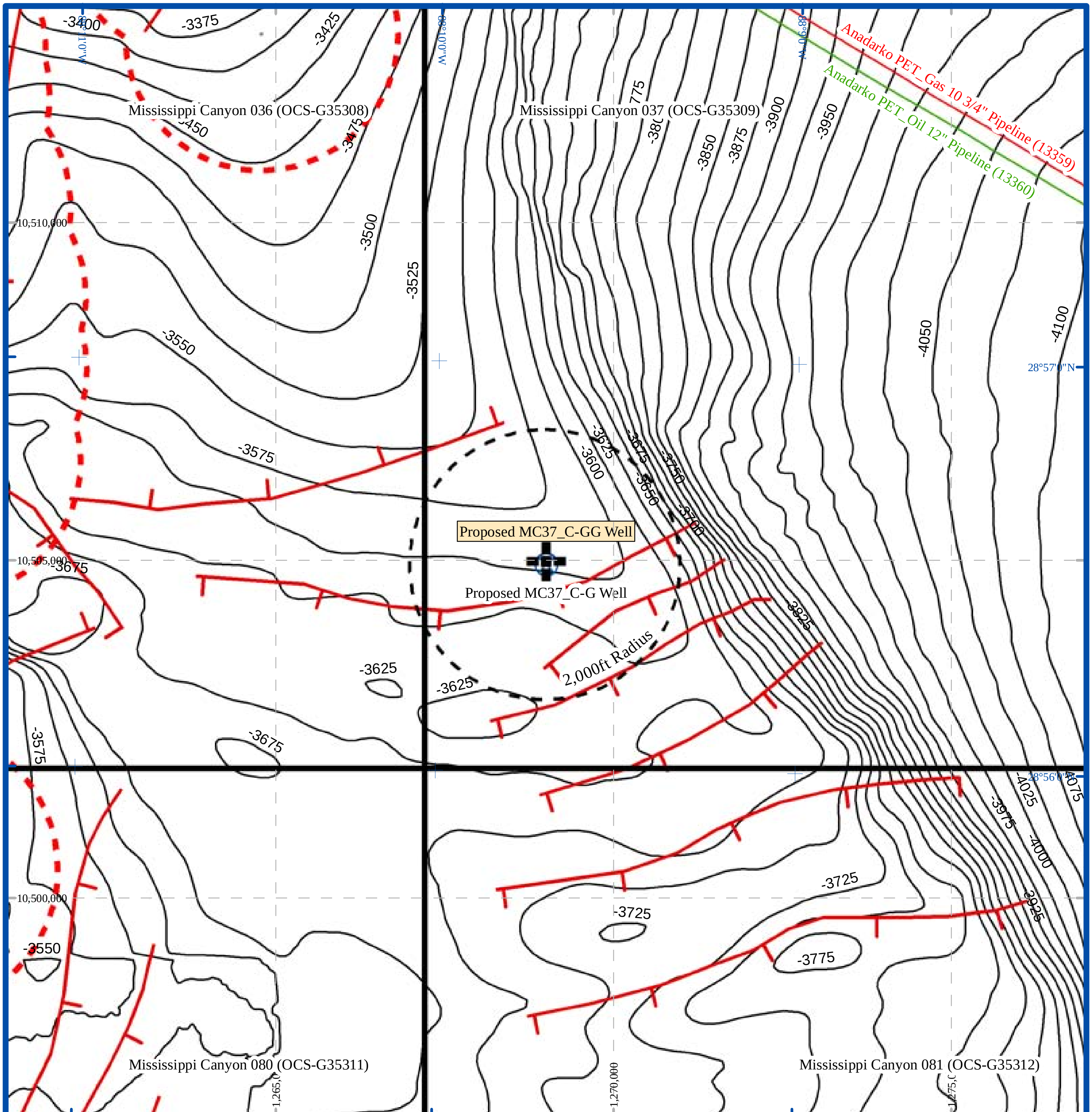
Proposed MC37_C-GG Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56’	30.768”	North	Easting	1,269,000	US ft. E
Longitude	88°	09’	41.711”	West	Northing	10,504,986	US ft. N
Latitude Decimal	28.9418801						
Longitude Decimal	-88.1615863						
FWL Mississippi Canyon 037	1,800ft			US ft.	Inline	12777	
FSL Mississippi Canyon 037	3,066ft			US ft.	Crossline	17649	
Water Depth: -3,595ft	Slope: 1.6° SSW						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon				105 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				9.2 Miles @ 27.9°		

Proposed MC37_C-G Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56’	30.273”	North	Easting	1,269,000	US ft. E
Longitude	88°	09’	41.705”	West	Northing	10,504,936	US ft. N
Latitude Decimal	28.9417426						
Longitude Decimal	-88.1615847						
FWL Mississippi Canyon 037	1,800ft			US ft.	Inline	12777	
FSL Mississippi Canyon 037	3,016ft			US ft.	Crossline	17645	
Water Depth: -3,596ft	Slope: 1.6° SSW						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon				105 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				9.2 Miles @ 27.9°		

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

Conclusions and Recommendations: The proposed MC37_C-GG and MC37_C-G well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC37_C-GG Well Location (1,269,000ft E / 10,504,986ft N)

Proposed MC37_C-G Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

-3595 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Cactus Prospect
Mississippi Canyon, Block MC37,
Offshore Gulf of Mexico

Description:
Proposed MC37_C-H Well Location

Project Number:
2020-328

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	A.H. ………………… A Haigh
	Quality Assurance	D Haigh ………………… D Haigh

Revision	**Date**	**Title**
0	September 18, 2020	Draft
1	October 02, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

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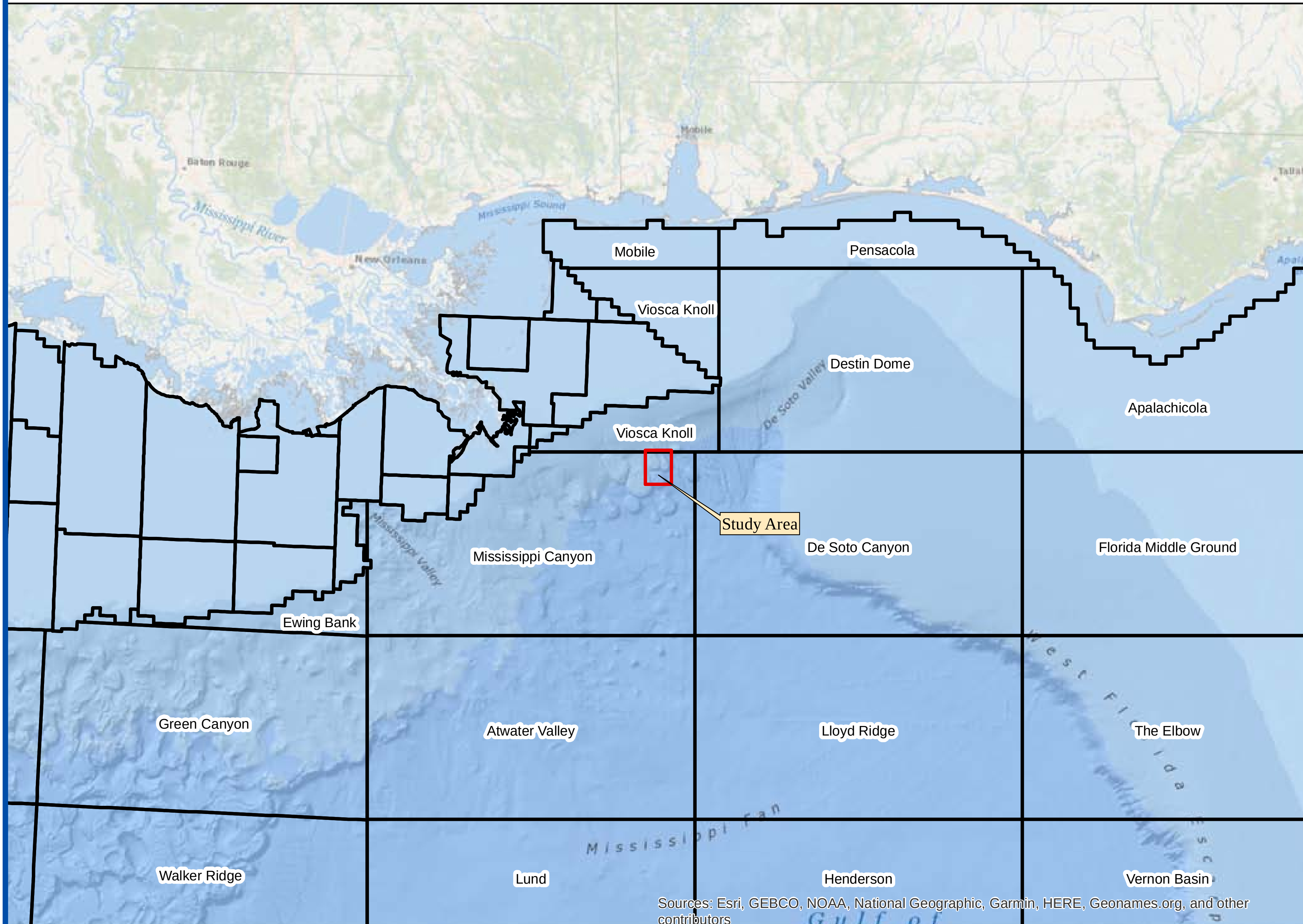
OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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LIST OF FIGURES

WELL CLEARANCE LETTER – PROPOSED MC37_C-H WELL LOCATION

October 02, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC37_C-H Well Location
Mississippi Canyon Block MC37
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC37_C-H Well Location, Mississippi Canyon Area (OCS-G-35309). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,160ft below sea surface (6,295ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC37_C-H well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC37_C-H Well Location lies in the northwest part of Block MC37 (OCS-G-35309).

Proposed MC37_C-H Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	29.298”	North	Easting	1,271,631	US ft. E
Longitude	88°	09’	13.405”	West	Northing	10,516,930	US ft. N
Latitude Decimal			28.974805				
Longitude Decimal			-88.1537235				
FWL Mississippi Canyon 037			4,431ft	US ft.	Inline	12882	
FNL Mississippi Canyon 037			830ft	US ft.	Crossline	17969	
Water Depth: -3,865ft			Slope: 5.1° NE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		6.6 Miles @ 27.7°		

Proposed MC37_C-HH Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	28.803”	North	Easting	1,271,631	US ft. E
Longitude	88°	09’	13.399”	West	Northing	10,516,880	US ft. N
Latitude Decimal			28.9746675				
Longitude Decimal			-88.153722				
FWL Mississippi Canyon 037			4,431ft	US ft.	Inline	12788	
FNL Mississippi Canyon 037			880ft	US ft.	Crossline	17733	
Water Depth: -3,861ft			Slope: 5.1° NE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		6.6 Miles @ 27.8°		

Location MC37_C-HH is 50ft from MC37_C-H on a bearing of 180°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC37_C-H well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC37_C-H well location is -3,865ft below sea surface (Figure 1). The seafloor slopes to the NE at 5.1°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC37_C-H well location is in the northwest part of block MC37. The proposed well is located in an area of relatively smooth to slightly undulated seabed located approximately 2,243ft to the east of the edge of Horn Dome.

The proposed well occurs along the edge the Dorsey Canyon. The proposed well is west of the steeper edges of the canyon, on an ancient terrace. The canyon is predominantly inactive at present. Immediately to the northwest of the proposed well location, a minor northeast / southwest trending linear seabed depression is observed, around 300ft across and around 10ft deep. The origin of this feature is unclear. The channel does not appear to be related to drainage or erosion, and perhaps is the result of the surficial diapiric uplift occurring to the west forming a minor seabed inflection point.

No seabed faults occur within 2,000ft of the proposed well.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius of the proposed well.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -4,076ft below sea surface (211ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -4,076ft below sea surface (211ft below seabed).

4.3 Unit B

Unit B from -4,076ft to -4,353ft below sea surface (211ft to 488ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The proposed location is on the updip part of these deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft.

Horizon H10 marks the base of Unit B, occurring at -4,353ft below sea surface (488ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,353ft to -5,061ft below sea surface (488ft to 1,196ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas or shallow water flwo risk is predicted within Unit C at the proposed well or within 2,000ft radius.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -5,061ft below sea surface (1,196ft below seabed).

4.5 Unit D

The upper part of Unit D from -5,061ft to -5,258ft below sea surface (1,196ft to 1,393ft below seabed) is characterized by slightly-chaotic and well-layered, low and isolated moderate-amplitude reflectors interpreted as clays, silts and occasional sands.

The lower part of Unit D from -5,258ft to -6,102ft below sea surface (1,393ft to 2,237ft below seabed) is characterized by slightly-chaotic and well-layered, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sand. This interval appears presents an acoustic character suggestive of a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can on occasions form some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~500ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -6,102ft below sea surface (2,237ft below seabed).

4.6 Unit E

Unit E from -6,102ft to -8,199ft below sea surface (2,237ft to 4,334ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~900ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit E.

Horizon H40 marks the base of Unit E at -8,199ft below sea surface (4,334ft below seabed).

4.7 Unit F

Unit F from -8,199ft to -8,851ft below sea surface (4,334ft to 4,986ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,000ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit F at the proposed well.

Horizon H50 marks the base of Unit F at -8,851t below sea surface (4,986ft below seabed).

4.8 Unit G

Unit G from -8,851ft to -10,160ft below sea surface (4,986ft to 6,295ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted with possibility of downdip connectivity to deeper parts of the mini-basin (~1,100ft). This geological setting can on occasions for some minor over-pressure. As such a **Slight Shallwo Water Flow Risk** is assigned to Unit G.

No risk of gas is predicted within Unit G at the proposed well. The nearest risk of gas occurs 1,937ft to the southwest of the proposed well.

The well-path will not traverse any faults within Unit G at the propsoed well.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,160ft below sea surface (6,295ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Throughout Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,076ft to -4,353ft below sea surface (211ft to 488ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,258ft to -6,102ft below sea surface (1,393ft to 2,237ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,102ft to -8,199ft below sea surface (2,237ft to 4,334ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -8,199ft to -8,851ft below sea surface (4,334ft to 4,986ft below seabed).

Throughout Unit G, a **Slight Shallow Water Flow Risk** is interpreted from -8,851ft to -10,160ft below sea surface (4,986ft to 6,295ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  No major hazards or problems interpreted. Seabed gradients are slightly higher at around 5.1°.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Throughout Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,076ft to -4,353ft below sea surface (211ft to 488ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  None Predicted.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,258ft to -6,102ft below sea surface (1,393ft to 2,237ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,102ft to -8,199ft below sea surface (2,237ft to 4,334ft below seabed) Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -8,199ft to -8,851ft below sea surface (4,334ft to 4,986ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit G

Throughout Unit G, a **Slight Shallow Water Flow Risk** is interpreted from -8,851ft to -10,160ft below sea surface (4,986ft to 6,295ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh
Geophysical Manager

D Haigh

Denise Haigh
Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:

Proposed MC37_C-H Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

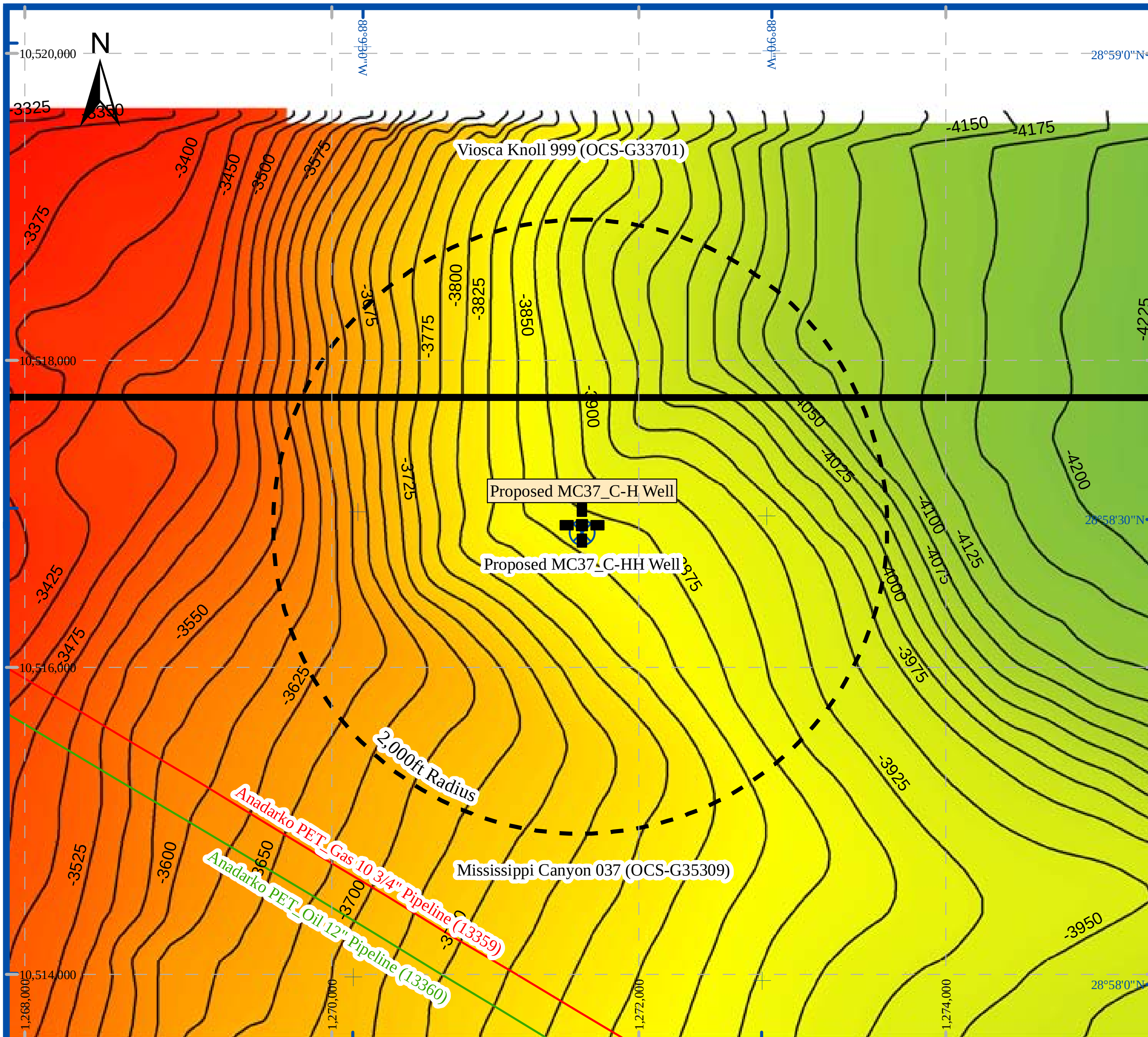
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC37_C-H Well Location (1,271,631ft E / 10,516,930ft N)

Proposed MC37_C-HH Well Location

Block boundaries

-3865 Depth in feet below sea surface to seabed, contoured at 25ft intervals

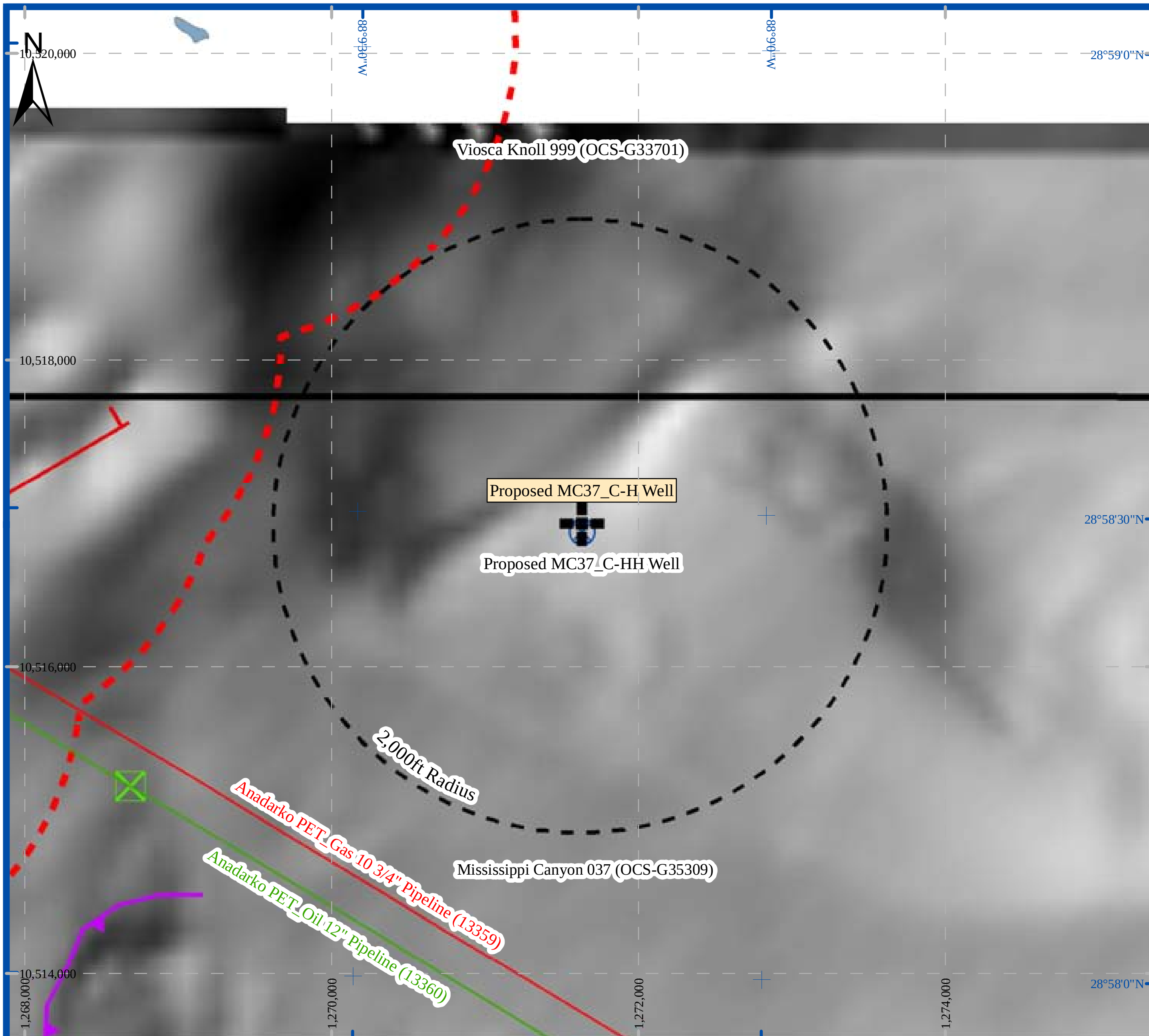
Seabed Depth (Feet)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 1 (MC37_C-H)



Seabed Morphology Extract

Proposed MC37_C-H Well Location (1,271,631ft E / 10,516,930ft N)

Proposed MC37_C-HH Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

Slump scar

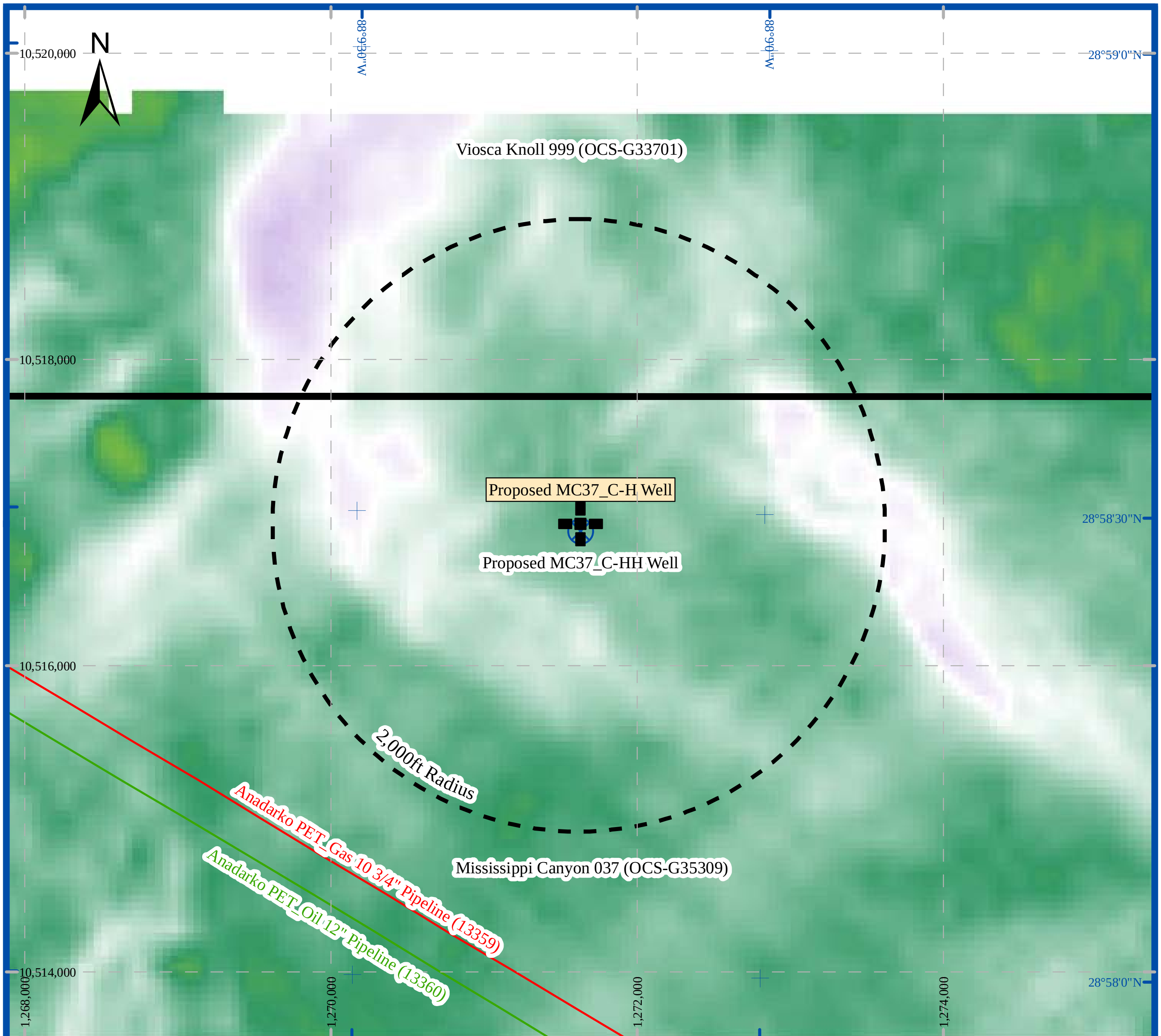
Sonar contacts, interpreted modern debris

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC37_C-H)



Seabed Amplitude Extract

Proposed MC37_C-H Well Location
(1,271,631ft E / 10,516,930ft N)

Proposed MC37_C-HH Well Location

Block boundaries

Relative Seabed Amplitude

Chart Scale 1" = 1,000'

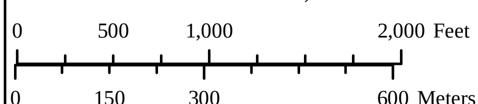
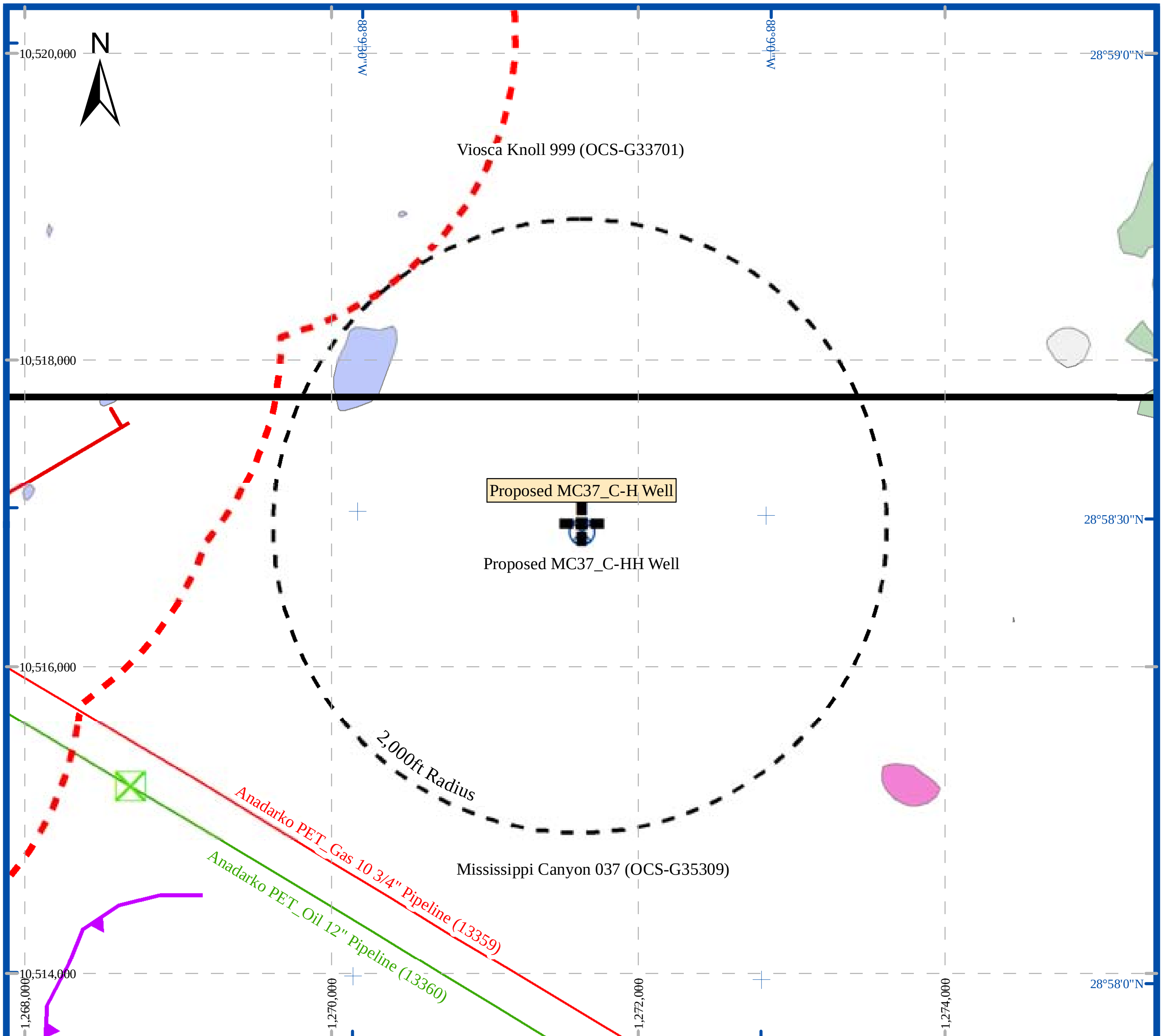


Figure 3
(MC37_C-H)



Geohazard Summary Extract

Proposed MC37_C-H Well Location (1,271,631ft E / 10,516,930ft N)

Proposed MC37_C-HH Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

Slump scar

Sonar contacts, interpreted modern debris

Slight and Moderate Riskof Gas within Unit A

Slight and Moderate Risk of Gas at Horizon H10

Slight and Moderate Risk of Gas within Unit E

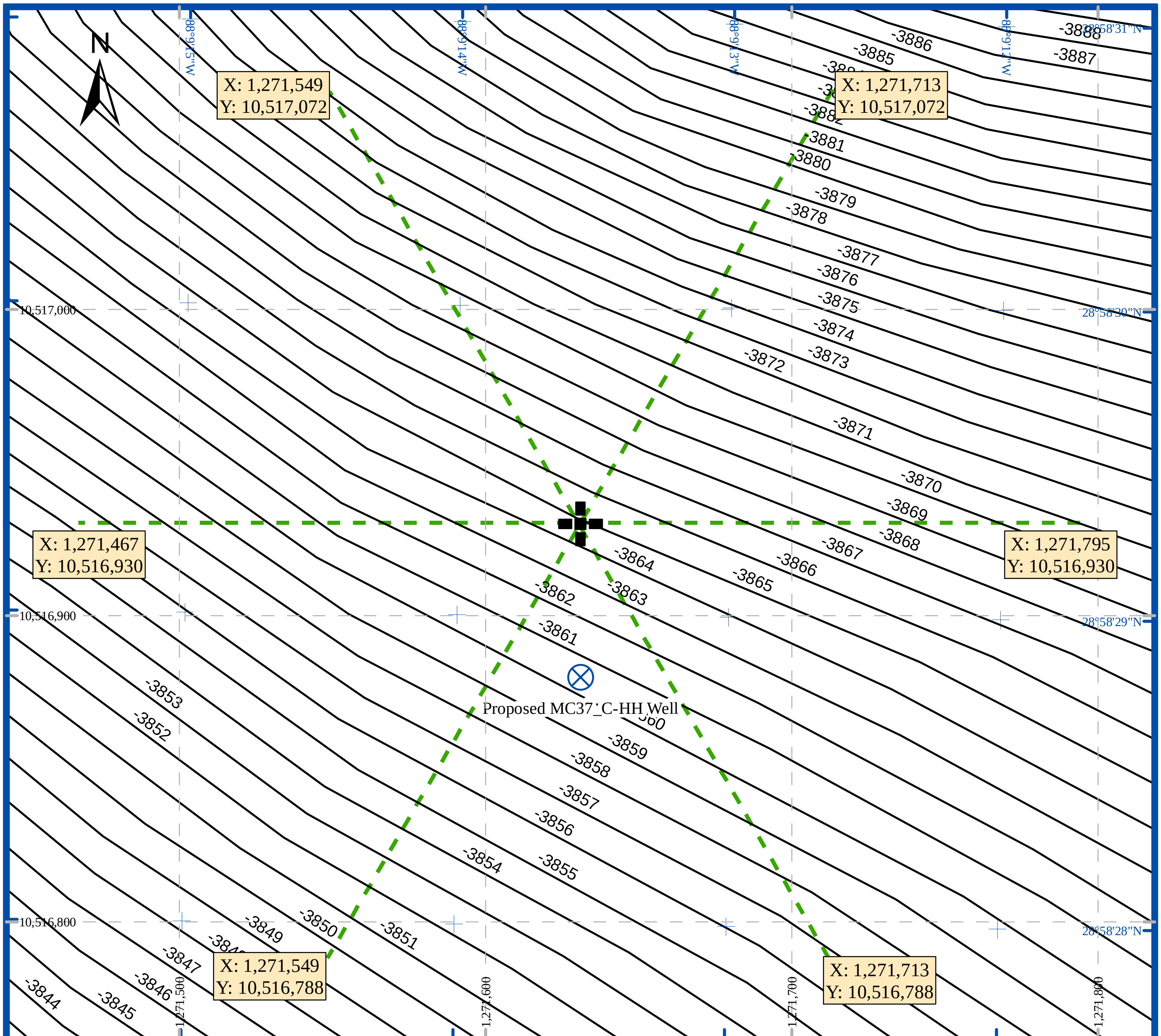
Slight and Moderate Risk of Gas within Unit G

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC37_C-H)



ROV Plat (MC37_C-H)

Proposed MC37_C-H Well Location
(1,271,631ft E / 10,516,930ft N)

Proposed MC37_C-HH Well Location

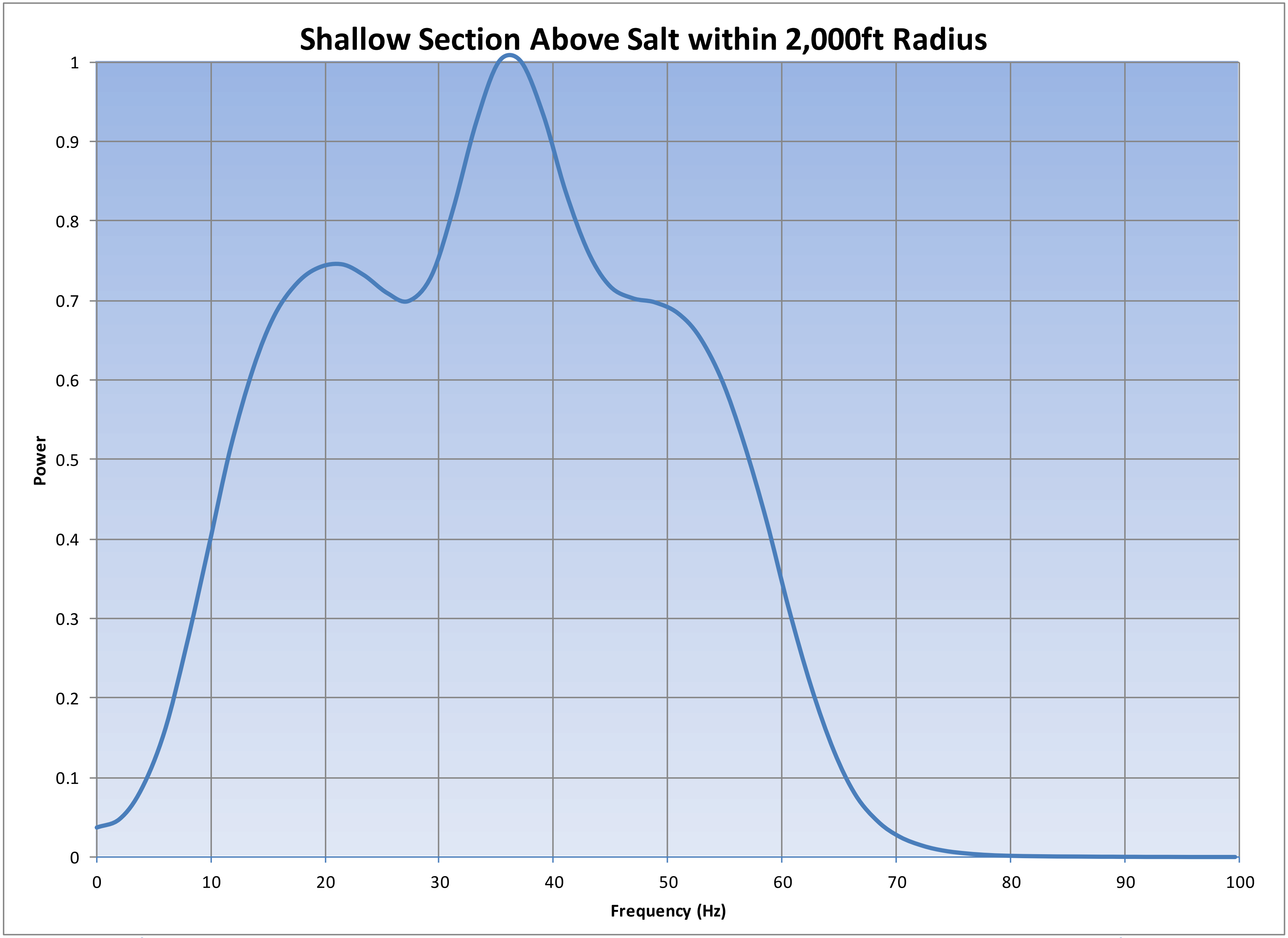
-3865 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC37_C-H)



MC37_C-H	Power Spectrum	Figure 10

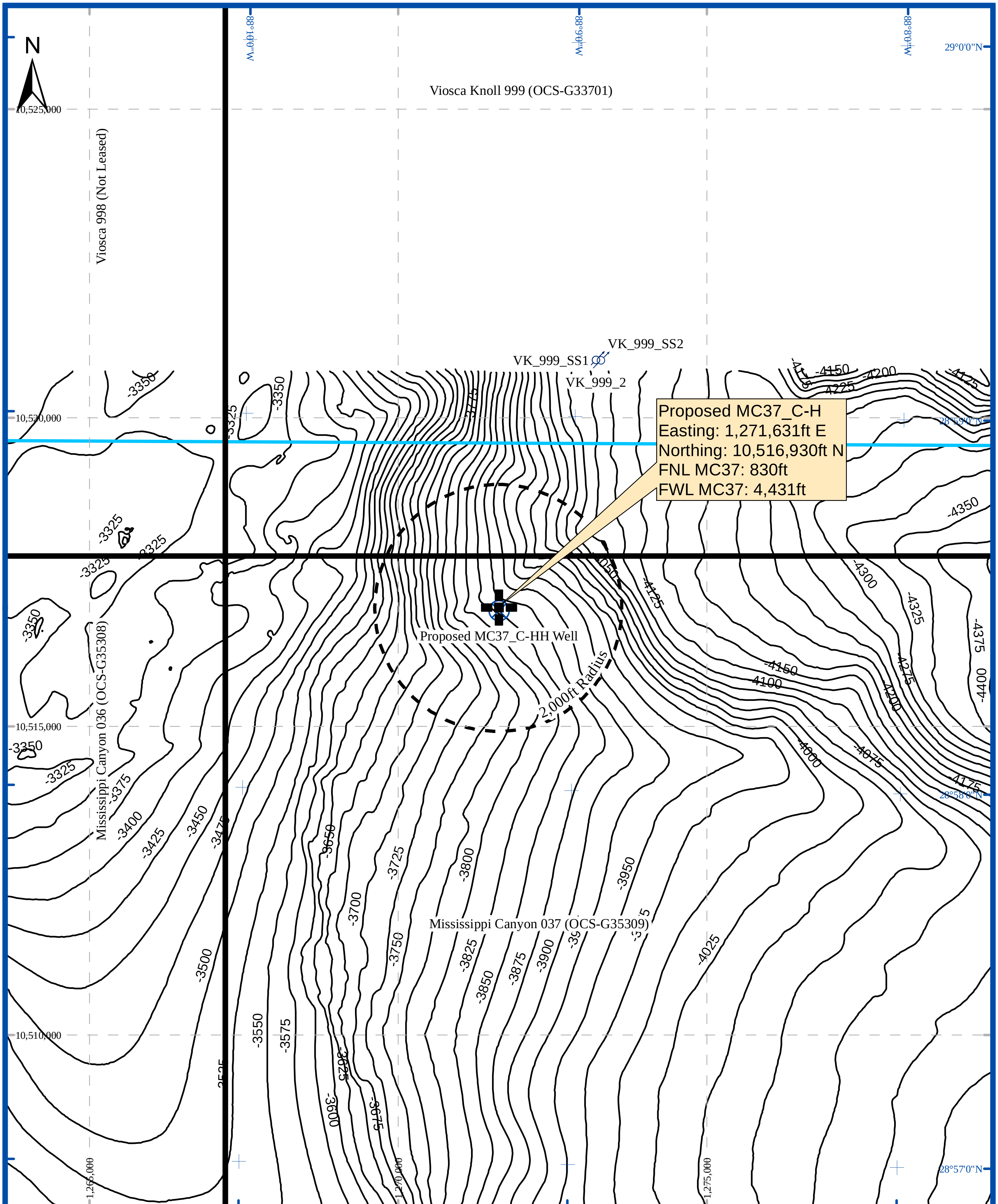


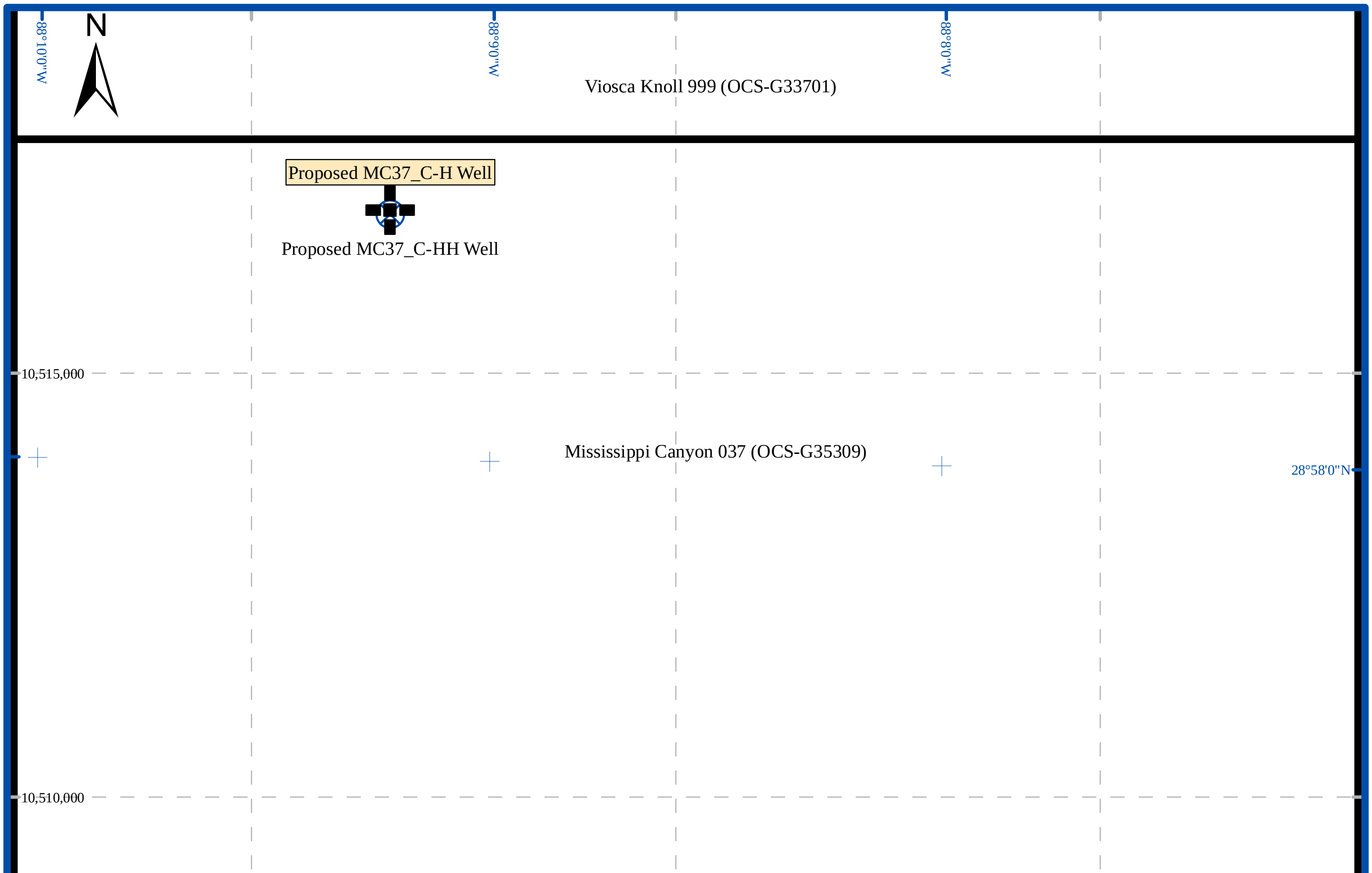
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC37_C-H							
Location	**Call N/S**	**Call E/W**	**X Coordinate**	**Y Coordinate**	**Latitude**	**Longitude**	**WD**
MC37_C-H SL	830ft FNL	4,431ft FWL	1,271,631ft E	10,516,930ft N	28° 58' 29.30"N	88° 09' 13.40"W	-3,865ft

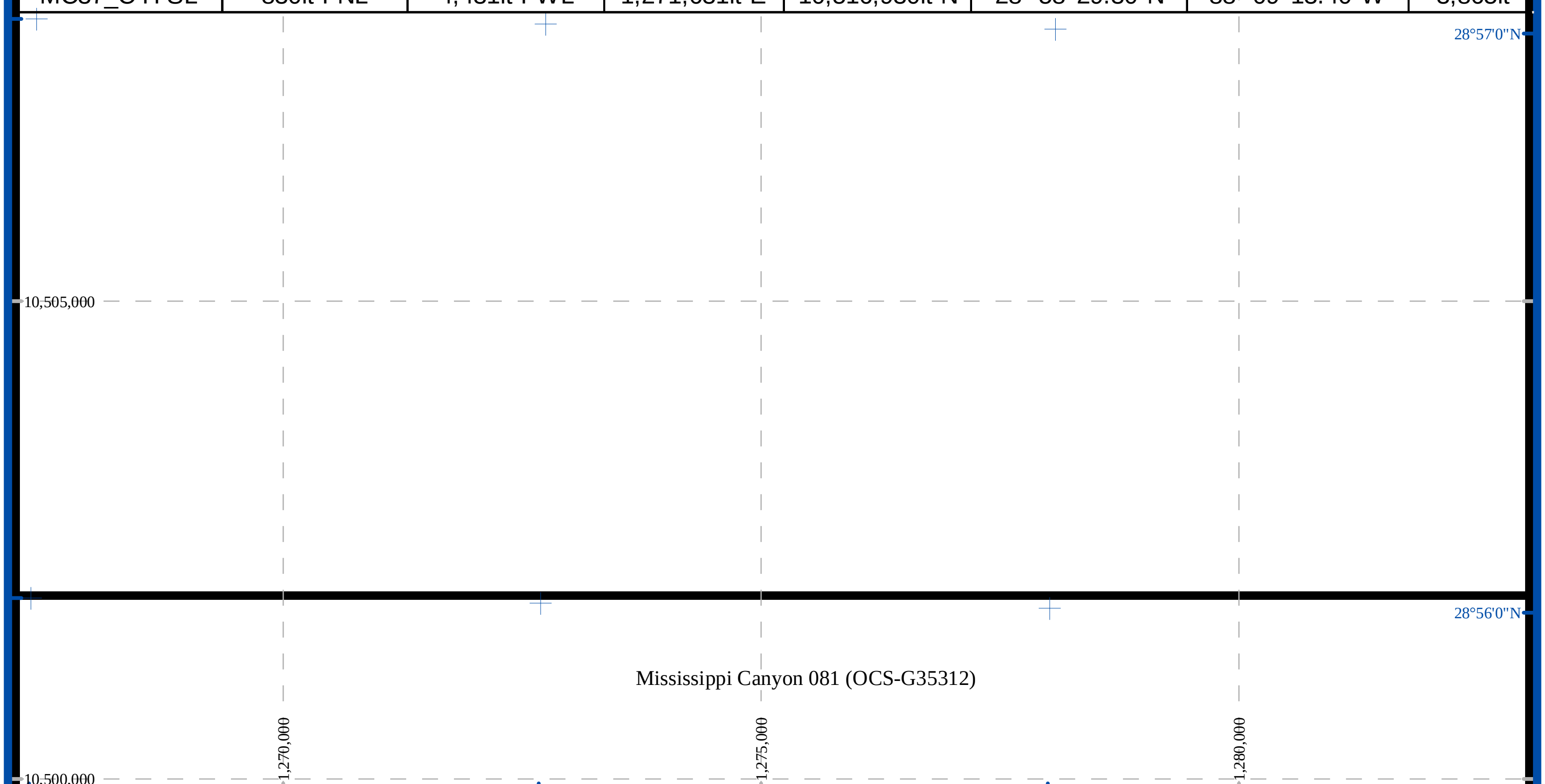


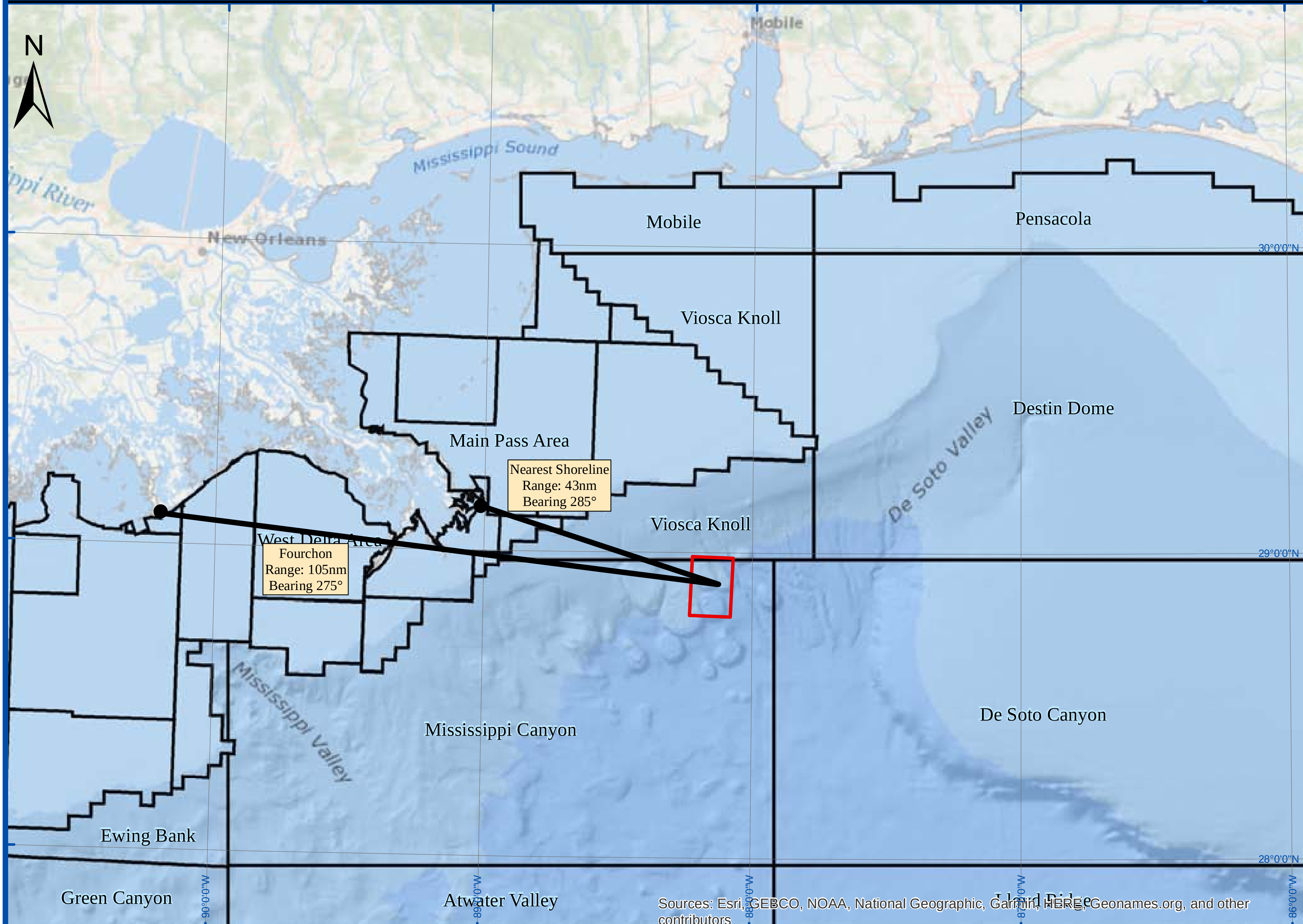
Chart scale 1" = 2,000'
0 500 1,000 2,000 Feet
0 150 300 600 Meters

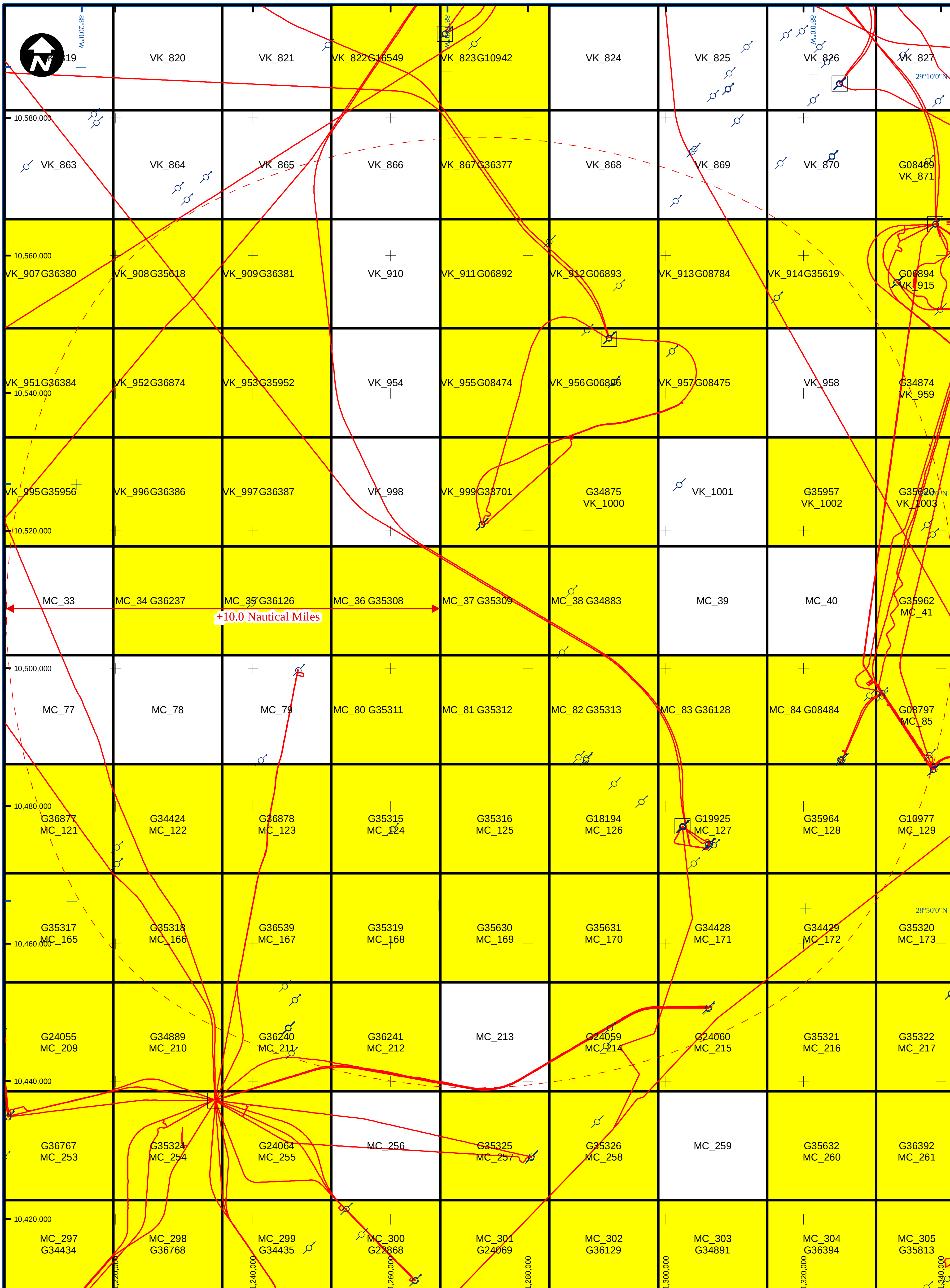
Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 37

Figure 13





Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 37

0 5 10 Miles

1 inch = 2.5 miles

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC37_C-H Well Location

October 02, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 37
(OCS-G OCS-G-35309)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-H well location with surface location in Block 37, Mississippi Canyon Area (OCS-G-35309). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,160ft below sea surface (6,295ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 5.1° to the ENE The proposed well is located in an area of relatively smooth to slightly undulated seabed located approximately 2,243ft to the east of the edge of Horn Dome.

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

No existing wells or pipelines occur within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas is assigned at the proposed well or within 2,000ft of the proposed well.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals throughout Unit B, within Unit D, and throughout Unit E, Unit F, and Unit G.

The well-path will not intersect any faults at the proposed well.

Proposed MC37_C-H Location (Surface)								
Location Coordinates								
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West			
Latitude	28°	58’	29.298”	North	Easting	1,271,631	US ft. E	
Longitude	88°	09’	13.405”	West	Northing	10,516,930	US ft. N	
Latitude Decimal			28.974805					
Longitude Decimal			-88.1537235					
FWL Mississippi Canyon 037			4,431ft	US ft.	Inline	12882		
FNL Mississippi Canyon 037			830ft	US ft.	Crossline	17969		
Water Depth: -3,865ft			Slope: 5.1° NE					
Nearest Shoreline			43 Nautical Miles @ 285°					
Port of Operation			Fourchon		105 Nautical Miles @ 275°			
Nearest Manned Platform			A Ram-Powell in VK956		6.6 Miles @ 27.7°			

Proposed MC37_C-HH Location (Surface)								
Location Coordinates								
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West			
Latitude	28°	58’	28.803”	North	Easting	1,271,631	US ft. E	
Longitude	88°	09’	13.399”	West	Northing	10,516,880	US ft. N	
Latitude Decimal			28.9746675					
Longitude Decimal			-88.153722					
FWL Mississippi Canyon 037			4,431ft	US ft.	Inline	12788		
FNL Mississippi Canyon 037			880ft	US ft.	Crossline	17733		
Water Depth: -3,861ft			Slope: 5.1° NE					
Nearest Shoreline			43 Nautical Miles @ 285°					
Port of Operation			Fourchon		105 Nautical Miles @ 275°			
Nearest Manned Platform			A Ram-Powell in VK956		6.6 Miles @ 27.8°			

Conclusions and Recommendations. No major problems are anticipated at the seabed.

No risk of gas is assigned at the proposed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, Unit E, Unit F, and Unit G.

The well-path will not intersect any faults.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC37_C-H Well Location

Anadarko Petroleum Corporation

October 02, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC37_C-H Well Location (OCS-G-35309)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-H with surface location in Block 37, Mississippi Canyon Area (OCS-G-35309). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 3,934ft to the northwest.

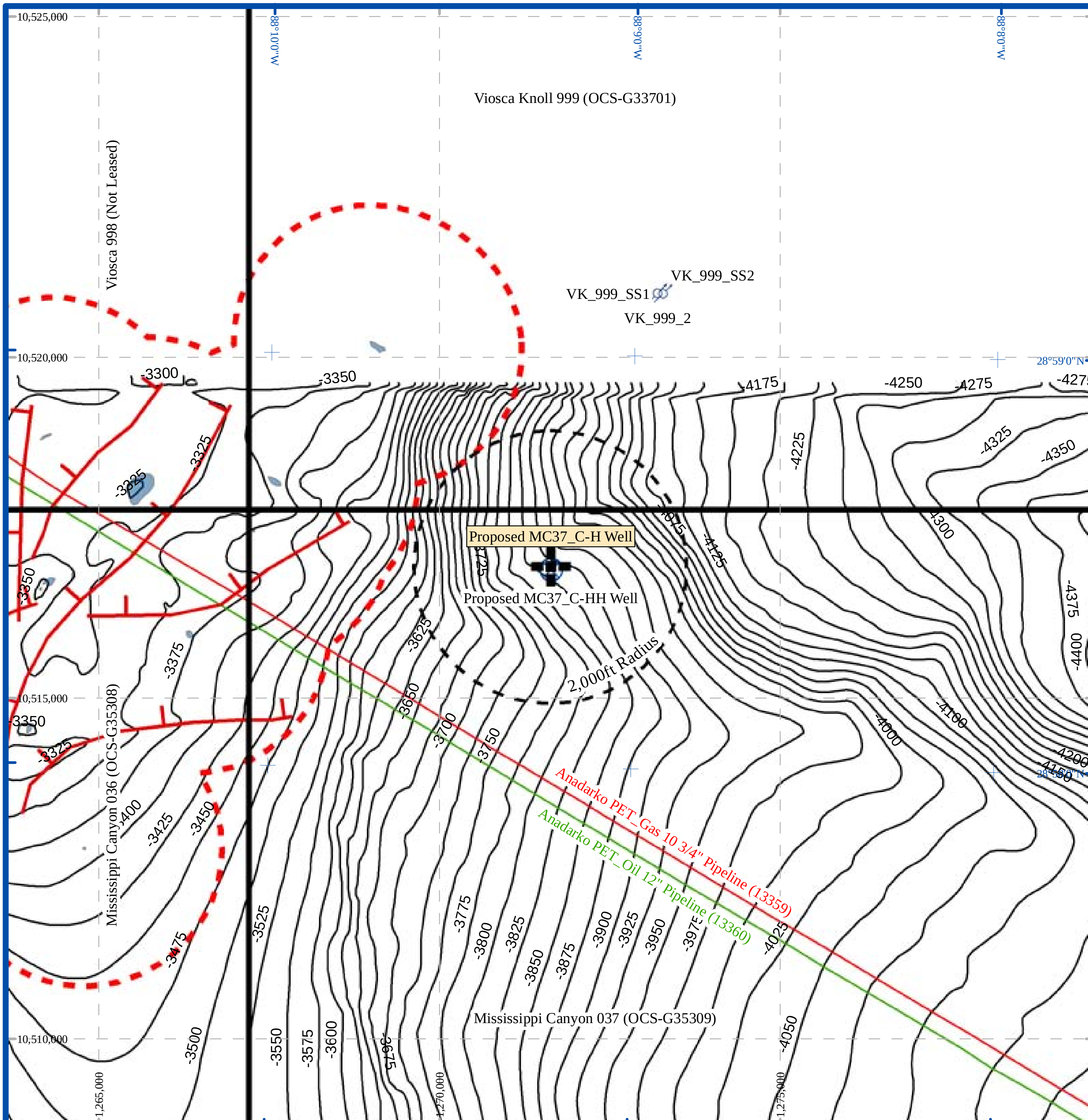
Proposed MC37_C-H Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	29.298"	North	Easting	1,271,631	US ft. E
Longitude	88°	09'	13.405"	West	Northing	10,516,930	US ft. N
Latitude Decimal			28.974805				
Longitude Decimal			-88.1537235				
FWL Mississippi Canyon 037			4,431ft	US ft.	Inline	12882	
FNL Mississippi Canyon 037			830ft	US ft.	Crossline	17969	
Water Depth: -3,865ft			Slope: 5.1° NE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		6.6 Miles @ 27.7°		

Proposed MC37_C-HH Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	28.803"	North	Easting	1,271,631	US ft. E
Longitude	88°	09'	13.399"	West	Northing	10,516,880	US ft. N
Latitude Decimal			28.9746675				
Longitude Decimal			-88.153722				
FWL Mississippi Canyon 037			4,431ft	US ft.	Inline	12788	
FNL Mississippi Canyon 037			880ft	US ft.	Crossline	17733	
Water Depth: -3,861ft			Slope: 5.1° NE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		6.6 Miles @ 27.8°		

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

Conclusions and Recommendations: The proposed MC37_C-HH and MC37_C-H well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC37_C-H Well Location (1,271,631ft E / 10,516,930ft N)

Proposed MC37_C-HH Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

-3865 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Cactus Prospect
Mississippi Canyon, Block MC37,
Offshore Gulf of Mexico

Description:
Proposed MC37_C-I Well Location

Project Number:
2020-329

Report Status:
Final

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REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	A.R.K. ………………… A Haigh
	Quality Assurance	D Haigh ………………… D Haigh

Revision	**Date**	**Title**
0	September 22, 2020	Draft
1	October 02, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

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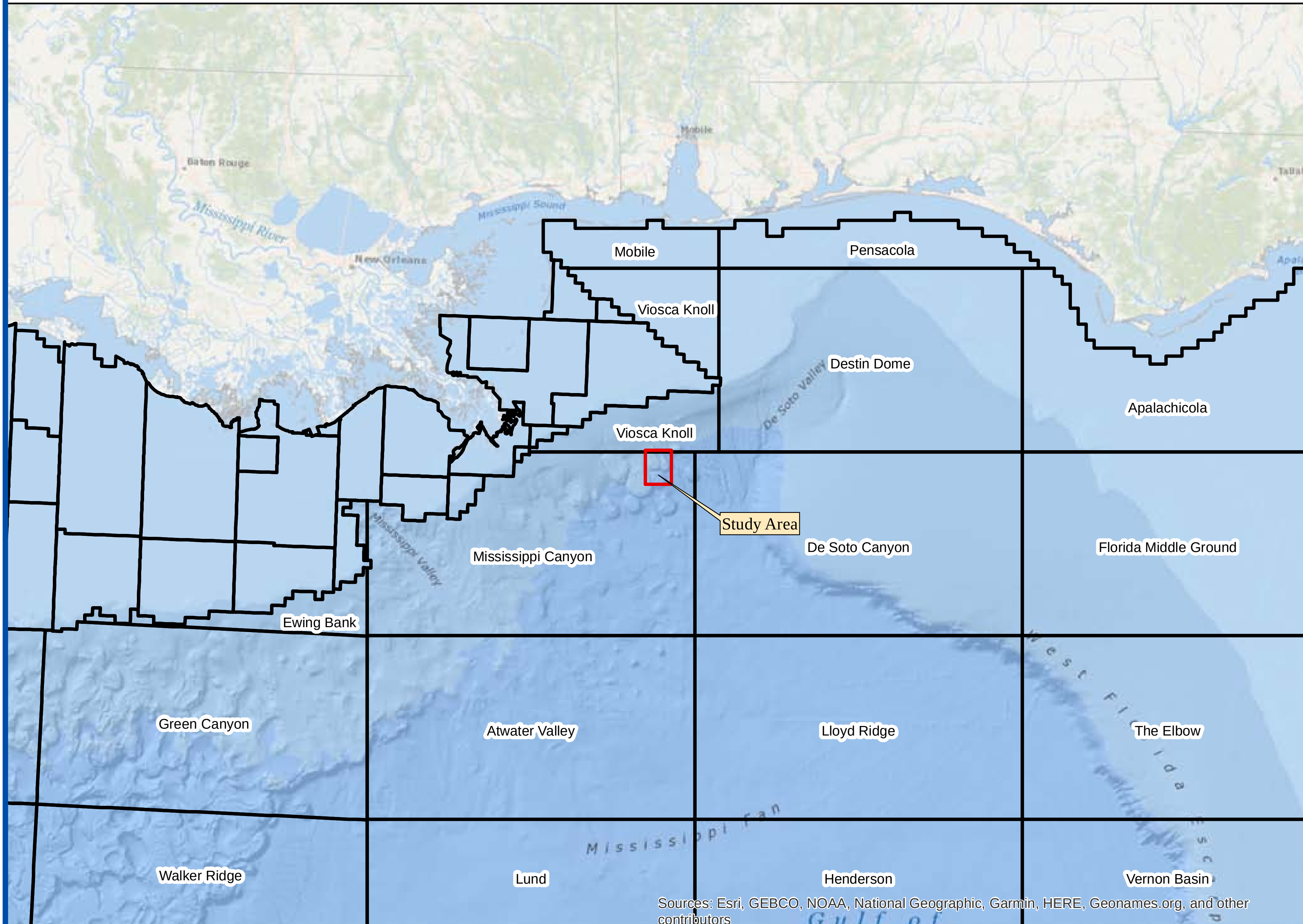
Location Map



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WELL CLEARANCE LETTER – PROPOSED MC37_C-I WELL LOCATION

October 02, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC37_C-I Well Location
Mississippi Canyon Block MC37
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC37_C-I Well Location, Mississippi Canyon Area (OCS-G-35309). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,129ft below sea surface (6,216ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC37_C-I well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC37_C-I Well Location lies in the northwest part of Block MC37 (OCS-G-35309).

Proposed MC37_C-I Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	15.405"	North	Easting	1,273,234	US ft. E
Longitude	88°	08'	55.198"	West	Northing	10,515,511	US ft. N
Latitude Decimal			28.9709458				
Longitude Decimal			-88.148666				
FWL Mississippi Canyon 037			6,034ft		US ft.	Inline	12884
FNL Mississippi Canyon 037			2,249ft		US ft.	Crossline	17865
Water Depth: -3,913ft			Slope: 5.4° NE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon			105 Nautical Miles @ 275°	
Nearest Manned Platform			A Ram-Powell in VK956			7.1 Miles @ 29.7°	

Proposed MC37_C-II Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	14.910"	North	Easting	1,273,234	US ft. E
Longitude	88°	08'	55.192"	West	Northing	10,515,461	US ft. N
Latitude Decimal			28.9708083				
Longitude Decimal			-88.1486645				
FWL Mississippi Canyon 037			6,034ft		US ft.	Inline	12883
FNL Mississippi Canyon 037			2,299ft		US ft.	Crossline	17865
Water Depth: -3,904ft			Slope: 5.4° NE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon			105 Nautical Miles @ 275°	
Nearest Manned Platform			A Ram-Powell in VK956			7.1 Miles @ 29.7°	

Location MC37_C-II is 50ft from MC37_C-I on a bearing of 180°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC37_C-I well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC37_C-I well location is -3,913ft below sea surface (Figure 1). The seafloor slopes to the NE at 5.4°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC37_C-I well location is in the northwest part of block MC37. The proposed well is located in an area of relatively smooth to slightly undulated seabed located approximately 4,065ft to the east of the edge of Horn Dome.

The proposed well occurs on the upper western flank of the Dorsey Canyon around 900ft southwest of a relatively well defined scarp related to past slope failure.. The Dorsey Canyon is described to be mostly inactive, with only possible seasonal or storm-related current activity. For a short term exploration well is is considered unlikely that any further soil instability would occur.

No seabed faults occur within 2,000ft of the proposed well.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius of the proposed well.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -4,139ft below sea surface (226ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -4,139ft below sea surface (226ft below seabed).

4.3 Unit B

Unit B from -4,139ft to -4,478ft below sea surface (226ft to 565ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The proposed location is on the updip part of these deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit B from -4,478ft to -4,598ft below sea surface (565ft to 685ft below seabed) is characterized by low amplitude reflectors interpreted as clays, silts and occasional sands.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft.

Horizon H10 marks the base of Unit B, occurring at -4,598ft below sea surface (685ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

The upper part of Unit C from -4,598ft to -4,752ft below sea surface (685ft to 839ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

The lower part of Unit C from -4,752ft below sea surface (839ft below seabed) to -5,449ft below sea surface (1,536ft below seabed) is interpreted to consist of well-layered and slightly-chaotic, low and occasional moderate-amplitude reflctors interpreted as clays, silts and several sands. Minor wellbore stability and drilling fluid circulation problmes may occur within this sandier interval.

No risk of gas or shallow water flwo risk is predicted within Unit C at the proposed well or within 2,000ft radius.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -5,449ft below sea surface (1,536ft below seabed).

4.5 Unit D

The upper part of Unit D from -5,449ft to -5,657ft below sea surface (1,536ft to 1,744ft below seabed) is characterized by slightly-chaotic and well-layered, low and isolated moderate-amplitude reflectors interpreted as clays, silts and occasional sands.

The lower part of Unit D from -5,657ft to -6,548ft below sea surface (1,744ft to 2,635ft below seabed) is characterized by slightly-chaotic and well-layered, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sand. This interval appears presents an acoustic character suggestive of a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can on occasions form some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~300ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -6,548ft below sea surface (2,635ft below seabed).

4.6 Unit E

The upper part of Unit E from -6,548ft to -7,650ft below sea surface (2,635ft to 3,737ft below seabed) is interpreted to consist of well-layered, low and occasional moderate-amplitude reflctors with clays, silts, and several sands. Minor wellbore stability and drilling fluid circulation problmes may occur within this upper interval.

A better defined interpreted <30ft thick sand interbed occurs at -6,671ft below sea surface (2,758ft below seabed). This interbed is connected downdip into the minibasin around 400ft and is interpreted as a **Slight Shallow Water Flow Risk**.

Unit E from -7,650ft to -8,703ft below sea surface (3,737ft to 4,790ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~400ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit E.

Horizon H40 marks the base of Unit E at -8,703ft below sea surface (4,790ft below seabed).

4.7 Unit F

Unit F from -8,703ft to -9,550ft below sea surface (4,790ft to 5,637ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~500ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit F at the proposed well.

Horizon H50 marks the base of Unit F at -9,550ft below sea surface (5,637ft below seabed).

4.8 Unit G

Unit G from -9,550ft to -10,129ft below sea surface (5,637ft to 6,216ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted with possibility of downdip connectivity to deeper parts of the mini-basin (~500ft). This geological setting can on occasions for some minor over-pressure. As such a **Slight Shallwo Water Flow Risk** is assigned to Unit G.

No risk of gas is predicted within Unit G at the proposed well. The nearest risk of gas occurs 410ft to the southeast of the proposed well with no indication of direct connectivity.

The well-path will not traverse any faults within Unit G at the propsoed well.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,129ft below sea surface (6,216ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,139ft to -4,478ft below sea surface (226ft to 565ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,657ft to -6,548ft below sea surface (1,744ft to 2,635ft below seabed).

Within Unit E an interpreted <30ft thick sand interbed at -6,671ft below sea surface (2,758ft below seabed) is interpreted as a **Slight Shallow Water Flow Risk**.

Withint Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -7,650ft to -8,703ft below sea surface (3,737ft to 4,790ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -8,703ft to -9,550ft below sea surface (4,790ft to 5,637ft below seabed).

Throughout Unit G, a **Slight Shallow Water Flow Risk** is interpreted from -9,550ft to -10,129ft below sea surface (5,637ft to 6,216ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  No major hazards or problems interpreted. Seabed gradients are slightly higher.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,139ft to -4,478ft below sea surface (226ft to 565ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  Minor wellbore stability and drilling fluid circulation problems may occur frim -4,752ft to -5,449ft below sea surface (839ft to 1,536ft below seabed).

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,657ft to -6,548ft below sea surface (1,744ft to 2,635ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Within Unit E an interpreted <30ft thick sand interbed at -6,671ft below sea surface (2,758ft below seabed) is interpreted as a **Slight Shallow Water Flow Risk**.

  Within Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -8,703ft to -9,550ft below sea surface (4,790ft to 5,637ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  Minor wellbore stability and drilling fluid circulation problems may occur frim -6,548ft to -7,650ft below sea surface (2,635ft to 3,737ft below seabed).

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -8,703ft to -9,550ft below sea surface (4,790ft to 5,637ft below seabed). Appropriate drilling methodology is

recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit G

Throughout Unit G, a **Slight Shallow Water Flow Risk** is interpreted from -9,550ft to -10,129ft below sea surface (5,637ft to 6,216ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:

Proposed MC37_C-I Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

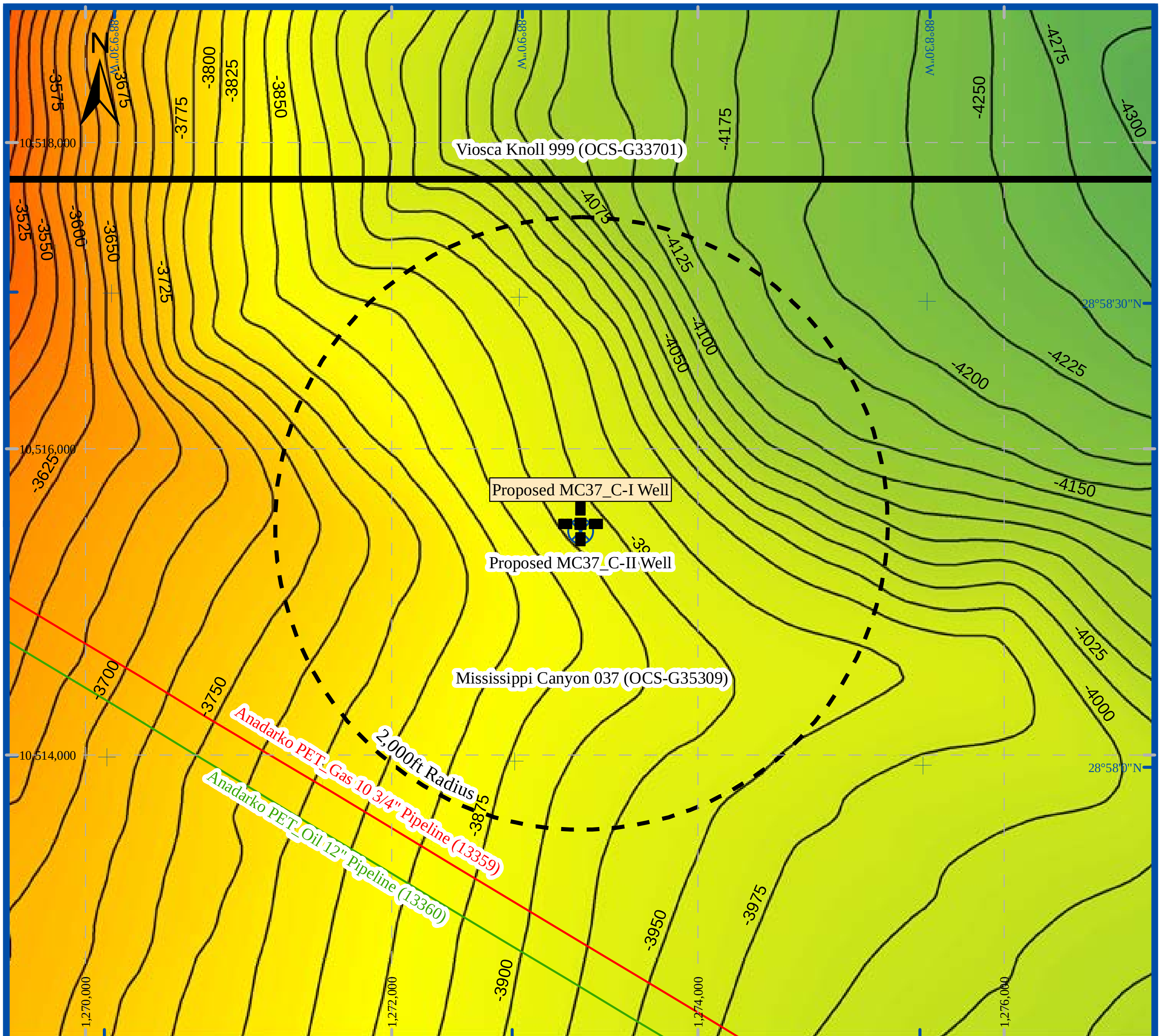
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC37_C-I Well Location (1,273,234ft E / 10,515,511ft N)

Proposed MC37_C-II Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

-3913 Depth in feet below sea surface to seabed, contoured at 25ft intervals

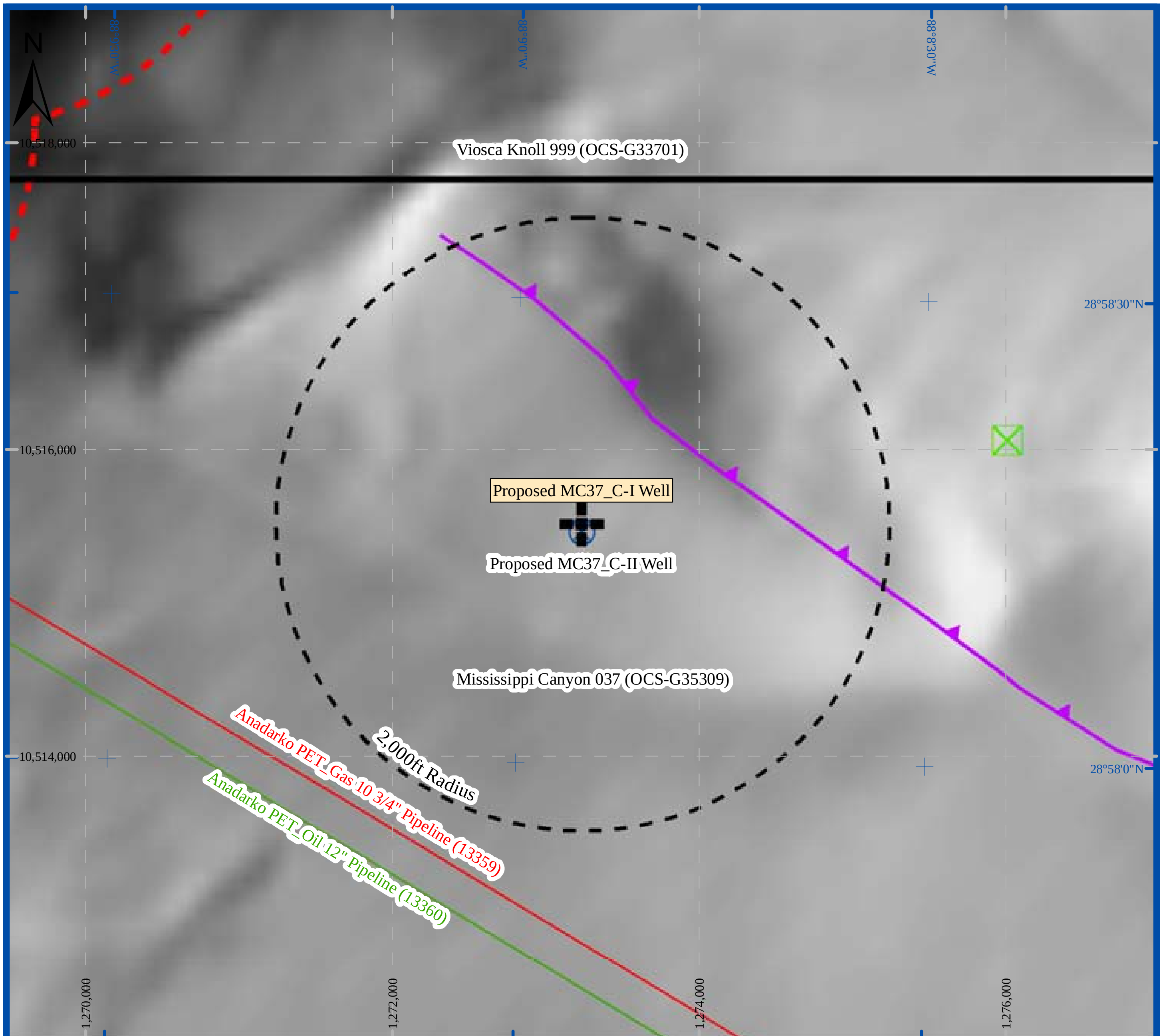
Seabed Depth (Feet)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 1 (MC37_C-I)



Seabed Morphology Extract

Proposed MC37_C-I Well Location (1,273,234ft E / 10,515,511ft N)

Proposed MC37_C-II Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Sonar contacts, interpreted modern debris

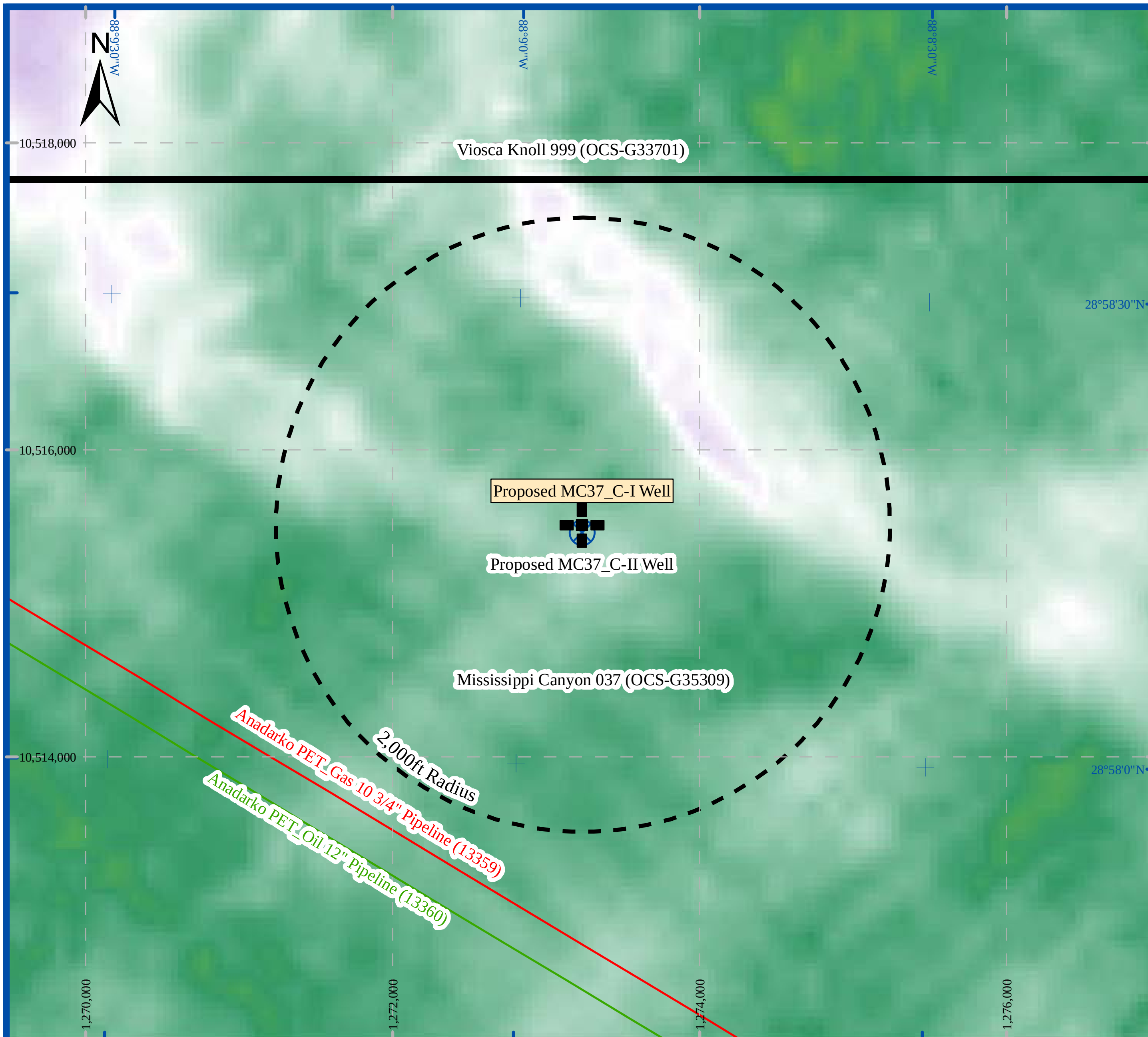
Slump scarp

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC37_C-I)



Seabed Amplitude Extract

Proposed MC37_C-I Well Location (1,273,234ft E / 10,515,511ft N)

Proposed MC37_C-II Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32

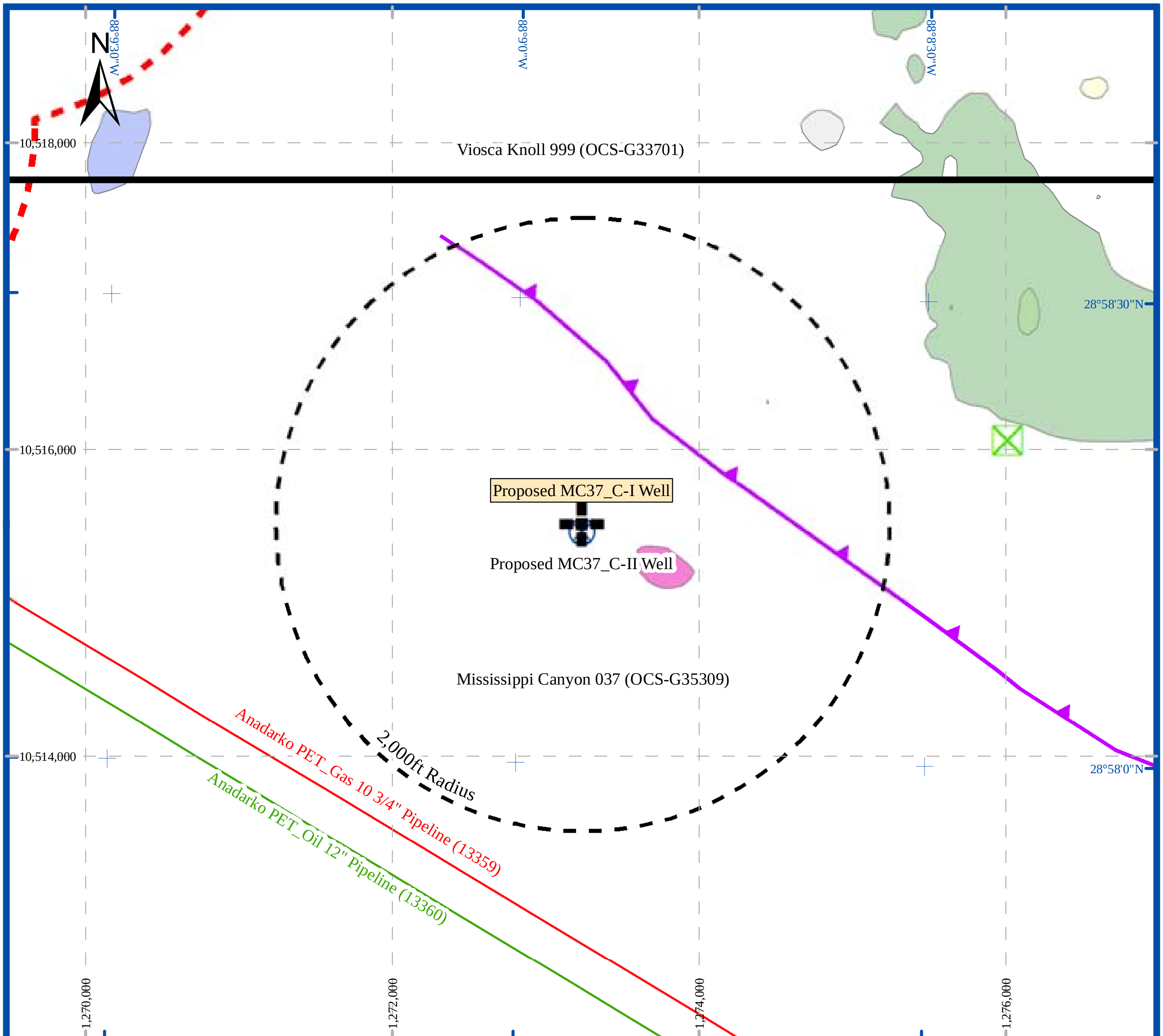
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC37_C-I)



Geohazard Summary Extract

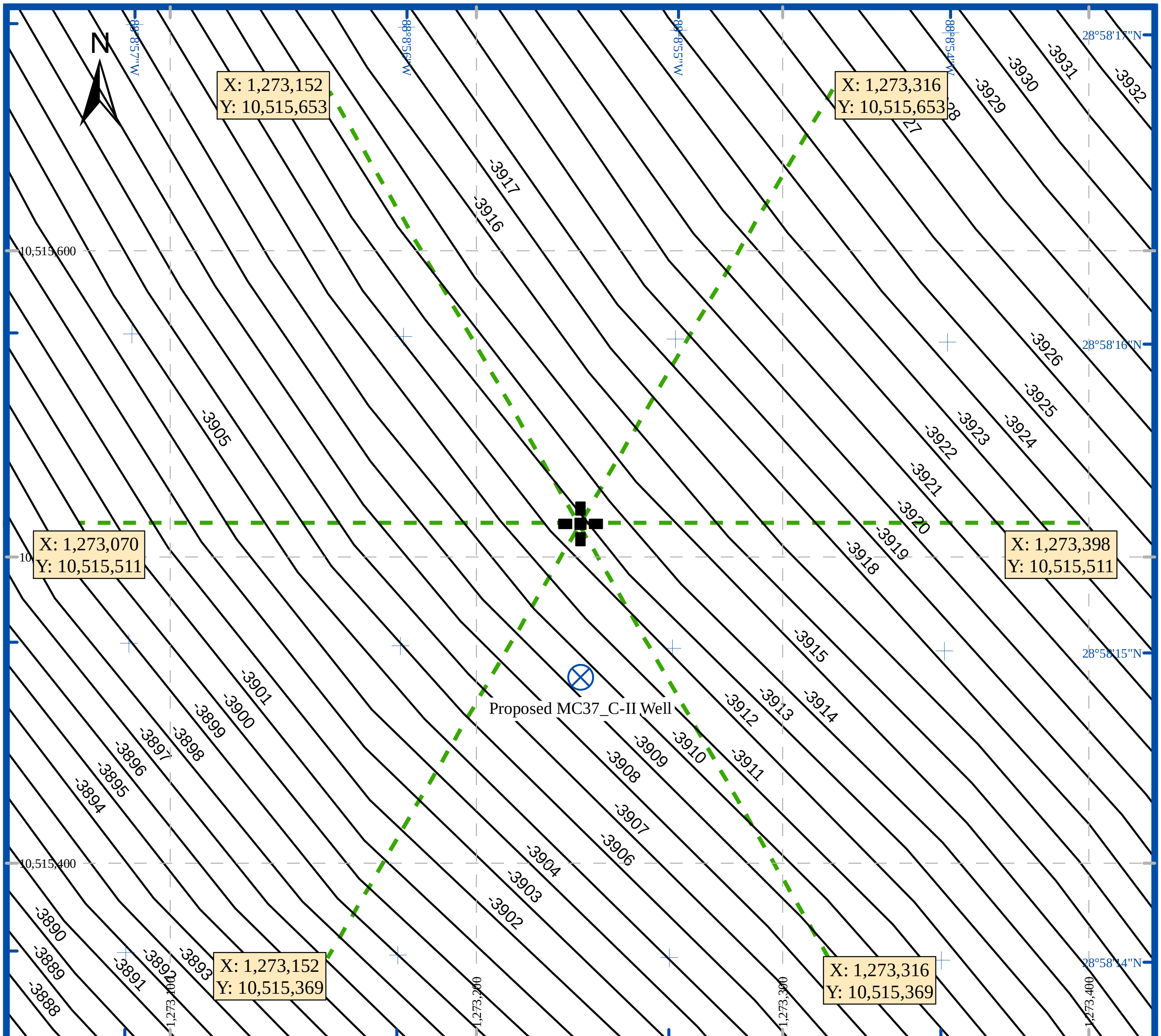
- Proposed MC37_C-I Well Location (1,273,234ft E / 10,515,511ft N)
- Proposed MC37_C-II Well Location
- Oil Pipeline
- Gas Pipeline
- Block boundaries
- 2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar
- Sonar contacts, interpreted modern debris
- Slump scarp
- Slight and Moderate Riskof Gas within Unit A
- Slight and Moderate Risk of Gas at Horizon H10
- Slight, Moderate, and High Risk of Gas within Unit D
- Slight and Moderate Risk of Gas within Unit E
- Slight and Moderate Risk of Gas within Unit G

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC37_C-I)



ROV Plat (MC37_C-I)

Proposed MC37_C-I Well Location (1,273,234ft E / 10,515,511ft N)

Proposed MC37_C-II Well Location

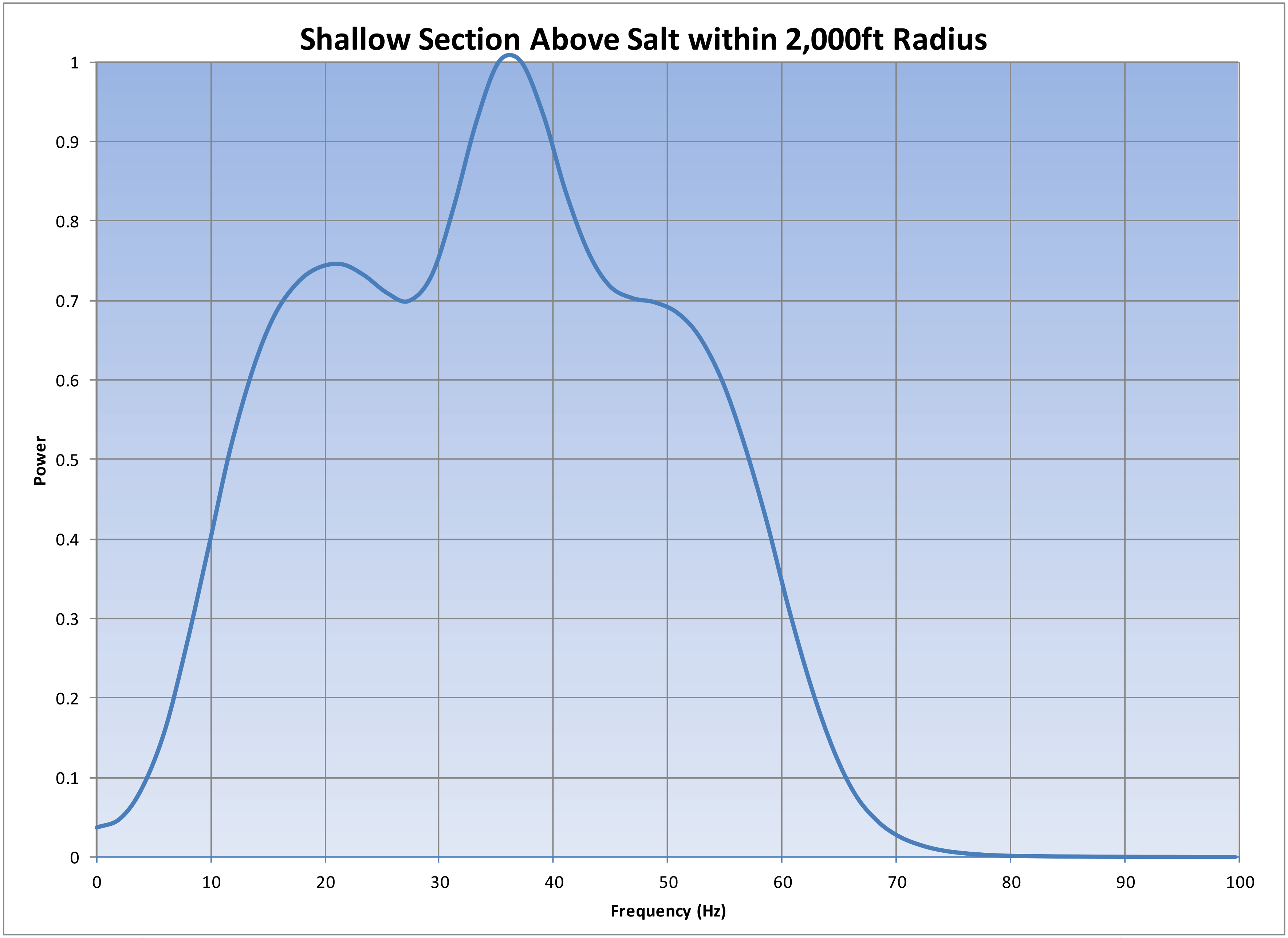
-3913 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9 (MC37_C-I)



MC37_C-I	Power Spectrum	Figure 10

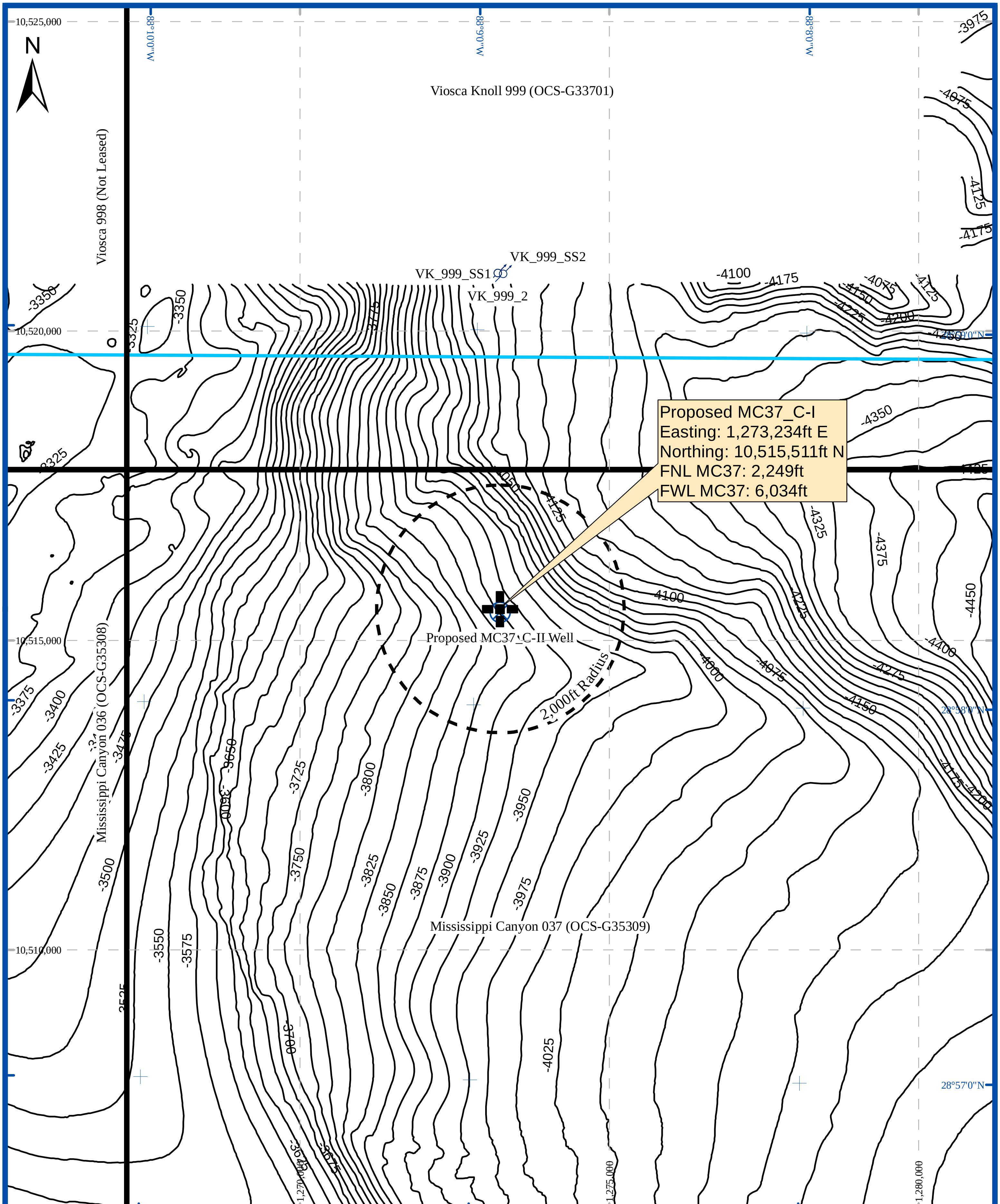


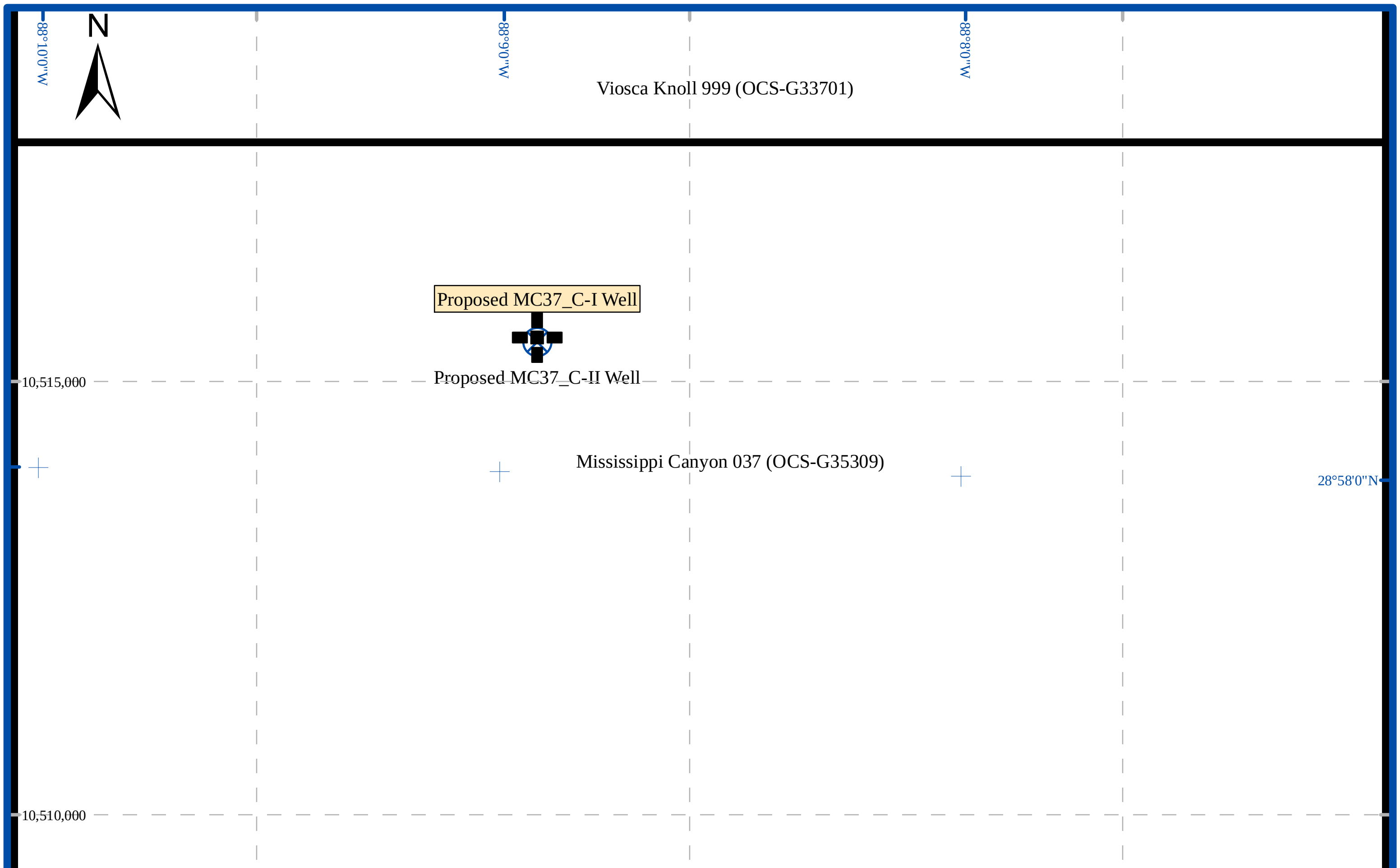
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC37_C-I							
Location	**Call N/S**	**Call E/W**	**X Coordinate**	**Y Coordinate**	**Latitude**	**Longitude**	**WD**
MC37_C-I SL	2,249ft FNL	6,034ft FWL	1,273,234ft E	10,515,511ft N	28° 58' 15.41"N	88° 08' 55.20"W	-3,913ft

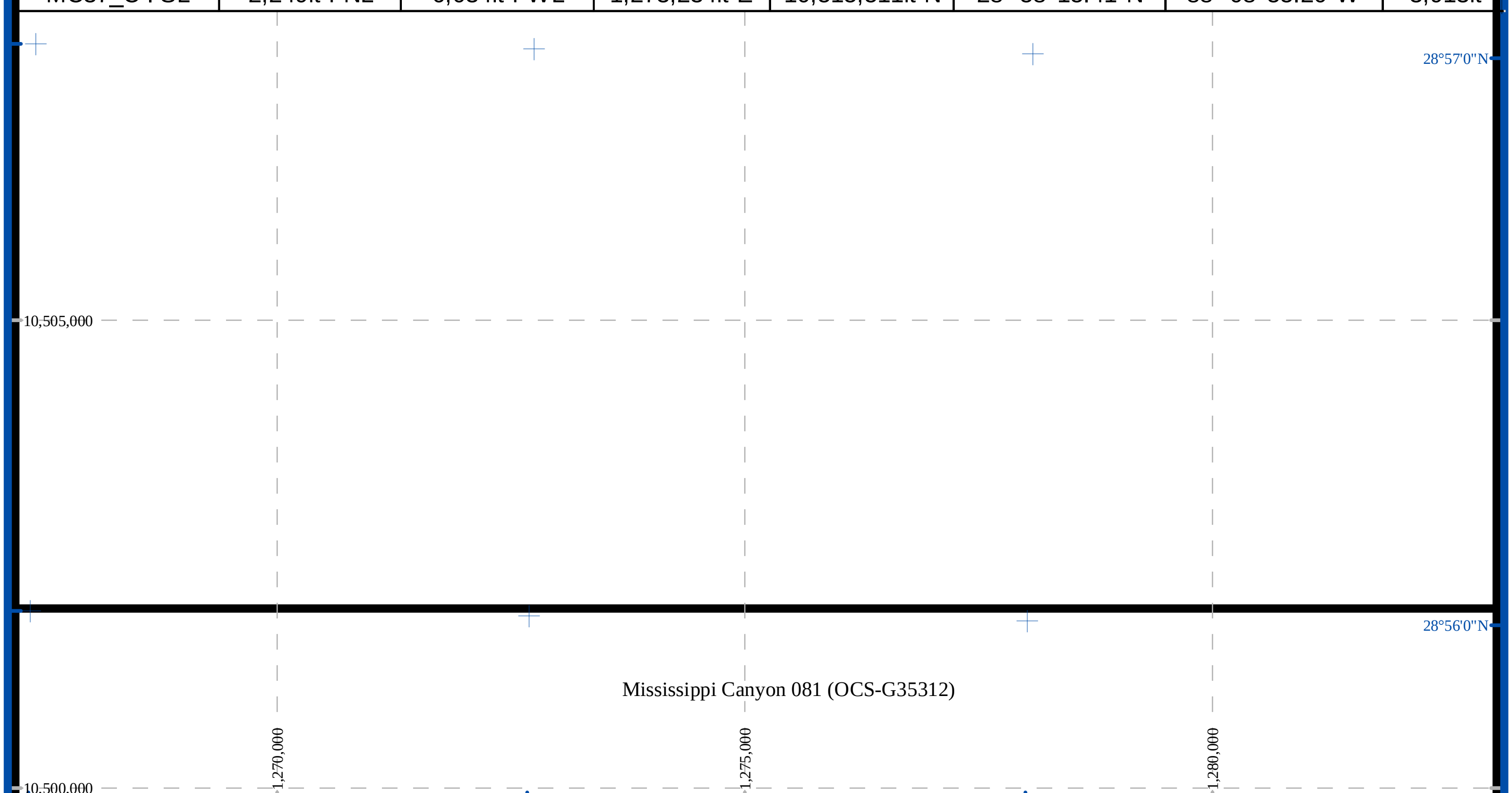


Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

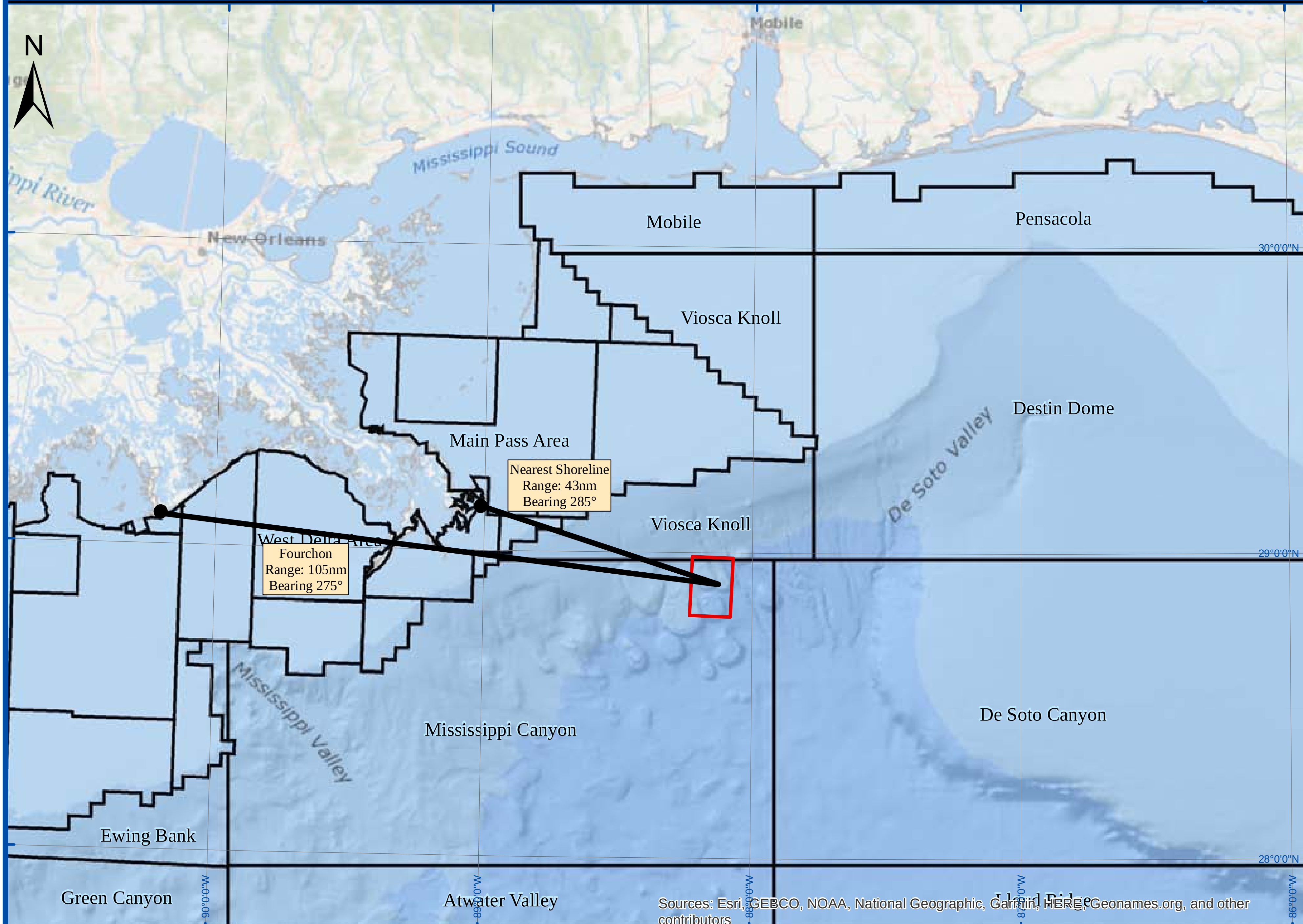
0 150 300 600 Meters

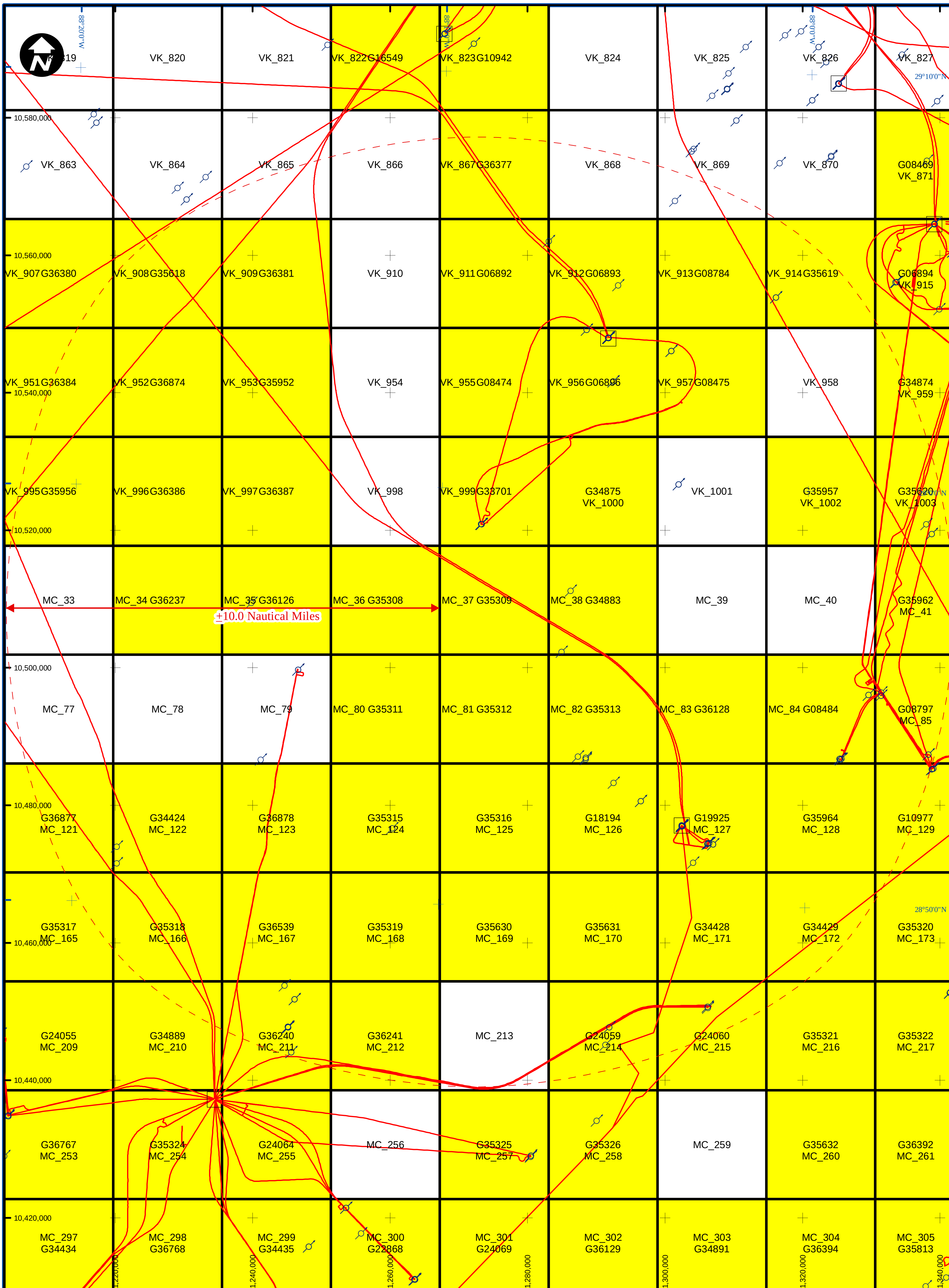
Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 37

Figure 13





Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 37

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC37_C-I Well Location

October 02, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 37
(OCS-G OCS-G-35309)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-I well location with surface location in Block 37, Mississippi Canyon Area (OCS-G-35309). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,129ft below sea surface (6,216ft below seabed).

Seabed Hazards. The proposed well is located in an area of relatively smooth to slightly undulated seabed located approximately 4,065ft to the east of the edge of Horn Dome. The seabed expressoons of slump lobe deposits are located around 900ft to the east of the proposed well.

The proposed well occurs at the edge of a seabed canyon Dorsey Canyon. The proposed well is just inside the steeper edges of the seabed canyon. Cuspate falures are observed at the edge of the seabed channel. This channel is described to be mostly inactive, with only possible seasonal or storm-related current activity.

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

No existing wells or pipelines occur within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas is assigned at the proposed well . A unconnected risk of gas anomaly occurs within Unit G.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, Unit E and throughout Unit F, and Unit G.

The well-path will not intersect any faults at the proposed well.

Proposed MC37_C-I Location (Surface)								
Location Coordinates								
NAD 27 Datum - Clarke 1866 Ellipsoid					**UTM Zone 16 - CM 87° West**			
Latitude	28°	58'	15.405"	North	Easting	1,273,234	US ft. E	
Longitude	88°	08'	55.198"	West	Northing	10,515,511	US ft. N	
Latitude Decimal			28.9709458					
Longitude Decimal			-88.148666					
FWL Mississippi Canyon 037			6,034ft	US ft.	Inline	12884		
FNL Mississippi Canyon 037			2,249ft	US ft.	Crossline	17865		
Water Depth: -3,913ft			Slope: 5.4° NE					
Nearest Shoreline			43 Nautical Miles @ 285°					
Port of Operation			Fourchon		105 Nautical Miles @ 275°			
Nearest Manned Platform			A Ram-Powell in VK956		7.1 Miles @ 29.7°			

Proposed MC37_C-II Location (Surface)								
Location Coordinates								
NAD 27 Datum - Clarke 1866 Ellipsoid					**UTM Zone 16 - CM 87° West**			
Latitude	28°	58'	14.910"	North	Easting	1,273,234	US ft. E	
Longitude	88°	08'	55.192"	West	Northing	10,515,461	US ft. N	
Latitude Decimal			28.9708083					
Longitude Decimal			-88.1486645					
FWL Mississippi Canyon 037			6,034ft	US ft.	Inline	12883		
FNL Mississippi Canyon 037			2,299ft	US ft.	Crossline	17865		
Water Depth: -3,904ft			Slope: 5.4° NE					
Nearest Shoreline			43 Nautical Miles @ 285°					
Port of Operation			Fourchon		105 Nautical Miles @ 275°			
Nearest Manned Platform			A Ram-Powell in VK956		7.1 Miles @ 29.7°			

Conclusions and Recommendations. No major problems are anticipated at the seabed.

No risk of gas is assigned at the proposed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, Unit E, and throughout Unit F and Unit G.

The well-path will not intersect any faults.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC37_C-I Well Location

Anadarko Petroleum Corporation

October 02, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC37_C-I Well Location (OCS-G-35309)

Ladies/Gentlemen:

Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-I with surface location in Block 37, Mississippi Canyon Area (OCS-G-35309). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities

Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 6,050ft to the northwest.

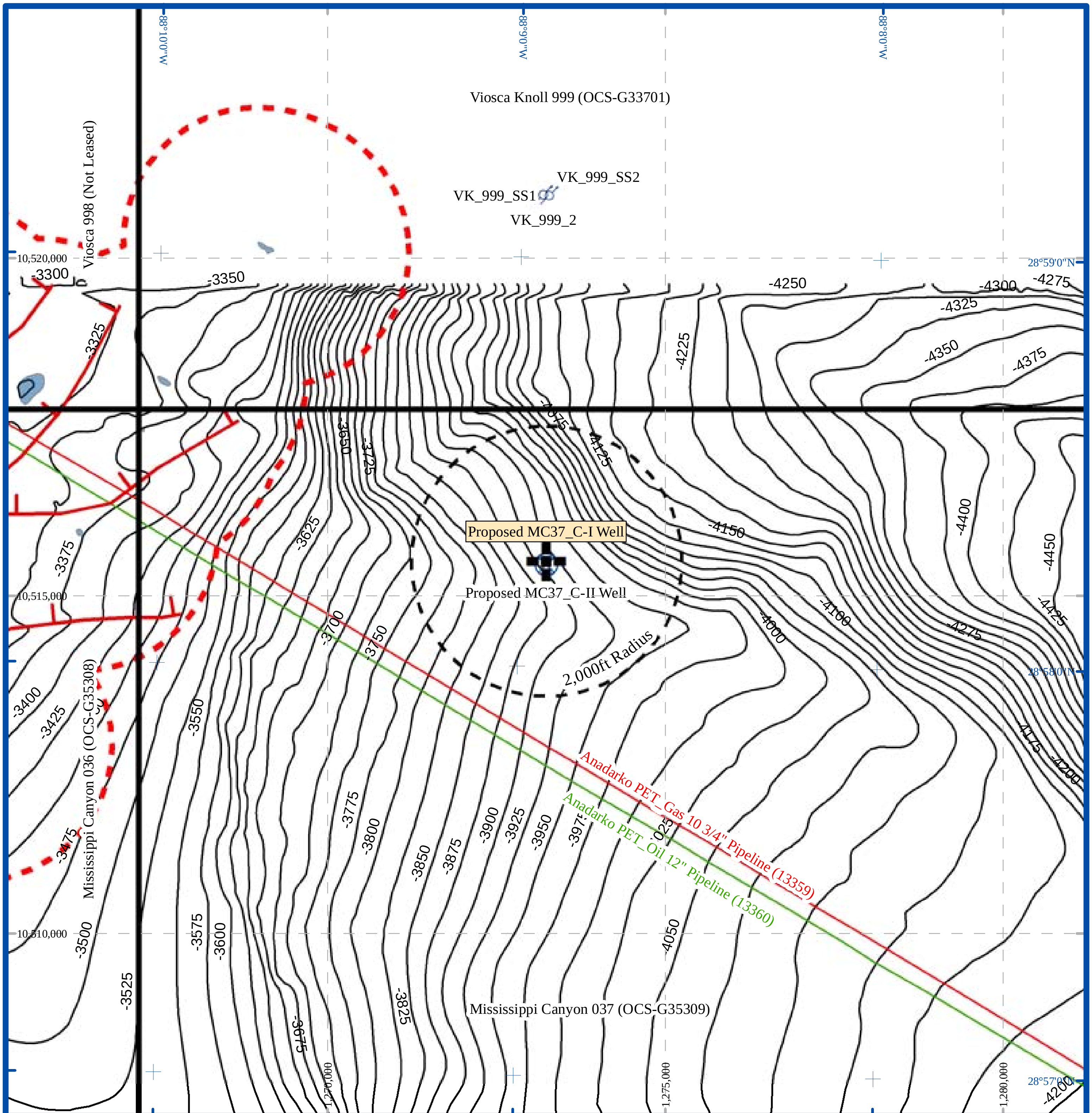
Proposed MC37_C-I Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	15.405”	North	Easting	1,273,234	US ft. E
Longitude	88°	08’	55.198”	West	Northing	10,515,511	US ft. N
Latitude Decimal	28.9709458						
Longitude Decimal	-88.148666						
FWL Mississippi Canyon 037	6,034ft	US ft.	Inline	12884			
FNL Mississippi Canyon 037	2,249ft	US ft.	Crossline	17865			
Water Depth: -3,913ft	Slope: 5.4° NE						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	7.1 Miles @ 29.7°					

Proposed MC37_C-II Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	14.910”	North	Easting	1,273,234	US ft. E
Longitude	88°	08’	55.192”	West	Northing	10,515,461	US ft. N
Latitude Decimal	28.9708083						
Longitude Decimal	-88.1486645						
FWL Mississippi Canyon 037	6,034ft	US ft.	Inline	12883			
FNL Mississippi Canyon 037	2,299ft	US ft.	Crossline	17865			
Water Depth: -3,904ft	Slope: 5.4° NE						
Nearest Shoreline	43 Nautical Miles @ 285°						
Port of Operation	Fourchon	105 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	7.1 Miles @ 29.7°					

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

Conclusions and Recommendations: The proposed MC37_C-I and MC37_C-II well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC37_C-I Well Location (1,273,234ft E / 10,515,511ft N)

Proposed MC37_C-II Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

-3913 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Cactus Prospect
Mississippi Canyon, Block MC37,
Offshore Gulf of Mexico

Description:
Proposed MC37_C-J Well Location

Project Number:
2020-330

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	………………… A Haigh
	Quality Assurance	………………… D Haigh

Revision	**Date**	**Title**
0	September 29, 2020	Draft
1	October 02, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

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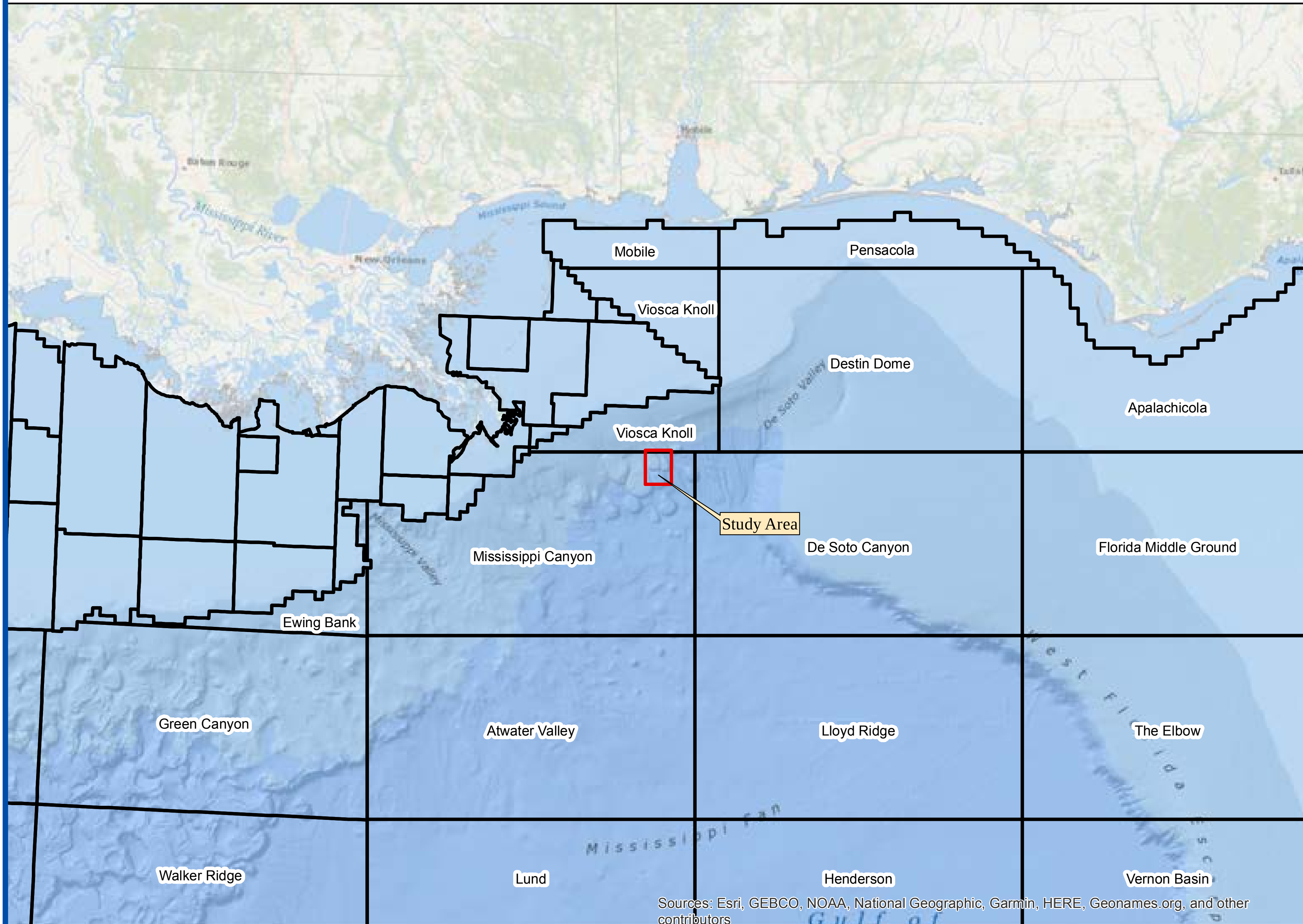
OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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WELL CLEARANCE LETTER – PROPOSED MC37_C-J WELL LOCATION

October 02, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC37_C-J Well Location
Mississippi Canyon Block MC37
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC37_C-J Well Location, Mississippi Canyon Area (OCS-G-35309). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -9,972ft below sea surface (5,787ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC37_C-J well location:

- C&C Technologies, December 2014 - Archaeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC37_C-J Well Location lies in the north part of Block MC37 (OCS-G-35309).

Proposed MC37_C-J Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	24.913”	North	Easting	1,275,331	US ft. E
Longitude	88°	08’	31.693”	West	Northing	10,516,451	US ft. N
Latitude Decimal				28.9735871			
Longitude Decimal				-88.142137			
FEL Mississippi Canyon 037				7,709ft	US ft.	Inline	12905
FNL Mississippi Canyon 037				1,309ft	US ft.	Crossline	17825
Water Depth: -4,185ft			Slope: 5.2° NE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon			105 Nautical Miles @ 275°	
Nearest Manned Platform			A Ram-Powell in VK956			6.7 Miles @ 27.5°	

Proposed MC37_C-JJ Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	24.418”	North	Easting	1,275,331	US ft. E
Longitude	88°	08’	31.688”	West	Northing	10,516,401	US ft. N
Latitude Decimal				28.9734495			
Longitude Decimal				-88.1421355			
FWL Mississippi Canyon 037				7,709ft	US ft.	Inline	12905
FNL Mississippi Canyon 037				1,359ft	US ft.	Crossline	17821
Water Depth: -4,183ft			Slope: 4.8° NE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon			105 Nautical Miles @ 275°	
Nearest Manned Platform			A Ram-Powell in VK956			6.7 Miles @ 27.5°	

Location MC37_C-JJ is 50ft from MC37_C-J on a bearing of 180°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC37_C-J well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)-(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC37_C-J well location is -4,187ft below sea surface (Figure 1). The seafloor slopes to the NE at 5.2°

3.2 Seafloor Morphology and Man-Made Features

The proposed MC37_CJ well location is in the north part of block MC37. The proposed well is located in an area of relatively smooth sloping seabed on the west flank upper terrace of the Dorsey Canyon. The canyon is believed to be a generally inactive drainage feature at present. Several low-angle failures occur upslope along the edge. No problems are expected for a long exploration well, however further soil stability studies are recommended for any long-term infrastructure.

The proposed well occurs approximately 5,800ft to the east of the edge of the salt diapiric uplift (Horn Dome).

No seabed faults occur within 2,000ft of the proposed well.

An ancient slump scarp occurs around 1,300ft to the southwest, trending northwest / southeast.

No other significant seabed features were observed within 2,000ft. A sonar contact interpreted as modern debris occurs around 800ft to the southeast.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius of the proposed well.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -4,463ft below sea surface (278ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

Increasingly sandy sediments are considered possible towards the base of Unit A. The sand interbeds shows some minor characteristics consistent with possible biogenic gas approximately 195ft to the northeast. If there is gas associated within the interbed it would be biogenic in nature and the shallow burial depth would not support any significant over pressure. The increasingly sandy sediments are within the planned jetted conductor section and may induce minor jetting variability and wellbore instability.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -4,463ft below sea surface (278ft below seabed).

4.3 Unit B

Unit B from -4,463ft to -4,756ft below sea surface (278ft to 571ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The proposed location is on the up-dip part of these deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft.

Horizon H10 marks the base of Unit B, occurring at -4,756ft below sea surface (571ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10 at the proposed well. The nearest risk of gas occurs 1,573ft to the northwest of the proposed well with no connectivity to the well-path.

4.4 Unit C

Unit C from -4,756ft to -5,520ft below sea surface (571ft to 1,335ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas or shallow water flow risk is predicted within Unit C at the proposed well or within a 2,000ft radius.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -5,520ft below sea surface (1,335ft below seabed).

4.5 Unit D

The upper part of Unit D from -5,520ft to -5,671ft below sea surface (1,335ft to 1,486ft below seabed) is characterized by slightly-chaotic and well-layered, low and isolated moderate-amplitude reflectors interpreted as clays, silts and occasional sands.

From -5,671ft to -6,623ft below sea surface (1,486ft to 2,348ft below seabed) is characterized by slightly-chaotic and well-layered, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sand. This interval appears presents an acoustic character suggestive of a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit D from -6,623ft to -6,775ft below sea surface (2,438ft to 2,590ft below seabed) comprises of well-layered, low-amplitude reflectors with clays, silts, and occasional sands.

No risk of gas is predicted within Unit D at the proposed well. The nearest risk of gas occurs 813ft to the northeast of the proposed well.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -6,775ft below sea surface (2,590ft below seabed).

4.6 Unit E

The upper part of Unit E from -6,775ft to -7,122ft below sea surface (2,590ft to 2,937ft below seabed) is interpreted to consist of well-layered and slightly chaotic, low and occasional moderate-amplitude reflectors with clays, silts, and several sands. This interval consists of channelized deposits with possible channel levee or over bank deposits that may contain fluid. As such a **Slight Shallow Water Flow Risk** is assigned to this upper interval. Additionally, minor wellbore stability and drilling fluid circulation problems may occur within this upper interval.

From -7,122ft to -7,340ft below sea surface (2,937ft to 3,155ft below seabed) is interpreted to consist of well-layered, low-amplitude reflectors with clays and silts.

The stratigraphy from -7,340ft to 7,706ft below sea surface (3,155ft to 3,521ft below seabed) is interpreted to comprise of well-layered, low and occasional moderate-amplitude reflectors with clays, silts, with several sands. Minor wellbore stability and drilling fluid circulation problems may occur with this interval.

Unit E from -7,706ft to -8,797ft below sea surface (3,521ft to 4,612ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~300ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit E.

Horizon H40 marks the base of Unit E at -8,797ft below sea surface (4,612ft below seabed).

4.7 Unit F

Unit F from -8,797ft to -9,715ft below sea surface (4,612ft to 5,530ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~400ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit F at the proposed well.

Horizon H50 marks the base of Unit F at -9,715ft below sea surface (5,530ft below seabed).

4.8 Unit G

Unit G from -9,715ft to -9,972ft below sea surface (5,530ft to 5,787ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted with possibility of downdip connectivity to deeper parts of the mini-basin (~500ft). This geological setting can on occasions for some minor over-pressure. As such a **Slight Shallow Water Flow Risk** is assigned to Unit G.

No risk of gas is predicted within Unit G at the proposed well. The nearest risk of gas occurs 1,771ft to the southwest of the proposed well with no indication of direct connectivity.

The well-path will not traverse any faults within Unit G at the proposed well.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -9,972ft below sea surface (5,787ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is interpreted.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,463ft to -4,756ft below sea surface (278ft to 571ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,671ft to -6,623ft below sea surface (1,486ft to 2,438ft below seabed).

Within Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,775ft to -7,122ft below sea surface (2,590ft to 2,937ft below seabed) and from -7,706ft to -8,797ft below sea surface (3,521ft to 4,612ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -8,797ft to -9,715ft below sea surface (4,612ft to 5,530ft below seabed).

Throughout Unit G, a **Slight Shallow Water Flow Risk** is interpreted from -9,715ft to -9,972ft below sea surface (5,530ft to 5,787ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

Seabed gradients are slightly higher. The proposed well is located on an upper west terrace of the Dorsey Canyon. Some apparently old surficial instability has occurred, but as the canyon is generally inactive at present no problems are anticipated for a short-term exploration well, however, further surficial studies are recommended for a long-term development well.

- Unit A

Minor variations in jetting conditions and minor wellbore instability could occur due to sandy sediments near the base of Unit A.

- Unit B

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,463ft to -4,756ft below sea surface (278ft to 571ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

None Predicted.

- Unit D

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,671ft to -6,623ft below sea surface (1,486ft to 2,438ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

Within Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,775ft to -7,122ft below sea surface (2,590ft to 2,937ft below seabed) and from -7,706ft to -8,797ft below sea surface (3,521ft to 4,612ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

Minor wellbore stability and drilling fluid circulation problems may occur from -7,340ft to -7,706ft below sea surface (3,155ft to 3,521ft below seabed).

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -8,797ft to -9,715ft below sea surface (4,612ft to 5,530ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit G

  Throughout Unit G, a **Slight Shallow Water Flow Risk** is interpreted from -9,715ft to -9,972ft below sea surface (5,530ft to 5,787ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:

Proposed MC37_C-J Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

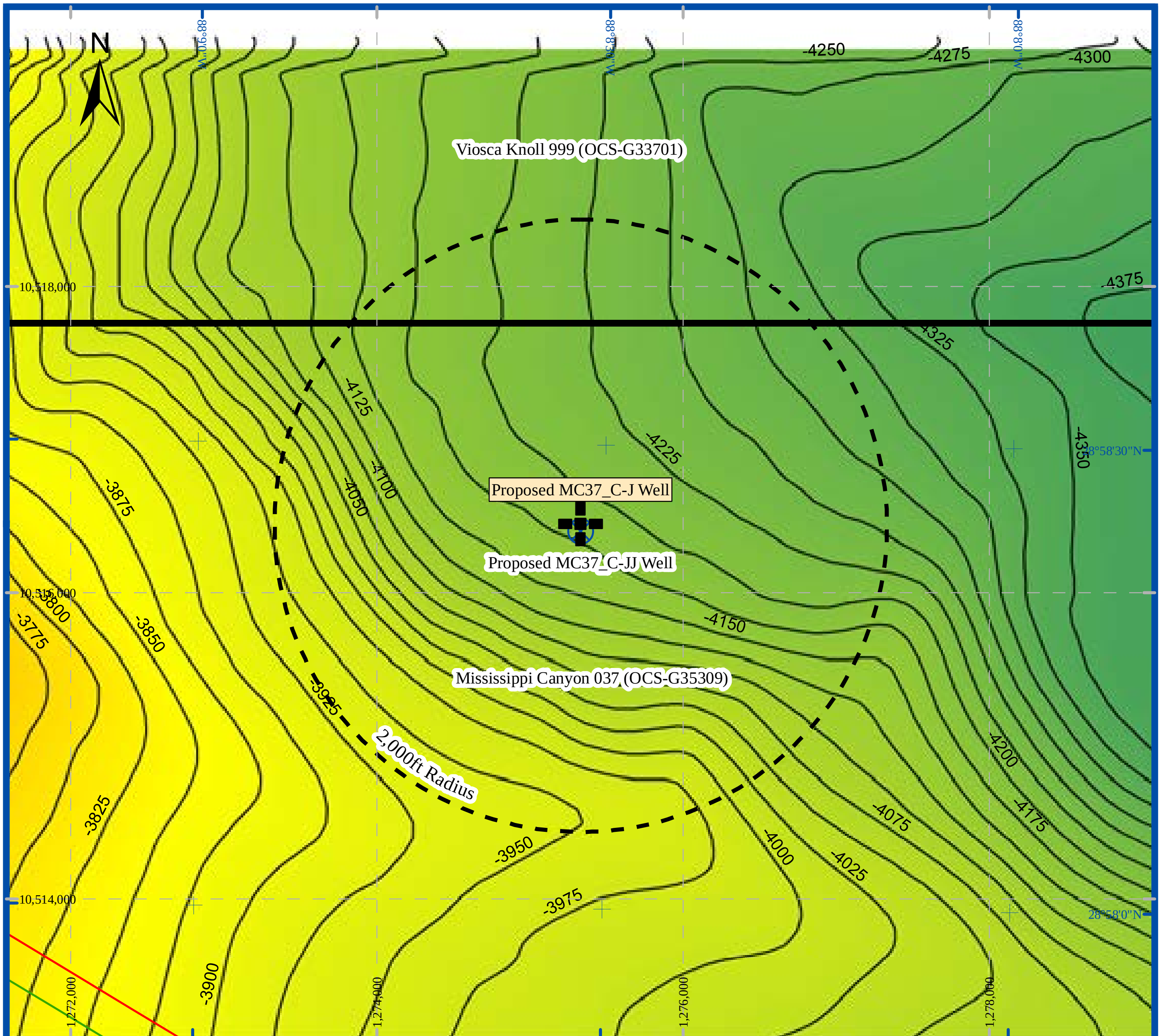
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC37_C-J Well Location (1,275,331ft E / 10,516,451ft N)

Proposed MC37_C-JJ Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

-4185 Depth in feet below sea surface to seabed, contoured at 25ft intervals

-5400 -5000 -4600 -4200 -3800 -3400

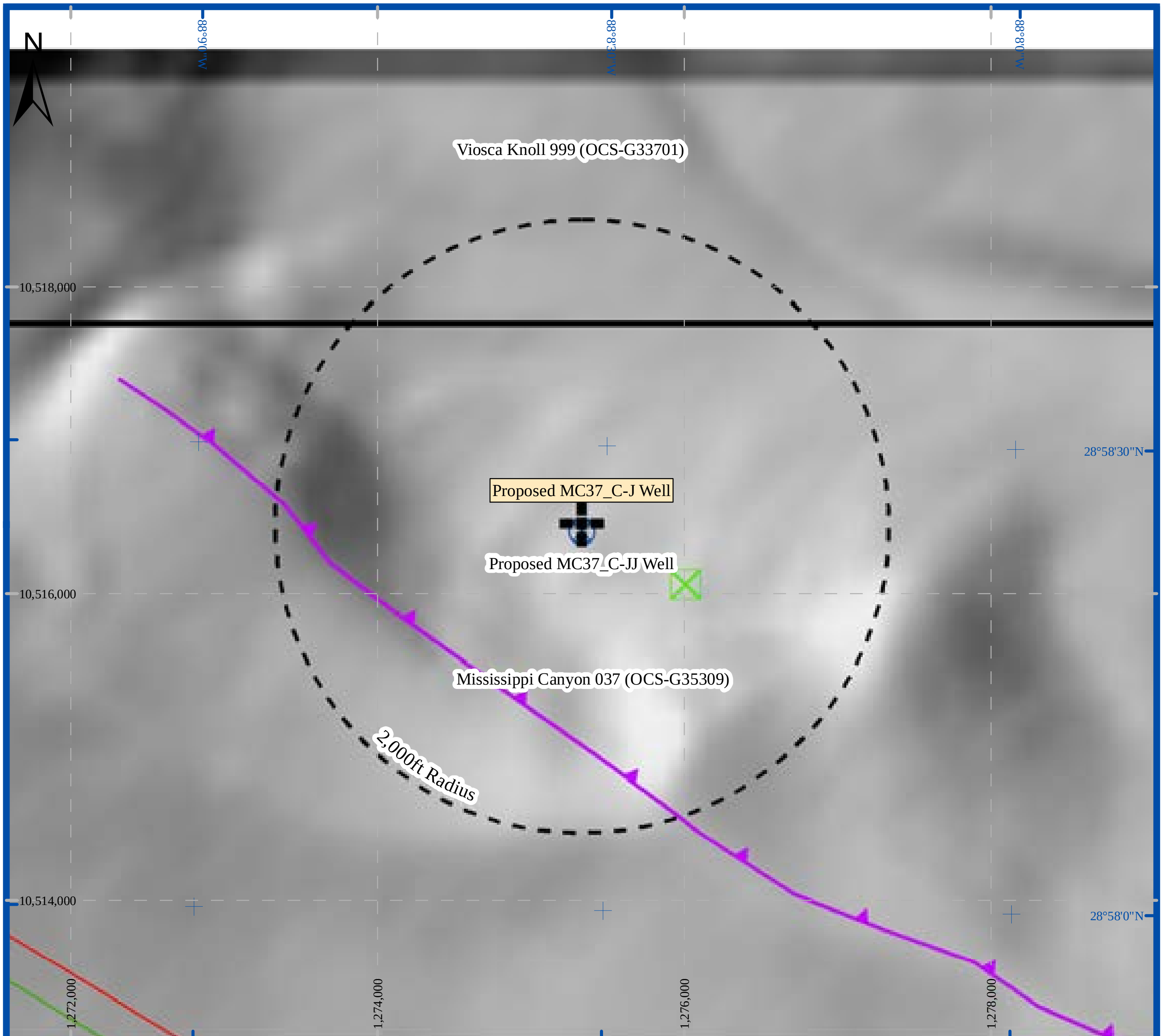
Seabed Depth (Feet)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 1 (MC37_C-J)



Seabed Morphology Extract

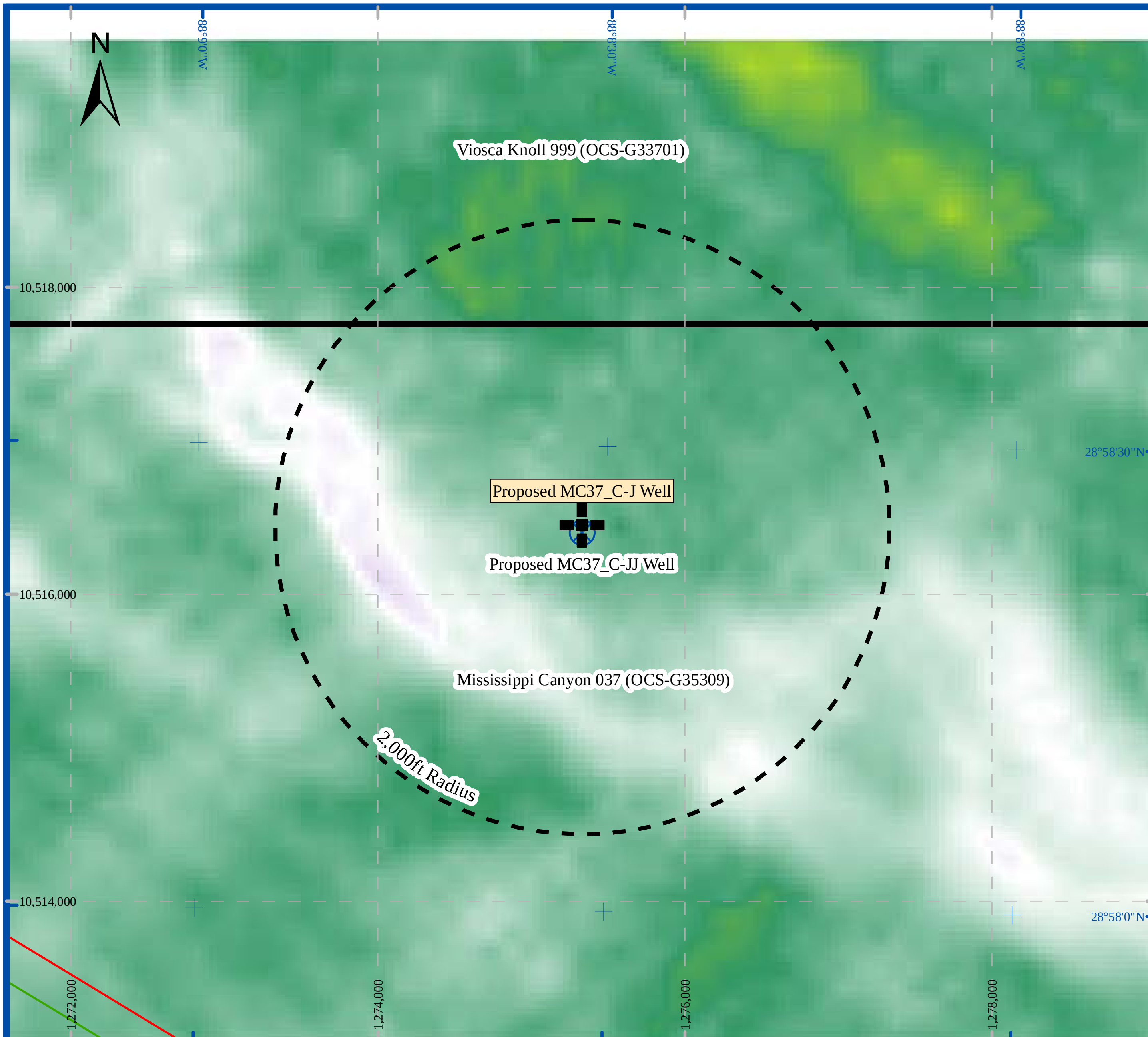
- Proposed MC37_C-J Well Location (1,275,331ft E / 10,516,451ft N)
- Proposed MC37_C-JJ Well Location
- Oil Pipeline
- Gas Pipeline
- Block boundaries
- Sonar contacts, interpreted modern debris
- Slump scarp

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC37_C-J)



Seabed Amplitude Extract

- Proposed MC37_C-J Well Location (1,275,331ft E / 10,516,451ft N)
- Proposed MC37_C-JJ Well Location
- Oil Pipeline
- Gas Pipeline
- Block boundaries

Chart Scale 1" = 1,000'

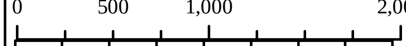
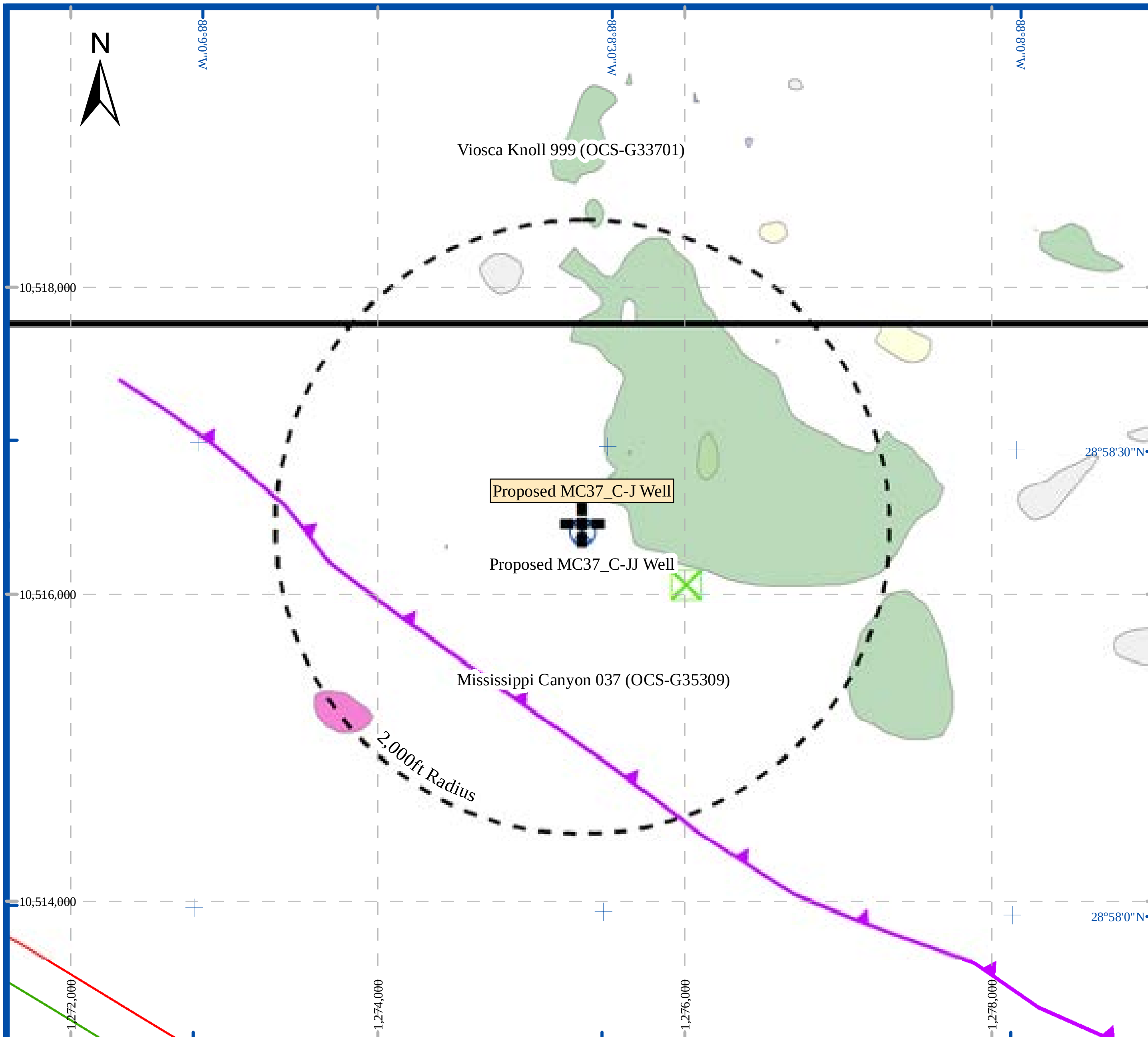


Figure 3
(MC37_C-J)



Geohazard Summary Extract

Proposed MC37_C-J Well Location (1,275,331ft E / 10,516,451ft N)

Proposed MC37_C-JJ Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

Sonar contacts, interpreted modern debris

Slump scarp

Slight and Moderate Risk of Gas within Unit A

Slight and Moderate Risk of Gas at Horizon H10

Slight, Moderate, and High Risk of Gas within Unit D

Slight and Moderate Risk of Gas within Unit E

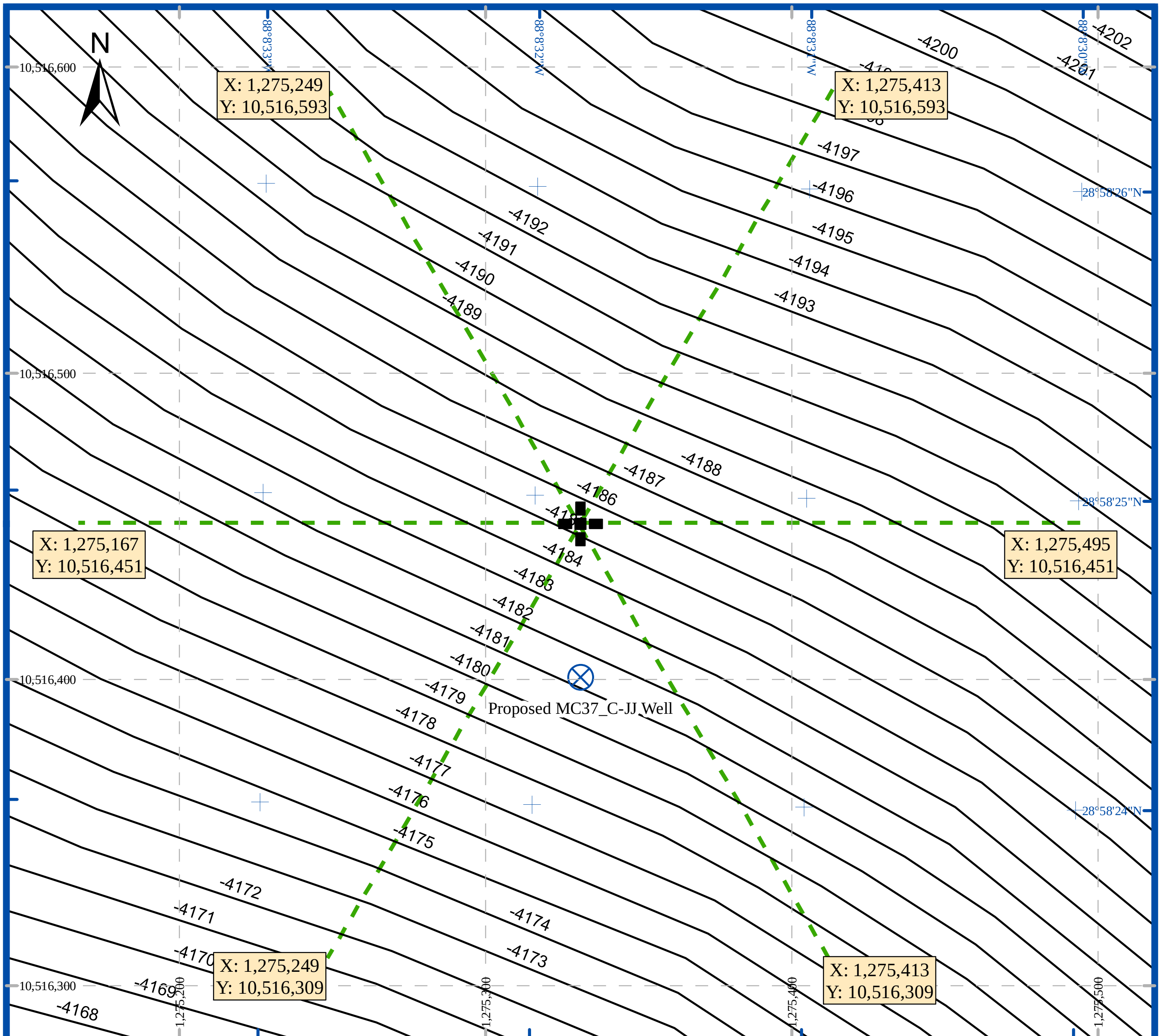
Slight and Moderate Risk of Gas within Unit G

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC37_C-J)



ROV Plat (MC37_C-J)

Proposed MC37_C-J Well Location
(1,275,331ft E / 10,516,451ft N)

Proposed MC37_C-JJ Well Location

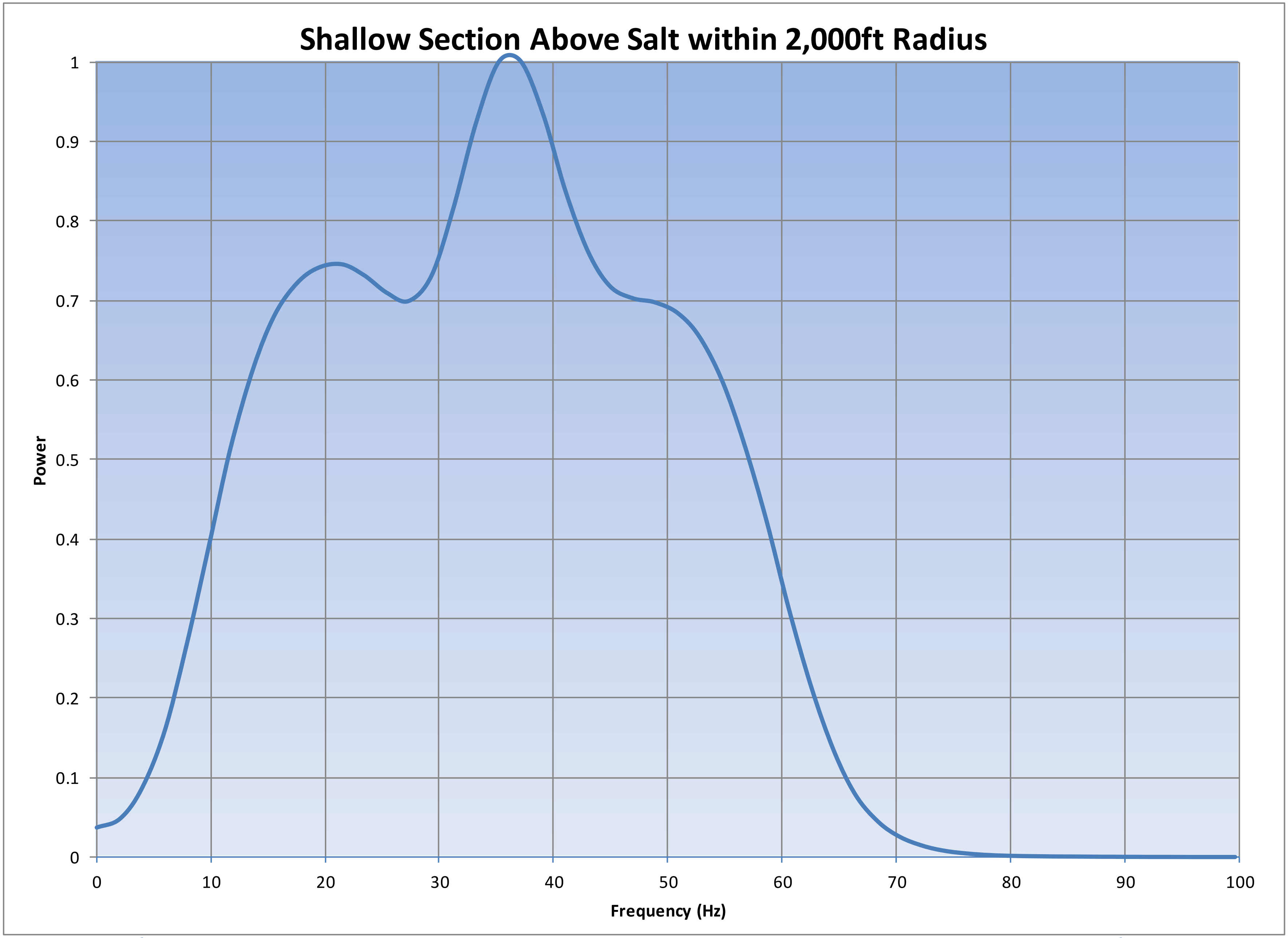
-4185 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC37_C-J)



MC37_C-J	Power Spectrum	Figure 10

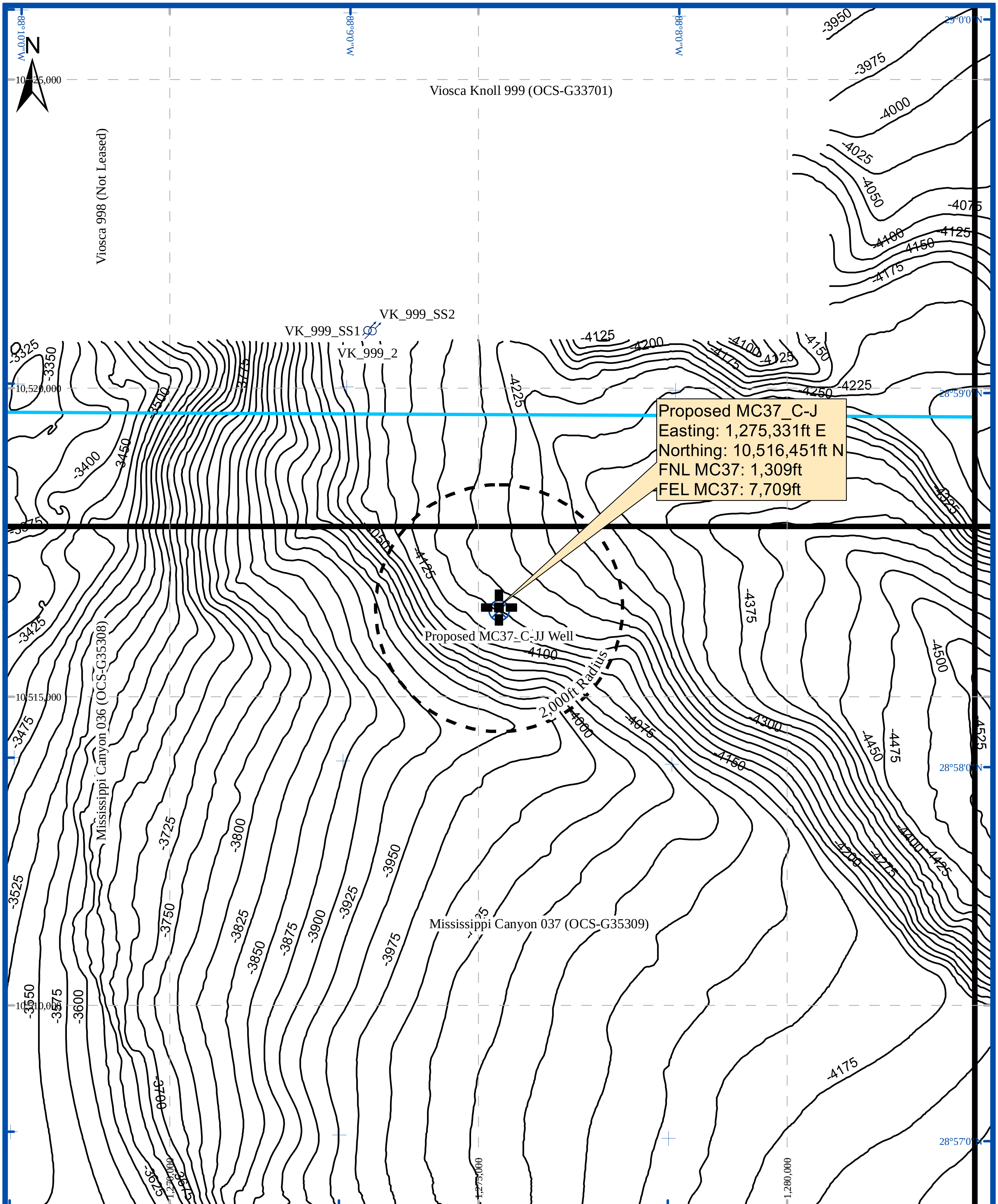


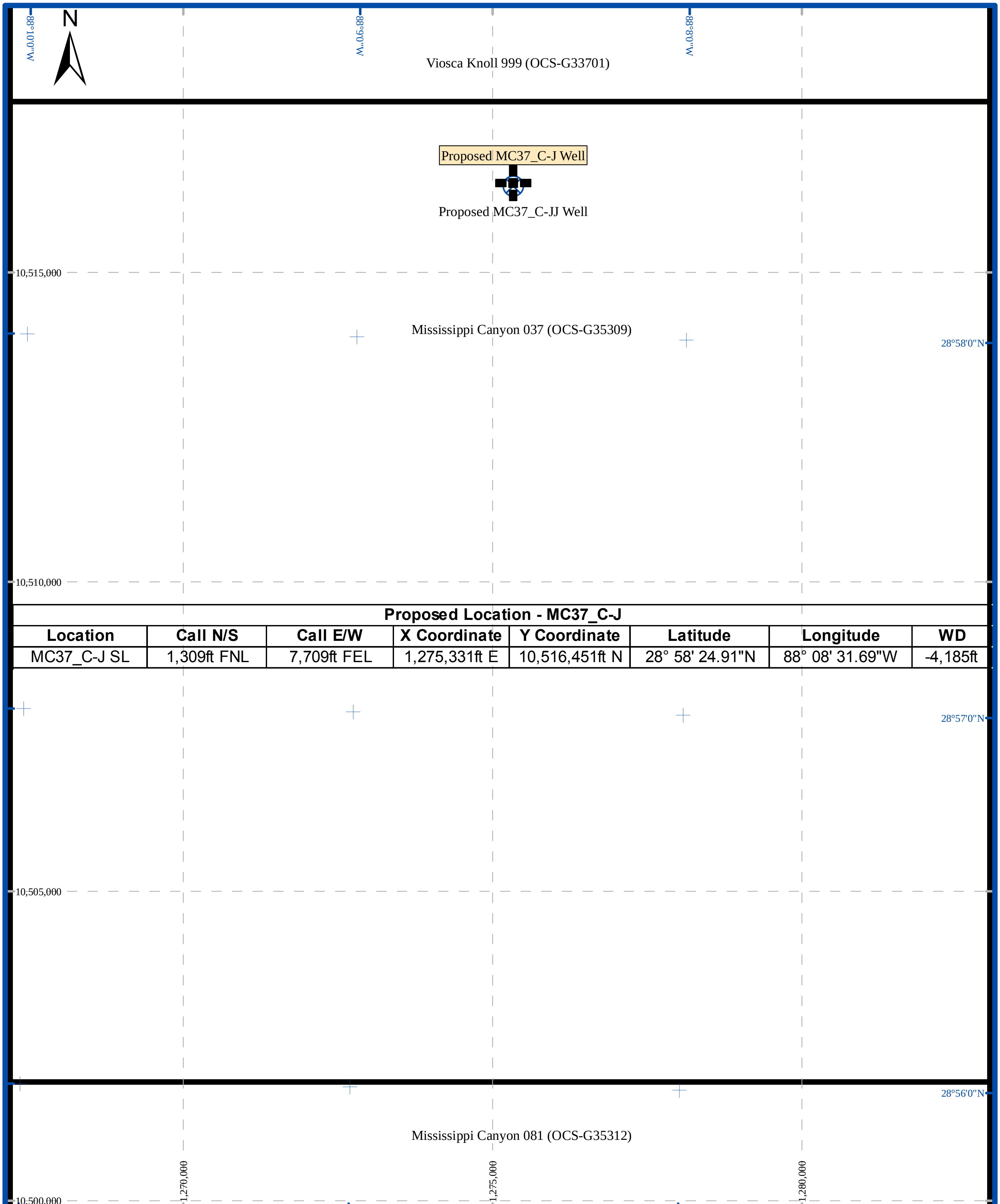
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC37_C-J

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC37_C-J SL	1,309ft FNL	7,709ft FEL	1,275,331ft E	10,516,451ft N	28° 58' 24.91"N	88° 08' 31.69"W	-4,185ft

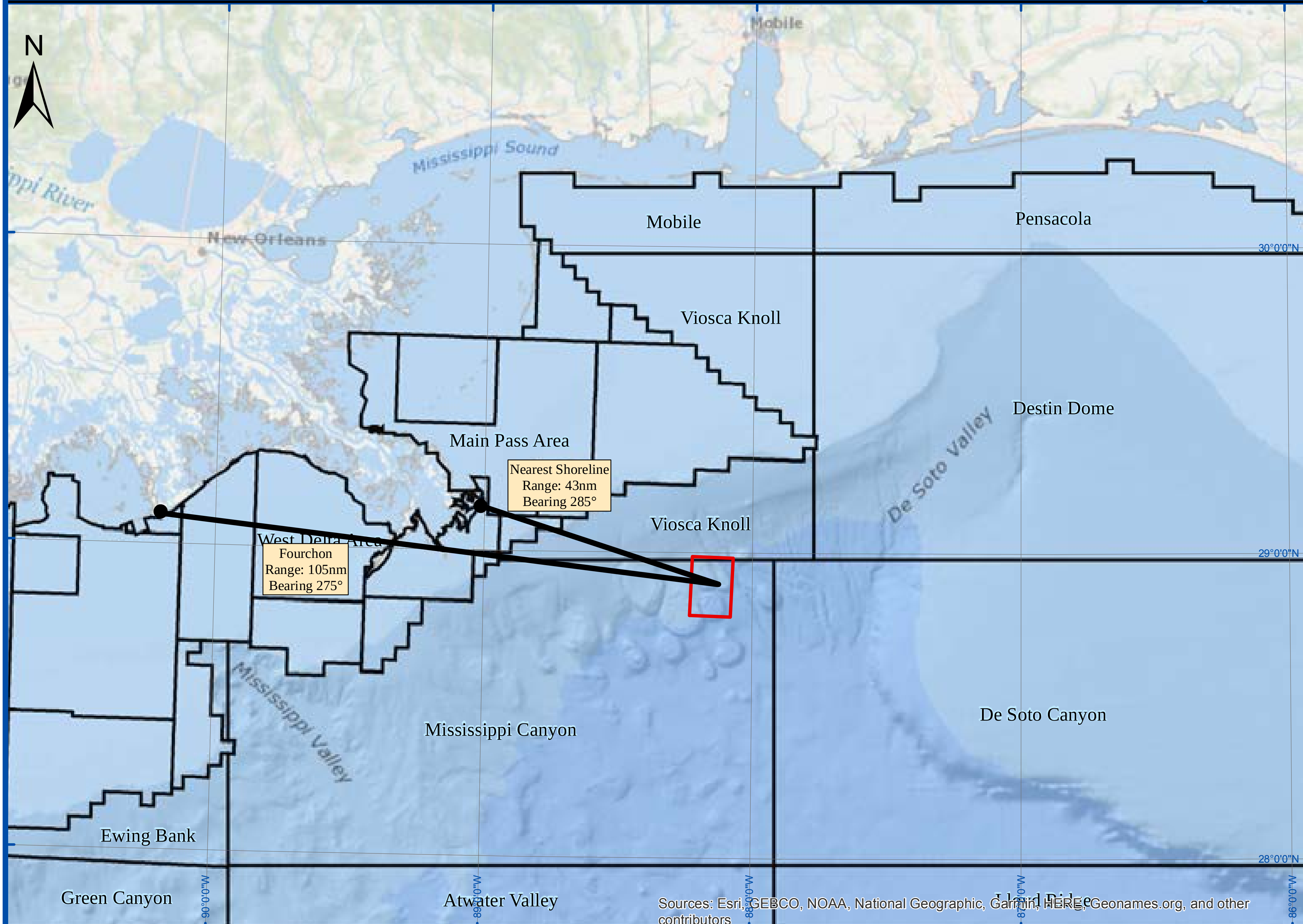
Chart scale 1" = 2,000'
0 500 1,000 2,000 Feet
0 150 300 600 Meters

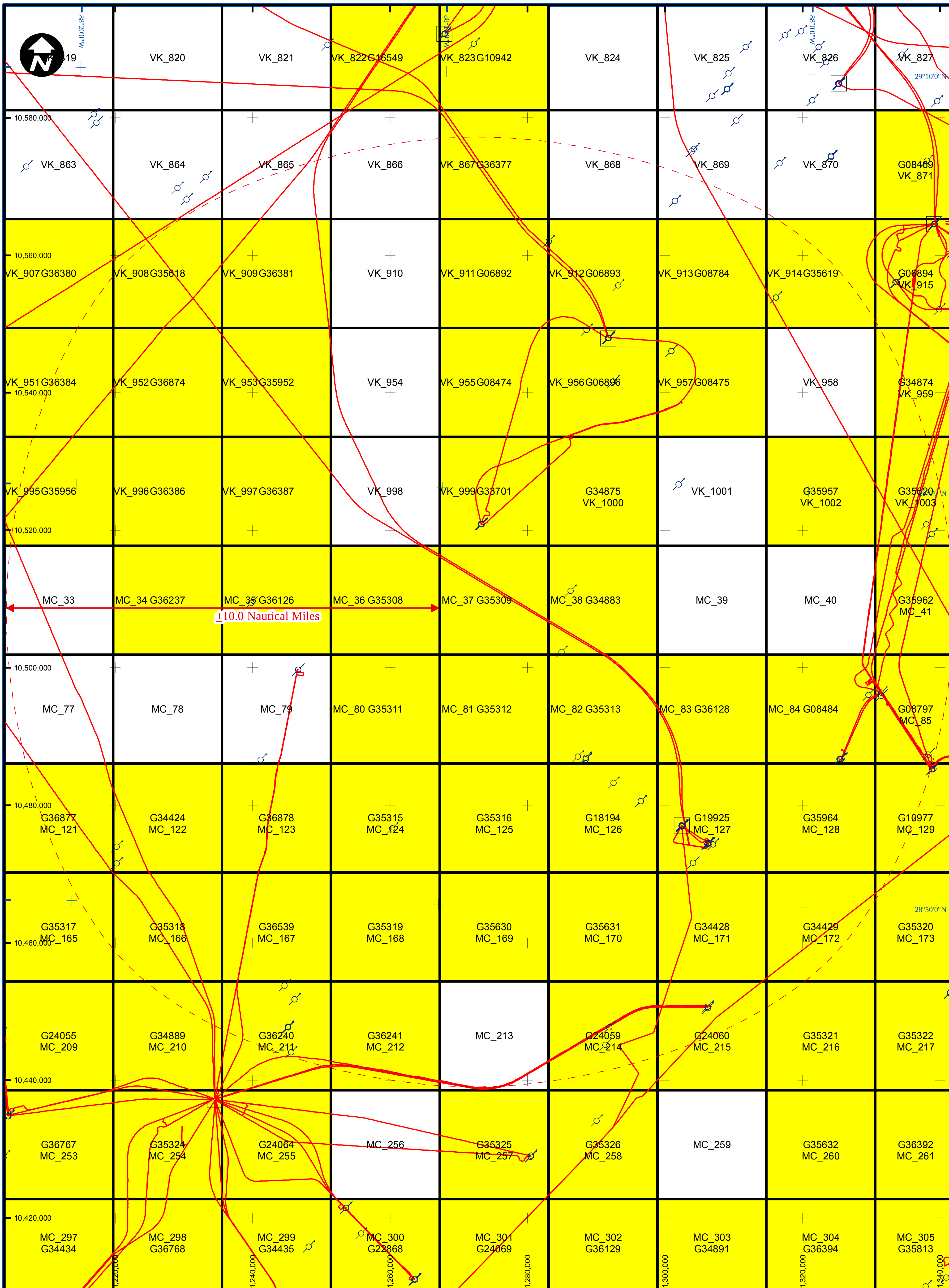
Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 37

Figure 13





Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 37

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC37_C-J Well Location

October 02, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 37
(OCS-G OCS-G-35309)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-J well location with surface location in Block 37, Mississippi Canyon Area (OCS-G-35309). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -9,972ft below sea surface (5,787ft below seabed).

Seabed Hazards. The proposed MC37_CJ well location is in the north part of block MC37. The proposed well is in an area of relatively smooth to slightly undulated seabed located on the edge of the Dorsey Canyon. No surficial instability problems are expected for a short-term exploration well, however further soil stability studies are recommended for any long-term infrastructure.

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

No seabed faults occur at the proposed well or within 2,000ft of the proposed well.

No existing wells or pipelines occur within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas affects the proposed well location. Occasional risk of gas anomalies occur within 2,000ft of the proposed well within Units A, D and G.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, Unit E and throughout Unit F, and Unit G.

The well-path will not intersect any faults at the proposed well.

Proposed MC37_C-J Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	24.913”	North	Easting	1,275,331	US ft. E
Longitude	88°	08’	31.693”	West	Northing	10,516,451	US ft. N
Latitude Decimal			28.9735871				
Longitude Decimal			-88.142137				
FEL Mississippi Canyon 037			7,709ft	US ft.	Inline	12905	
FNL Mississippi Canyon 037			1,309ft	US ft.	Crossline	17825	
Water Depth: -4,185ft			Slope: 5.2° NE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		6.7 Miles @ 27.5°		

Proposed MC37_C-JJ Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	24.418”	North	Easting	1,275,331	US ft. E
Longitude	88°	08’	31.688”	West	Northing	10,516,401	US ft. N
Latitude Decimal			28.9734495				
Longitude Decimal			-88.1421355				
FWL Mississippi Canyon 037			7,709ft	US ft.	Inline	12905	
FNL Mississippi Canyon 037			1,359ft	US ft.	Crossline	17821	
Water Depth: -4,183ft			Slope: 4.8° NE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon		105 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		6.7 Miles @ 27.5°		

Conclusions and Recommendations. No problems for a short-term exploration well, further soil stability studies are recommended for any long-term infrastructure.

A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, Unit E, and throughout Unit F and Unit G.

The well-path will not intersect any faults.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC37_C-J Well Location

Anadarko Petroleum Corporation

October 02, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC37_C-J Well Location (OCS-G-35309)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC37_C-J with surface location in Block 37, Mississippi Canyon Area (OCS-G-35309). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 7,030ft to the northwest.

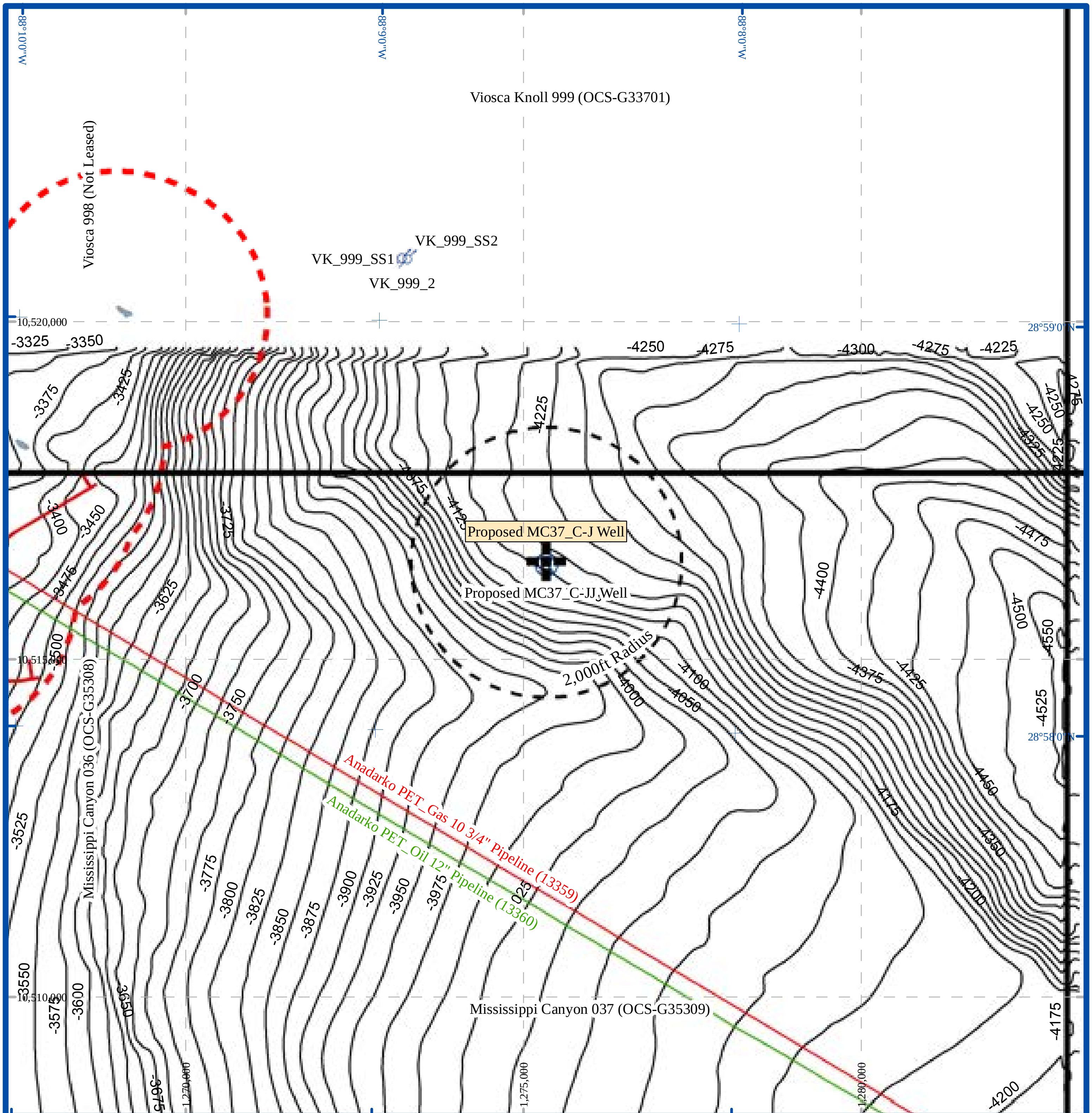
Proposed MC37_C-J Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	24.913”	North	Easting	1,275,331	US ft. E
Longitude	88°	08’	31.693”	West	Northing	10,516,451	US ft. N
Latitude Decimal			28.9735871				
Longitude Decimal			-88.142137				
FEL Mississippi Canyon 037			7,709ft		US ft.	Inline	12905
FNL Mississippi Canyon 037			1,309ft		US ft.	Crossline	17825
Water Depth: -4,185ft			Slope: 5.2° NE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon			105 Nautical Miles @ 275°	
Nearest Manned Platform			A Ram-Powell in VK956			6.7 Miles @ 27.5°	

Proposed MC37_C-JJ Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	24.418”	North	Easting	1,275,331	US ft. E
Longitude	88°	08’	31.688”	West	Northing	10,516,401	US ft. N
Latitude Decimal			28.9734495				
Longitude Decimal			-88.1421355				
FWL Mississippi Canyon 037			7,709ft		US ft.	Inline	12905
FNL Mississippi Canyon 037			1,359ft		US ft.	Crossline	17821
Water Depth: -4,183ft			Slope: 4.8° NE				
Nearest Shoreline			43 Nautical Miles @ 285°				
Port of Operation			Fourchon			105 Nautical Miles @ 275°	
Nearest Manned Platform			A Ram-Powell in VK956			6.7 Miles @ 27.5°	

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

Conclusions and Recommendations: The proposed MC37_C-J and MC37_C-JJ well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC37_C-J Well Location (1,275,331ft E / 10,516,451ft N)

Proposed MC37_C-JJ Well Location

Oil Pipeline

Gas Pipeline

Block boundaries

-4185 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Peach Prospect
Mississippi Canyon, Block MC36,
Offshore Gulf of Mexico

Description:
Proposed MC36_P-A Well Location

Project Number:
2020-304

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	.... A Haigh
	Quality Assurance	.... D Haigh

Revision	**Date**	**Title**
0	July 20, 2020	Draft
1	August 31, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

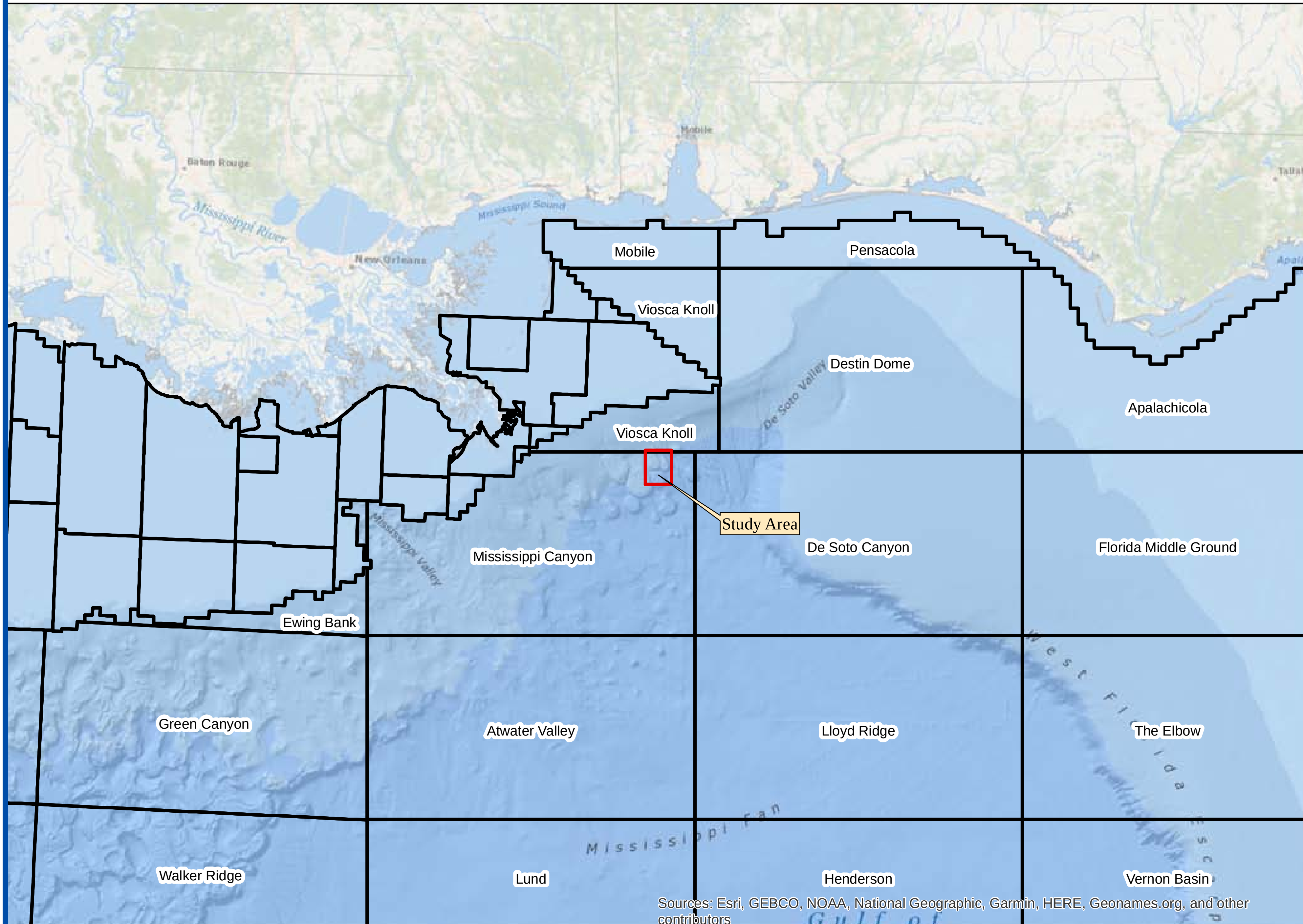
This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

Please be aware that further distribution of this report, in whole or part, or the use of the data for a purpose not expressly stated within the contractual work scope is at the client's sole risk, and Ocean Geo Solutions, Inc recommends that this disclaimer is included in any such distribution.

OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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LIST OF FIGURES

WELL CLEARANCE LETTER – PROPOSED MC36_P-A WELL LOCATION

August 31, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC36_P-A Well Location
Mississippi Canyon Block MC36
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC36_P-A Well Location, Mississippi Canyon Area (OCS-G-35308). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,427ft below sea surface (6,970ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC36_P-A well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC36_P-A Well Location lies in the south-central of Block MC36 (OCS-G-35308).

Proposed MC36_P-A Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	27.834”	North	Easting	1,255,500	US ft. E
Longitude	88°	12’	15.047”	West	Northing	10,516,943	US ft. N
Latitude Decimal			28.9743984				
Longitude Decimal			-88.2041798				
FWL Mississippi Canyon 036			4,140ft	US ft.	Inline	12766	
FNL Mississippi Canyon 036			817ft	US ft.	Crossline	18525	
Water Depth: -3,457ft			Slope: 1.7° WSW				
Nearest Shoreline			44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.7 Miles @ 52.0°		

Proposed MC36_P-AA Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	28.330”	North	Easting	1,255,500	US ft. E
Longitude	88°	12’	15.053”	West	Northing	10,516,993	US ft. N
Latitude Decimal			28.974536				
Longitude Decimal			-88.2041813				
FWL Mississippi Canyon 036			4,140ft	US ft.	Inline	12767	
FNL Mississippi Canyon 036			767ft	US ft.	Crossline	18525	
Water Depth: -3,456ft			Slope: 1.1° WSW				
Nearest Shoreline			44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.7 Miles @ 52.0°		

Location MC36_P-AA is 50ft from MC36_P-A on a bearing of 000°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC36_P-A well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC36_P-A well location is -3,457ft below sea surface (Figure 1). The seafloor slopes to the WSW at 1.7°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC36_P-A well location is in the northwest part of block MC36. The proposed well is located in an area of relatively smooth seabed located within a mini-basin to the northwest of Horn Dome.

No seabed fault intersections occur within 2,000ft of the proposed location.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,681ft below sea surface (224ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,681ft below sea surface (224ft below seabed).

4.3 Unit B

The upper part of Unit B, from -3,681ft to -3,772ft below sea surface (224ft to 315ft below seabed), displays generally low-amplitude reflectors, and is interpreted as well-layered clays and silts with occasional sands.

From -3,772ft to -3,947ft below sea surface (315ft to 490ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. . The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

From –3,947ft below sea surface (490ft below seabed) to -4,282ft below sea surface (825ft below seabed), Unit B is characterized by well-layered, low and occasional moderate--amplitude reflectors interpreted as clays, silts, and several sands. Minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -4,282ft below sea surface (825ft below seabed) to -4,602ft below sea surface (1,145ft below seabed) presents acoustically as well-layered, low-amplitude reflectors with clays, silts, and occasional sand interbeds.

No risk of gas occurs within Unit B at the proposed well or within 2,000ft radius of the proposed well.

The well-path will not traverse any faults within Unit B.

Horizon H10 marks the base of Unit B, occurring at -4,602ft below sea surface (1,145ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

The upper part of Unit C from -4,602ft to -5,395ft below sea surface (1,145ft to 1,938ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

The lower part of Unit C from -5,395ft below sea surface (1,938ft below seabed) to -5,459ft below sea surface (2,002ft below seabed) is interpreted to comprise of slightly-chaotic, low and occasional moderate-amplitude reflectors with clays, silts, and several sands. This interval is probably a slightly channelized interval. Minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit C at the proposed well, or within 2,000ft.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -5,459ft below sea surface (2,002ft below seabed).

4.5 Unit D

The upper part of Unit D from -5,459ft below sea surface (2,002ft below seabed) to -5,929ft below sea surface (2,472ft below seabed) presents as well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional sands.

Unit D from -5,929ft to -6,443ft below sea surface (2,472ft to 2,986ft below seabed) is characterized by slightly-chaotic, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sands. This interval appears to have been deposited at a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can, on occasions, induce minor over-pressure, and as such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit D from -6,443ft below sea surface (2,986ft below seabed) to -7,029ft below sea surface (3,572ft below seabed) is interpreted to consist of clays, silts, and occasional sands.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -7,029ft below sea surface (3,572ft below seabed).

4.6 Unit E

The upper part of Unit E from -7,029ft to -7,263ft below sea surface (3,572ft to 3,806ft below seabed) is characterized by low and occasional moderate-amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~300ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit E from -7,263ft to -7,863ft below sea surface (3,806ft to 4,406ft below seabed) is characterized by low amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit E.

Horizon H40 marks the base of Unit E at -7,863ft below sea surface (4,406ft below seabed).

4.7 Unit F

Unit F from -7,863ft to -9,875ft below sea surface (4,406ft to 6,418ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~600ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft radius of the proposed well.

The well-path will not traverse any faults within Unit F.

Horizon H50 marks the base of Unit F at -9,875ft below sea surface (6,148ft below seabed).

4.8 Unit G

Unit G from -9,875ft to -10,427ft below sea surface (6,418ft to 6,970ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit G.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,427ft below sea surface (6,970ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is interpreted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within the interval from -3,772ft to -3,947ft below sea surface (315ft to 490ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,929ft to -6,443ft below sea surface (2,472ft to 2,986ft below seabed).

Within Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -7,029ft to -7,263ft below sea surface (3,572ft to 3,806ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,863ft to -9,825ft below sea surface (4,406ft to 6,418ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None predicted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within the interval from -3,772ft to -3,947ft below sea surface (315ft to 490ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  Minor wellbore and drilling fluid circulation problems may occur from -3,947ft below sea surface (490ft below seabed) to -4,282ft below sea surface (825ft below seabed).

- Unit C

  Minor wellbore and drilling fluid circulation problems may occur from -5,395ft below sea surface (1,938ft below seabed) to -5,459ft below sea surface (2,002ft below seabed).

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,929ft to -6,443ft below sea surface (2,472ft to 2,986ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Within Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -7,029ft to -7,263ft below sea surface (3,572ft to 3,806ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,863ft to -9,875ft below sea surface (4,406ft to 6,418ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit G

  No drilling hazards or problems interpreted.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC36_P-A Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

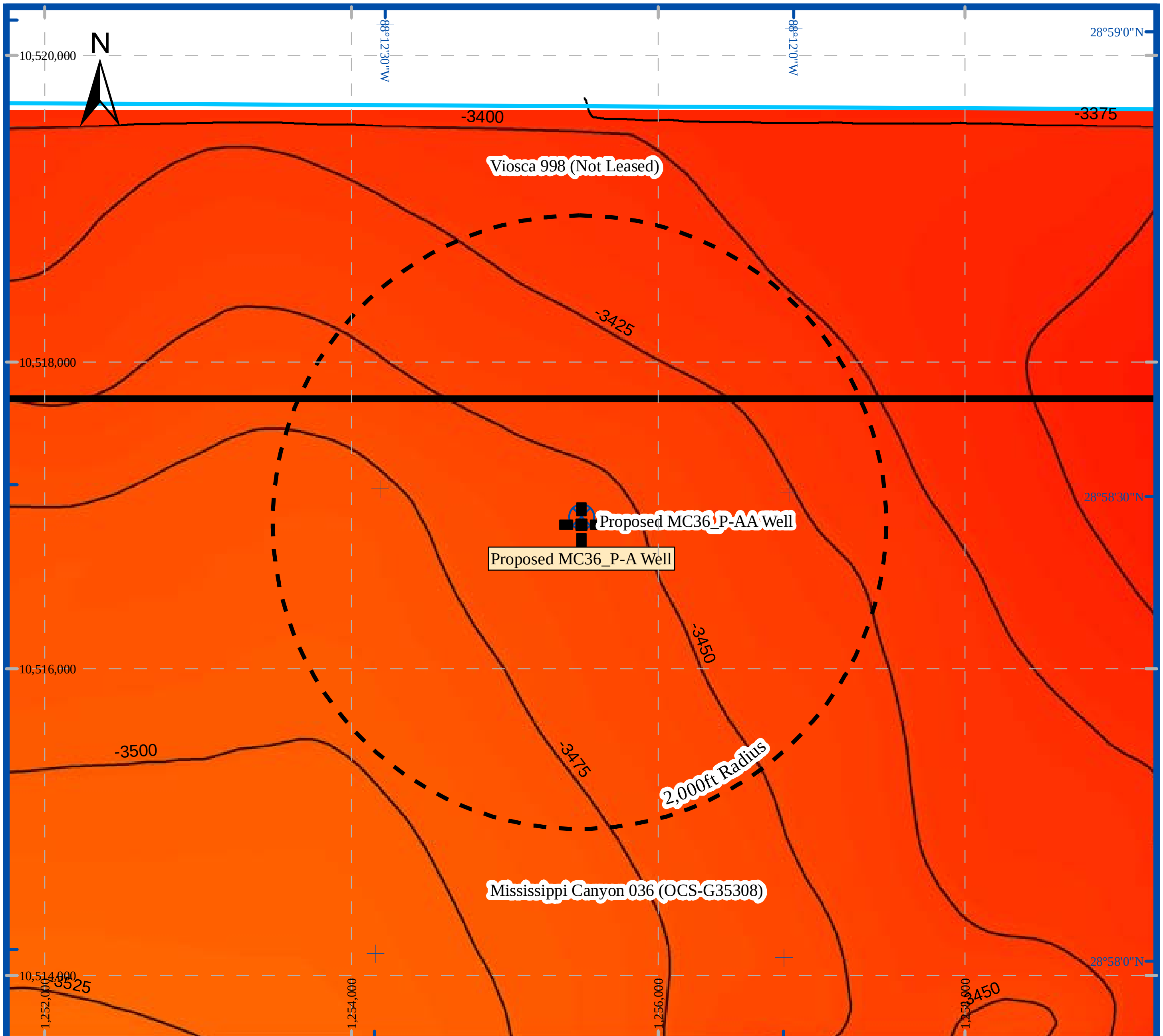
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC36_P-A Well Location (1,255,500ft E / 10,516,943ft N)

Proposed MC36_P-AA Well Location

Block boundaries

Study area boundary

-3457 Depth in feet below sea surface to seabed, contoured at 25ft intervals

-5400 -5000 -4600 -4200 -3800 -3400

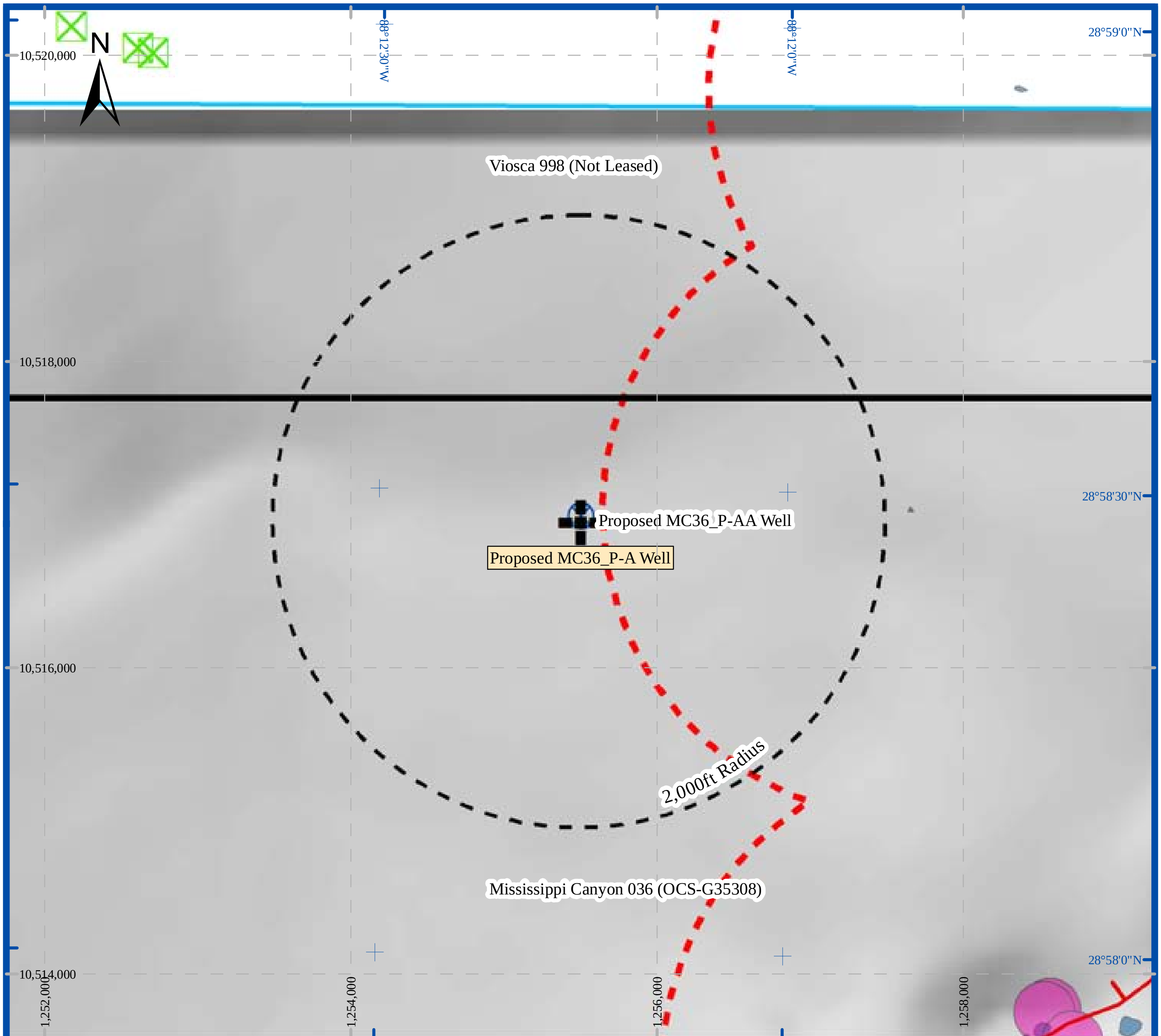
Seabed Depth (Feet)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 1 (MC36_P-A)



Seabed Morphology Extract

Proposed MC36_P-A Well Location (1,255,500ft E / 10,516,943ft N)

Proposed MC36_P-AA Well Location

Block boundaries

Study area boundary

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Sonar contacts, interpreted modern debris

BOEM database

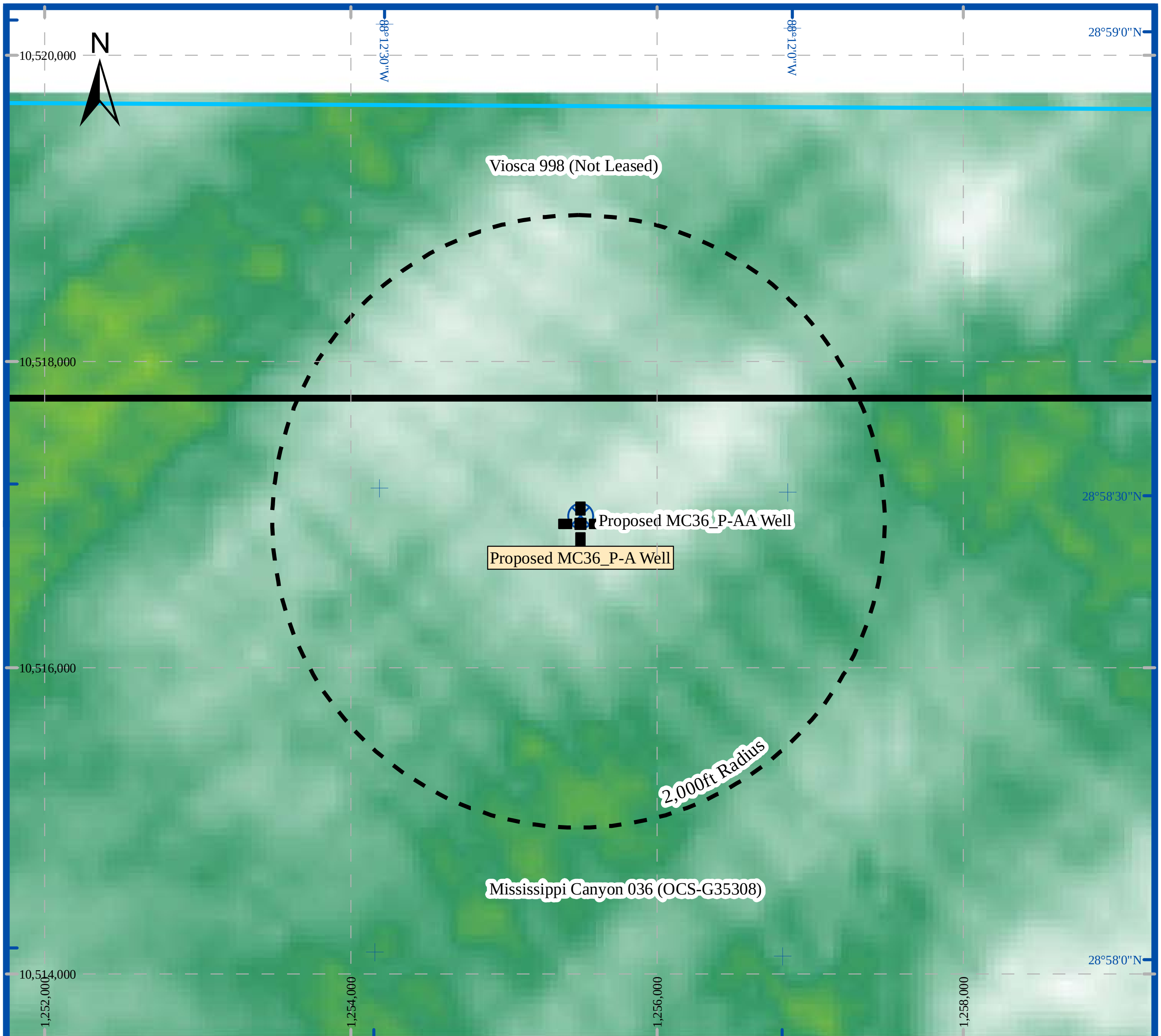
EM302 plumes (400ft Diam)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC36_P-A)



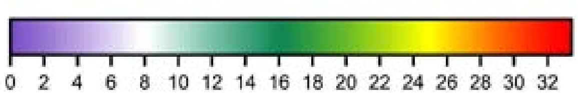
Seabed Amplitude Extract

Proposed MC36_P-A Well Location
(1,255,500ft E / 10,516,943ft N)

Proposed MC36_P-AA Well Location

Block boundaries

Study area boundary



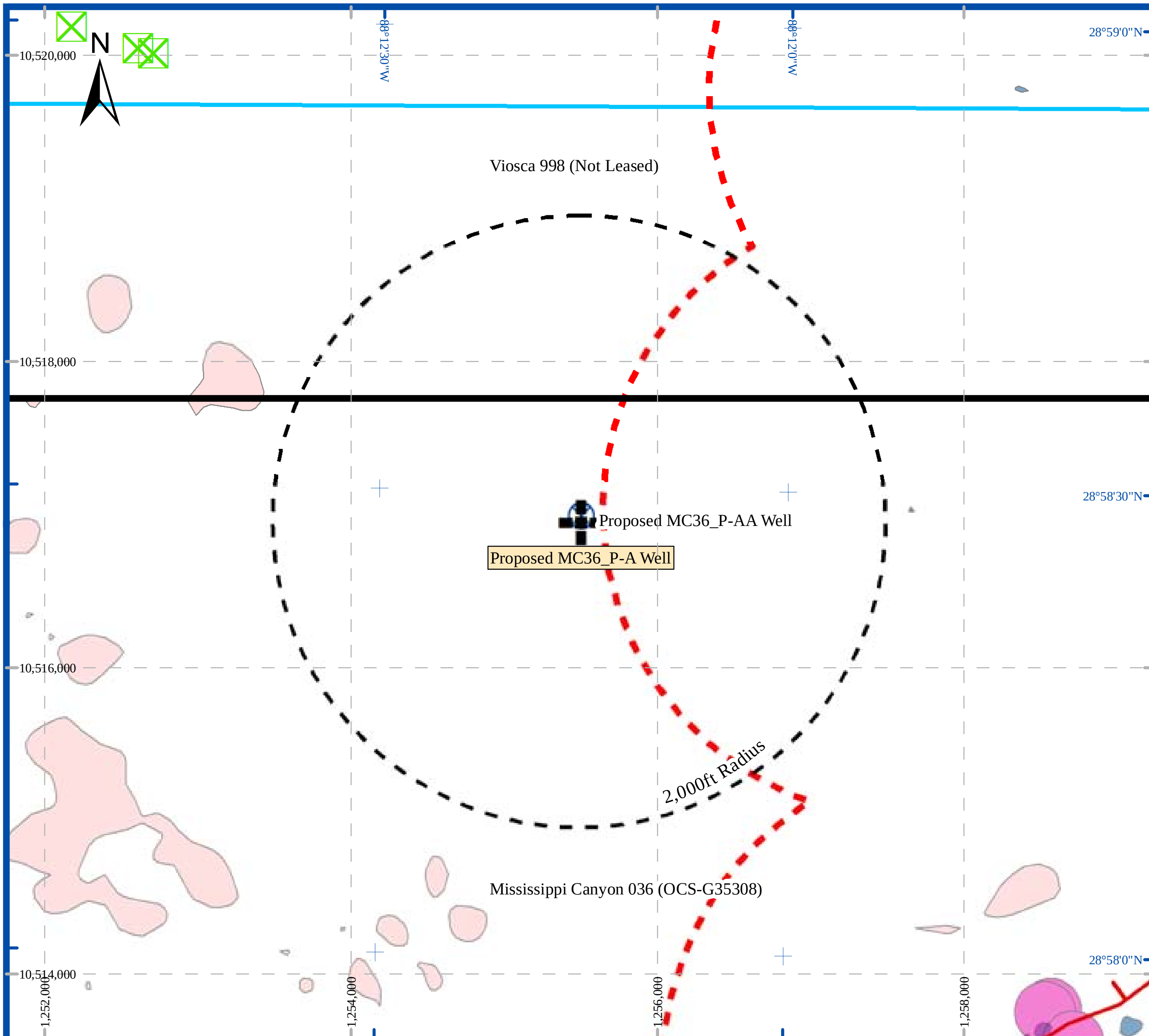
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC36_P-A)



Geohazard Summary Extract

Proposed MC36_P-A Well Location (1,255,500ft E / 10,516,943ft N)

Proposed MC36_P-AA Well Location

Block boundaries

Study area boundary

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Sonar contacts, interpreted modern debris

BOEM database — EM302 plumes (400ft Diam)

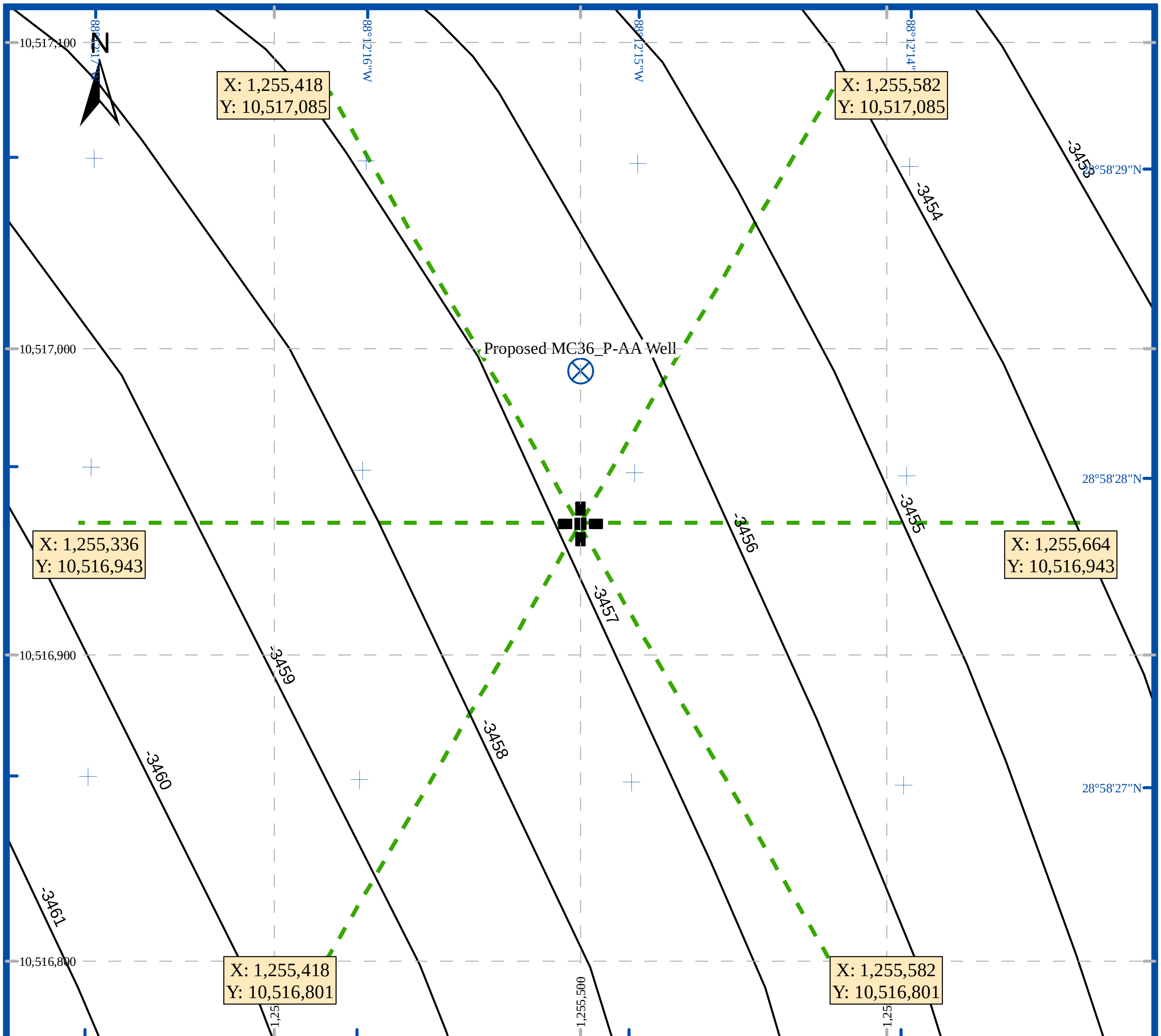
Slight, Moderate, and High Risk of Gas within Unit B

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4 (MC36_P-A)



ROV Plat (MC36_P-A)

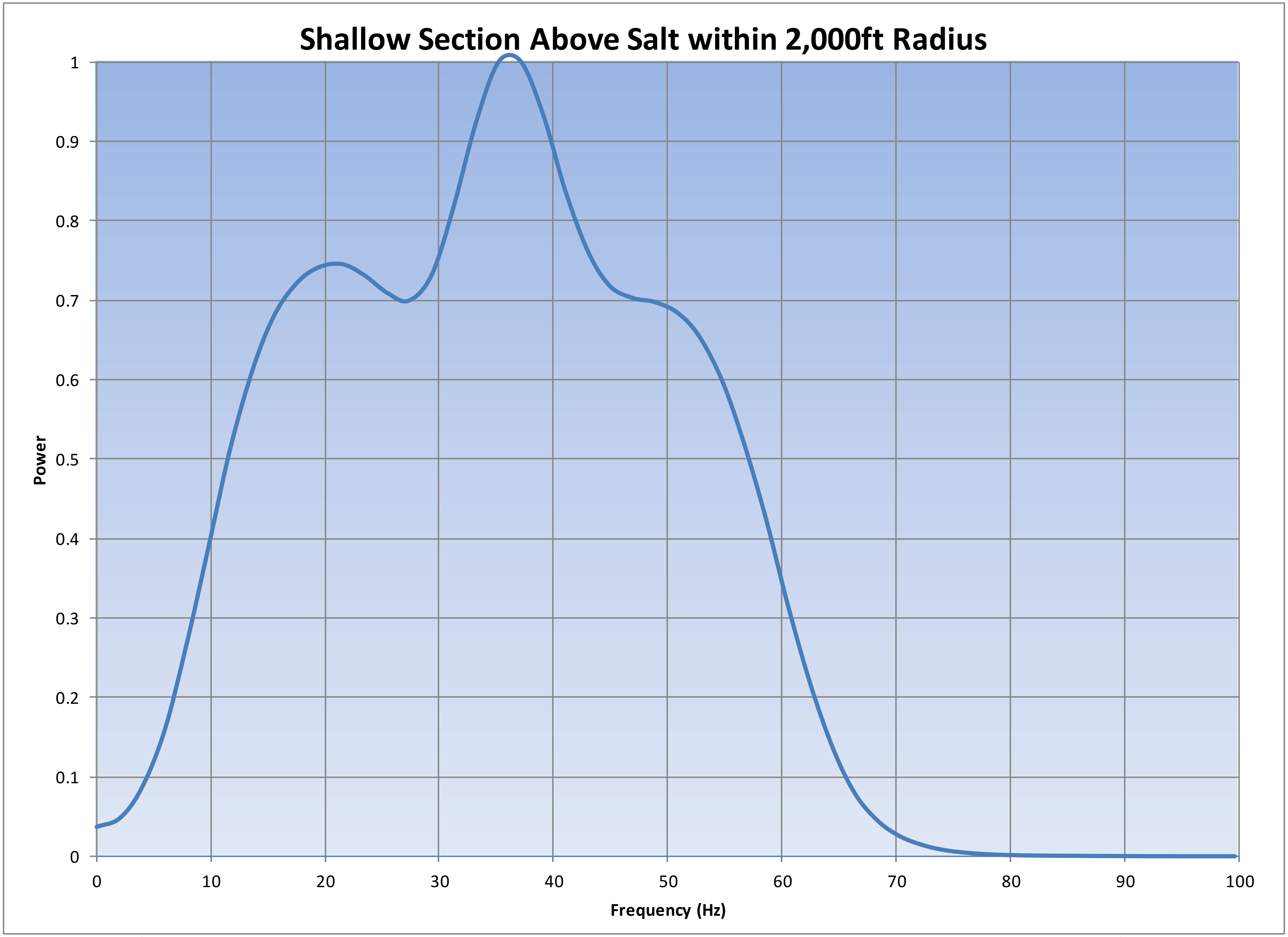
(symbol)	Proposed MC36_P-A Well Location (1,255,500ft E / 10,516,943ft N)	-3457	Depth in feet below sea surface to seabed, contoured at 1ft intervals
(symbol)	Proposed MC36_P-AA Well Location		

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC36_P-A)



MC36_P-A	Power Spectrum	Figure 10

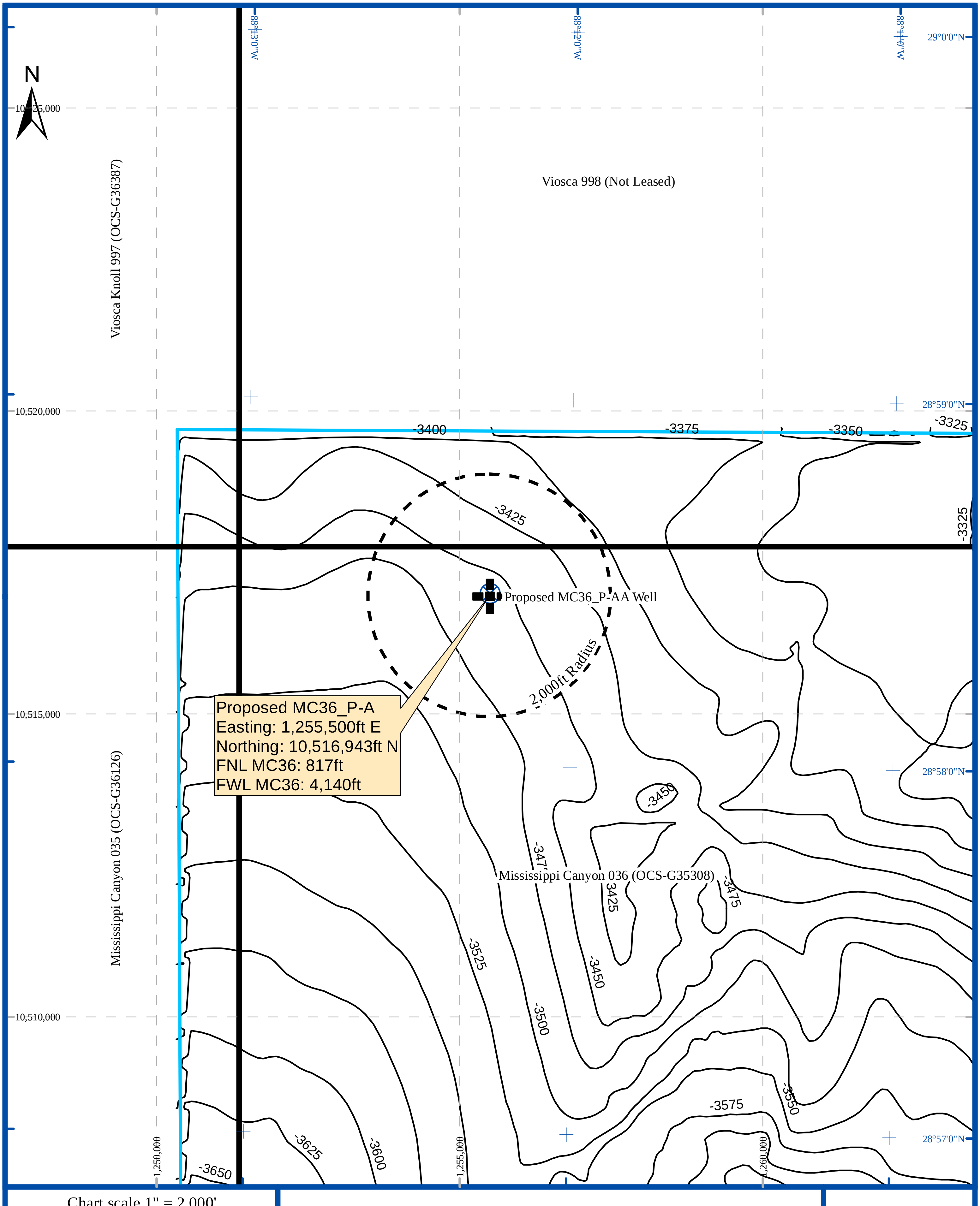


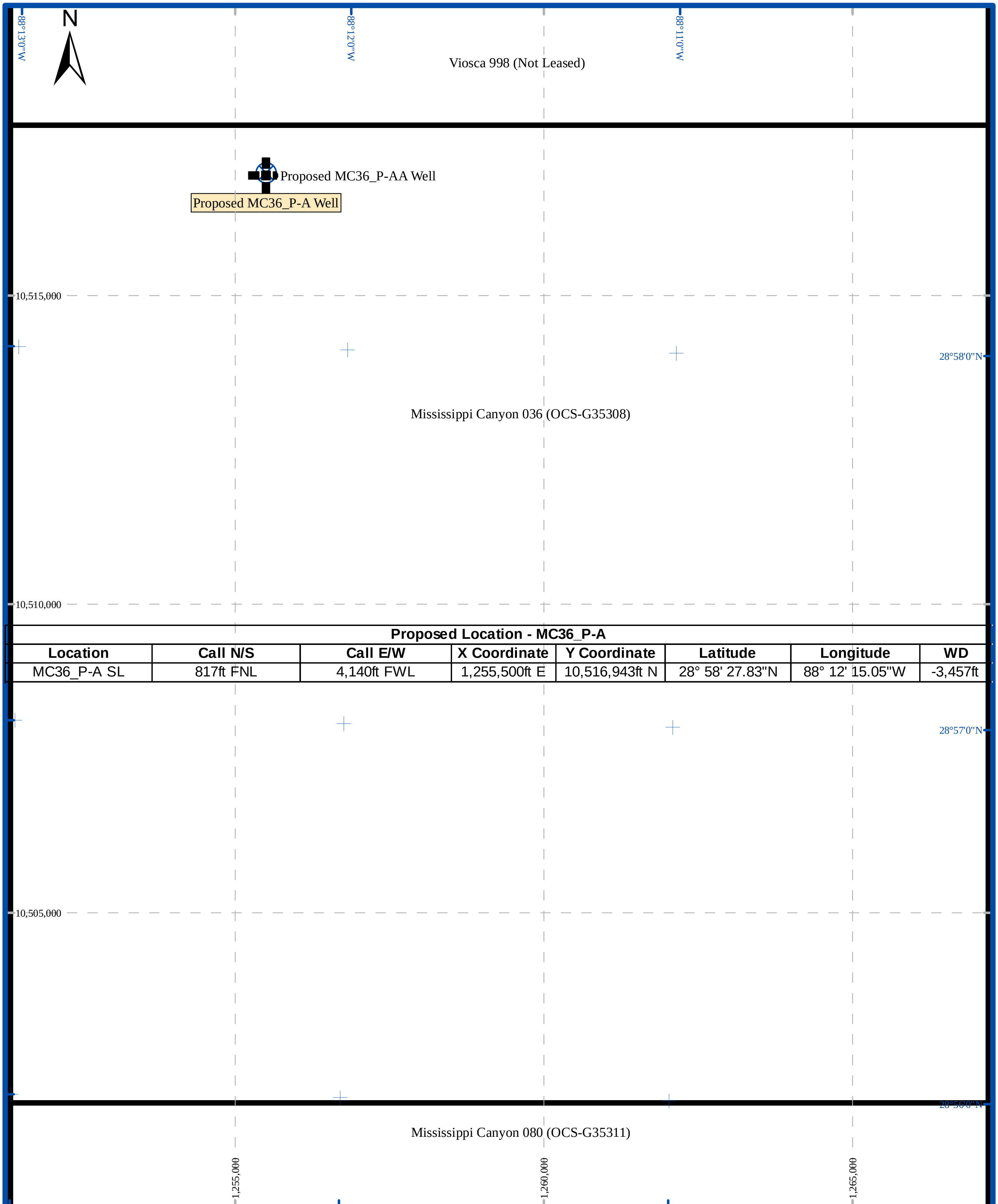
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC36_P-A

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC36_P-A SL	817ft FNL	4,140ft FWL	1,255,500ft E	10,516,943ft N	28° 58' 27.83"N	88° 12' 15.05"W	-3,457ft

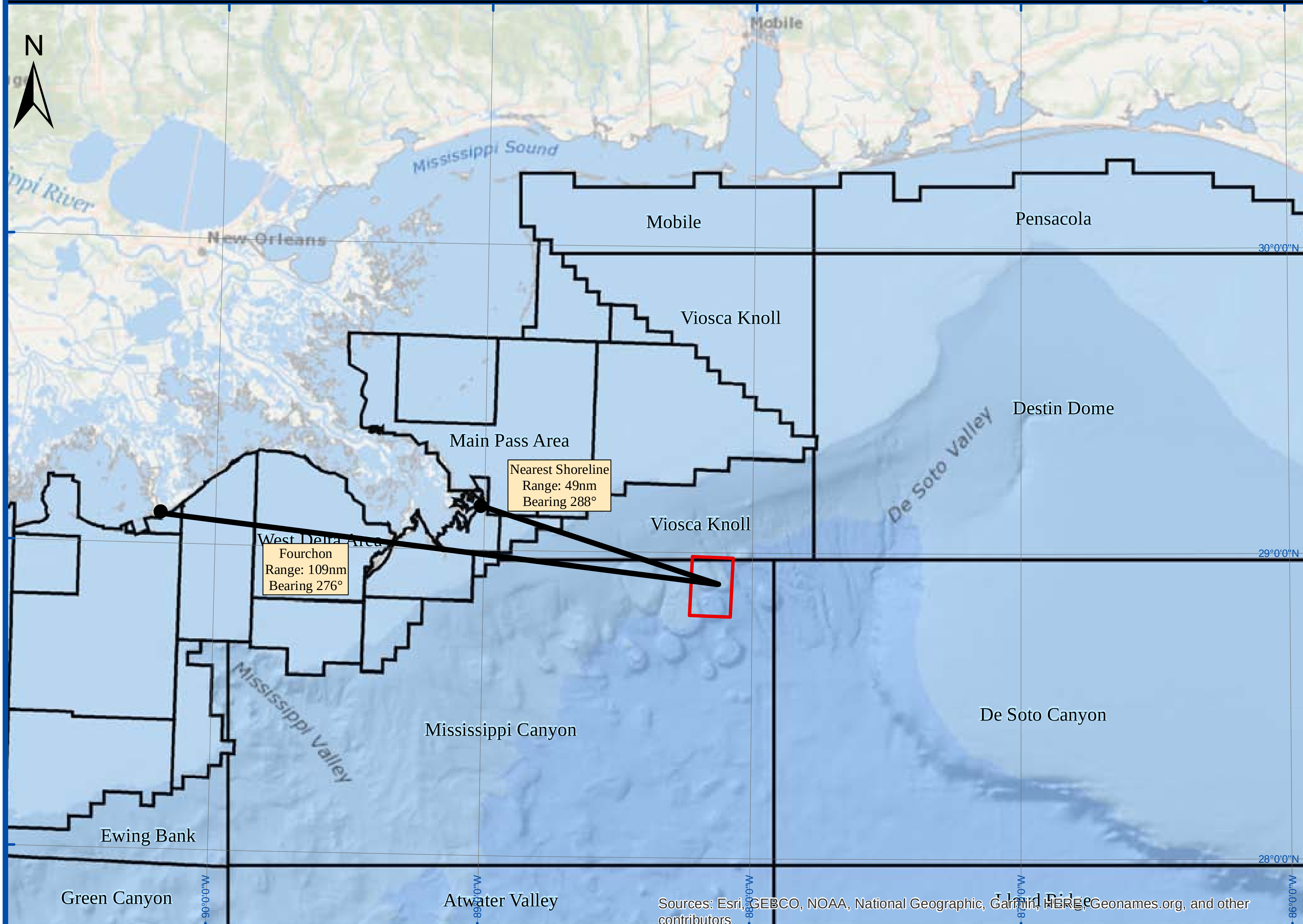
Chart scale 1" = 2,000'
0 500 1,000 2,000 Feet
0 150 300 600 Meters

Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 36

Figure 13



Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 36

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC36_P-A Well Location

August 31, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 36
(OCS-G OCS-G-35308)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-A well location with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.5 seconds two-way time (TWT), -10,427ft below sea surface (6,970ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 1.7° to the WSW. No seabed faults occur within 2,000ft of the proposed well.

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

No seabed infrastructure occurs within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No Identified amplitude anomalies indicative of shallow gas occur within the 2,000ft radius. The vertical borehole will not directly penetrate any identified risk of gas anomalies. No risk of gas is assigned at the proposed well.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, Unit E and throughout Unit F.

No major faults intersect the proposed well.

Proposed MC36_P-A Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	27.834”	North	Easting	1,255,500	US ft. E
Longitude	88°	12’	15.047”	West	Northing	10,516,943	US ft. N
Latitude Decimal			28.9743984				
Longitude Decimal			-88.2041798				
FWL Mississippi Canyon 036			4,140ft	US ft.	Inline	12766	
FNL Mississippi Canyon 036			817ft	US ft.	Crossline	18525	
Water Depth: -3,457ft			Slope: 1.7° WSW				
Nearest Shoreline			44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.7 Miles @ 52.0°		

Proposed MC36_P-AA Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	28.330”	North	Easting	1,255,500	US ft. E
Longitude	88°	12’	15.053”	West	Northing	10,516,993	US ft. N
Latitude Decimal			28.974536				
Longitude Decimal			-88.2041813				
FWL Mississippi Canyon 036			4,140ft	US ft.	Inline	12767	
FNL Mississippi Canyon 036			767ft	US ft.	Crossline	18525	
Water Depth: -3,456ft			Slope: 1.1° WSW				
Nearest Shoreline			44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.7 Miles @ 52.0°		

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

No risk of gas is assigned at the proposed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, Unit E, and throughout Unit F.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC36_P-A Well Location

Anadarko Petroleum Corporation

August 31, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC36_P-A Well Location (OCS-G 35308)

Ladies/Gentlemen:

Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-A with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities

Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 2,020ft to the east.

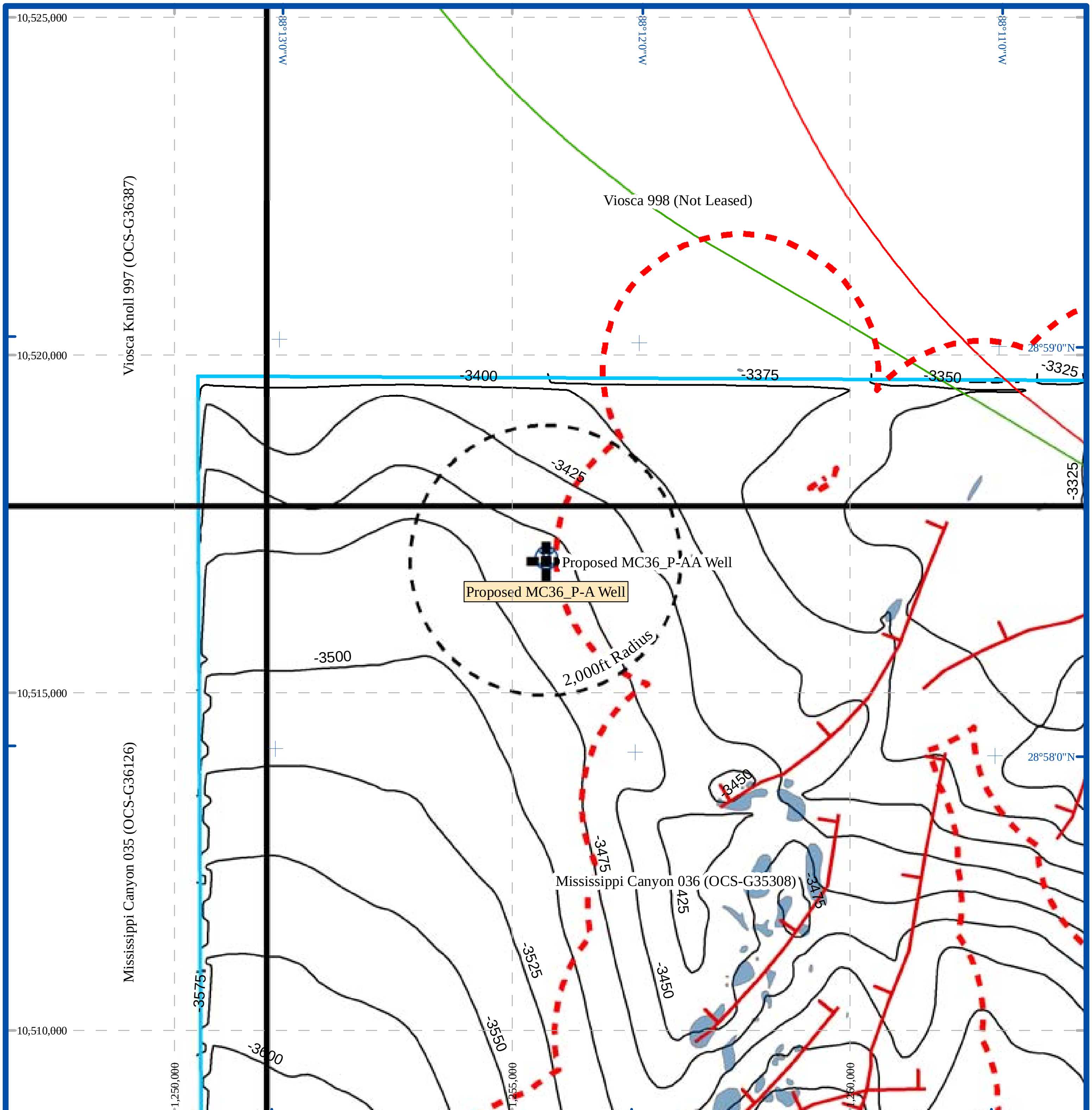
Proposed MC36_P-A Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	27.834"	North	Easting	1,255,500	US ft. E
Longitude	88°	12'	15.047"	West	Northing	10,516,943	US ft. N
Latitude Decimal			28.9743984				
Longitude Decimal			-88.2041798				
FWL Mississippi Canyon 036			4,140ft	US ft.	Inline	12766	
FNL Mississippi Canyon 036			817ft	US ft.	Crossline	18525	
Water Depth: -3,457ft			Slope: 1.7° WSW				
Nearest Shoreline			44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.7 Miles @ 52.0°		

Proposed MC36_P-AA Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	28.330"	North	Easting	1,255,500	US ft. E
Longitude	88°	12'	15.053"	West	Northing	10,516,993	US ft. N
Latitude Decimal			28.974536				
Longitude Decimal			-88.2041813				
FWL Mississippi Canyon 036			4,140ft	US ft.	Inline	12767	
FNL Mississippi Canyon 036			767ft	US ft.	Crossline	18525	
Water Depth: -3,456ft			Slope: 1.1° WSW				
Nearest Shoreline			44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		8.7 Miles @ 52.0°		

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

Conclusions and Recommendations: The proposed MC36_P-A and proposed MC36_P-AA well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC36_P-A Well Location (1,255,500ft E / 10,516,943ft N)

Proposed MC36_P-AA Well Location

Block boundaries

Oil Pipelines

Gas Pipelines

Study area boundary

-3457 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Peach Prospect
Mississippi Canyon, Block MC36,
Offshore Gulf of Mexico

Description:
Proposed MC36_P-B Well Location

Project Number:
2020-305

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	………………… A Haigh
	Quality Assurance	………………… D Haigh

Revision	**Date**	**Title**
0	July 22, 2020	Draft
1	August 31, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

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OCEAN GEO SOLUTIONS, INC
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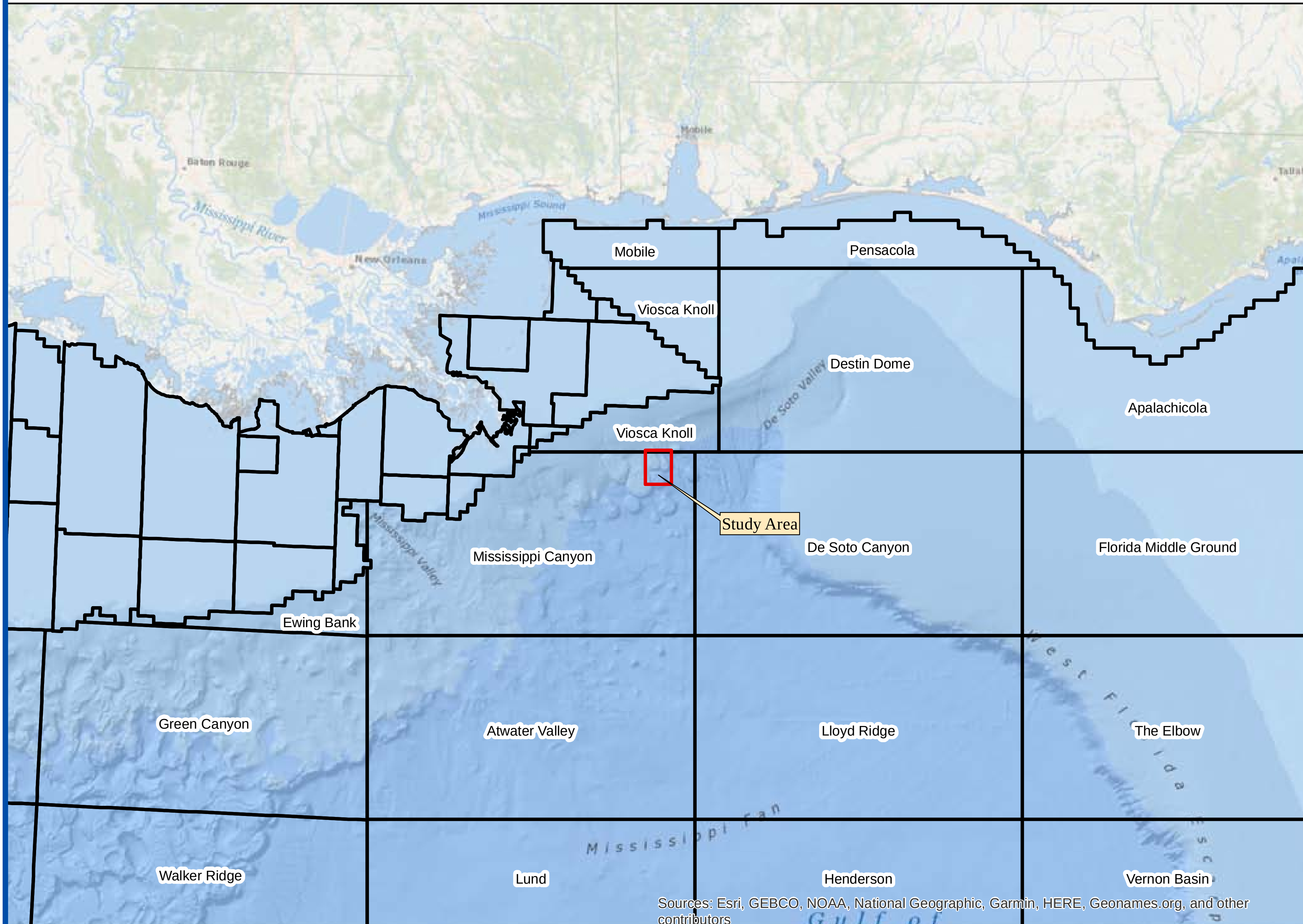
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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WELL CLEARANCE LETTER – PROPOSED MC36_P-B WELL LOCATION

August 31, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC36_P-B Well Location
Mississippi Canyon Block MC36
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC36_P-B Well Location, Mississippi Canyon Area (OCS-G-35308). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,405ft below sea surface (6,921ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC36_P-B well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC36_P-B Well Location lies in the south-central of Block MC36 (OCS-G-35308).

Proposed MC36_P-B Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	07.99”	North	Easting	1,255,300.	US ft. E
Longitude	88°	12’	17.079”	West	Northing	10,514,941	US ft. N
Latitude Decimal			28.9688861				
Longitude Decimal			-88.2047415				
FWL Mississippi Canyon 36			3,940ft	US ft.	Inline	12751	
FNL Mississippi Canyon 36			2,819ft	US ft.	Crossline	18461	
Water Depth: -3,484ft			Slope: 1.54° SW				
Nearest Shoreline			43 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		9.3 Miles @ 47.8°		

Proposed MC36_P-BB Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58’	08.485”	North	Easting	1,255,300.	US ft. E
Longitude	88°	12’	17.075”	West	Northing	10,514,991	US ft. N
Latitude Decimal			28.9690236				
Longitude Decimal			-88.20474314				
FWL Mississippi Canyon 36			3,940ft	US ft.	Inline	12751	
FNL Mississippi Canyon 36			2,769ft	US ft.	Crossline	18465	
Water Depth: -3,483ft			Slope: 1.5° SW				
Nearest Shoreline			43 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		9.3 Miles @ 47.8°		

Location MC36_P-BB is 50ft from MC36_P-B on a bearing of 000°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC36_P-B well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)-(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC36_P-B well location is -3,484ft below sea surface (Figure 1). The seafloor slopes to the southwest at 1.54°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC36_P-B well location is in the northwest part of block MC36. The proposed well is located in an area of relatively smooth seabed located within a minibasin to the northwest of Horn Dome.

No seabed fault intersections occur within 2,000ft of the proposed location.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,705ft below sea surface (221ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,705ft below sea surface (221ft below seabed).

4.3 Unit B

The upper part of Unit B, from -3,705ft to -3,791ft below sea surface (221ft to 307ft below seabed), displays generally low-amplitude reflectors, and is interpreted as well-layered clays and silts with occasional sands.

From -3,791ft to -3,953ft below sea surface (307ft to 469ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur. These sands also show an anomalous character consistent with shallow gas approximately 455ft to the SSW of the proposed well. The anomaly exhibits connectivity to the well-path where the amplitude decreases slightly. Given that the proposed well is located slightly updip from the amplitude anomaly with connectivity a **Slight Risk of Gas** is assigned within this interval.

From –3,953ft below sea surface (469ft below seabed) to -4,243ft below sea surface (759ft below seabed), Unit B is characterized by well-layered, low and occasional moderate--amplitude reflectors interpreted as clays, silts, and occasional sands. A better defined <20ft thick sand interbed ocurs at -4,049ft below sea surface (565ft below sebaed). Minor wellbore stability and drilling fluid circulation problems may occur at this interbed.

The lower interval of Unit B from -4,243ft below sea surface (759ft below seabed) to -4,552ft below sea surface (1,068ft below seabed) presents acoustically as well-layered, low-amplitude reflectors with clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

Horizon H10 marks the base of Unit B, occurring at -4,552ft below sea surface (1,068ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4

Unit C from -4,552ft to -5,289ft below sea surface (1,068ft to 1,805ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit C at the proposed well, or within 2,000ft.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -5,289ft below sea surface (1,805ft below seabed).

4.5 Unit D

The upper part of Unit D from -5,289ft below sea surface (1,805ft below seabed) to -5,795ft below sea surface (2,311ft below seabed) presents as well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional sands.

Unit D from -5,795ft to -6,190ft below sea surface (2,311ft to 2,706ft below seabed) is characterized by slightly-chaotic, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sands. This interval appears to have been deposited at a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology is slightly-tilted and disrupted. This geological setting can, on occasions, induce minor over-pressure, and as such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit D from -6,190ft below sea surface (2,706ft below seabed) to -6,655ft below sea surface (3,171ft below seabed) is interpreted to consist of clays, silts, and occasional sands.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -6,655ft below sea surface (3,171ft below seabed).

4.6 Unit E

The upper part of Unit E from -6,655ft to -6,900ft below sea surface (3,171ft to 3,416ft below seabed) is characterized by low and occasional moderate-amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~600ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit E from -6,900ft below sea surface (3,416ft below seabed) to –7,422ft below sea surface (3,938ft below seabed) is interpreted to comprise well-layered, low amplitude, slightly tilted ineterbeds with clays, silts, and occasional sands.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit E.

Horizon H40 marks the base of Unit E at -7,422ft below sea surface (3,938ft below seabed).

4.7 Unit F

Unit F from -7,422ft to -9,056ft below sea surface (3,938ft to 5,572ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~750ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft radius of the proposed well.

The well-path will not traverse any faults within Unit F.

Horizon H50 marks the base of Unit F at -9,056ft below sea surface (5,572ft below seabed).

4.8 Unit G

Unit G from -9,056ft to -10,405ft below sea surface (5,572ft to 6,921ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit G.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,405ft below sea surface (6,921ft below seabed).

4.9 Shallow Gas Assessment

Within Unit B, a **Slight Risk of Gas** is interpreted within the interval from -3,791ft to -3,953ft below sea surface (307ft to 469ft below seabed).

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within the interval from -3,791ft to -3,953ft below sea surface (307ft to 469ft below seabed).

Throughout Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,795ft to -6,190ft below sea surface (2,311ft to 2,706ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,655ft to -6,900ft below sea surface (3,171ft to 3,416ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,422ft to -9,056ft below sea surface (3,938ft to 5,572ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None predicted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Risk of Gas** and a **Slight Shallow Water Flow Risk** is interpreted within the interval from -3,791ft to -3,953ft below sea surface (307ft to 469ft below seabed) Drilling Caution and appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  Minor wellbore and drilling fluid circulation problems may occur at the level of a <20ft thick sand interbed at -4,049ft below sea surface (565ft below seabed).

- Unit C

  None Predicted.

- Unit D

  Throughout Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,795ft to -6,190ft below sea surface (2,311ft to 2,706ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,655ft to -6,900ft below sea surface (3,171ft to 3,416ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,422ft to -9,056ft below sea surface (3,938ft to 5,572ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit G

  No drilling hazards or problems interpreted.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:

Proposed MC36_P-B Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

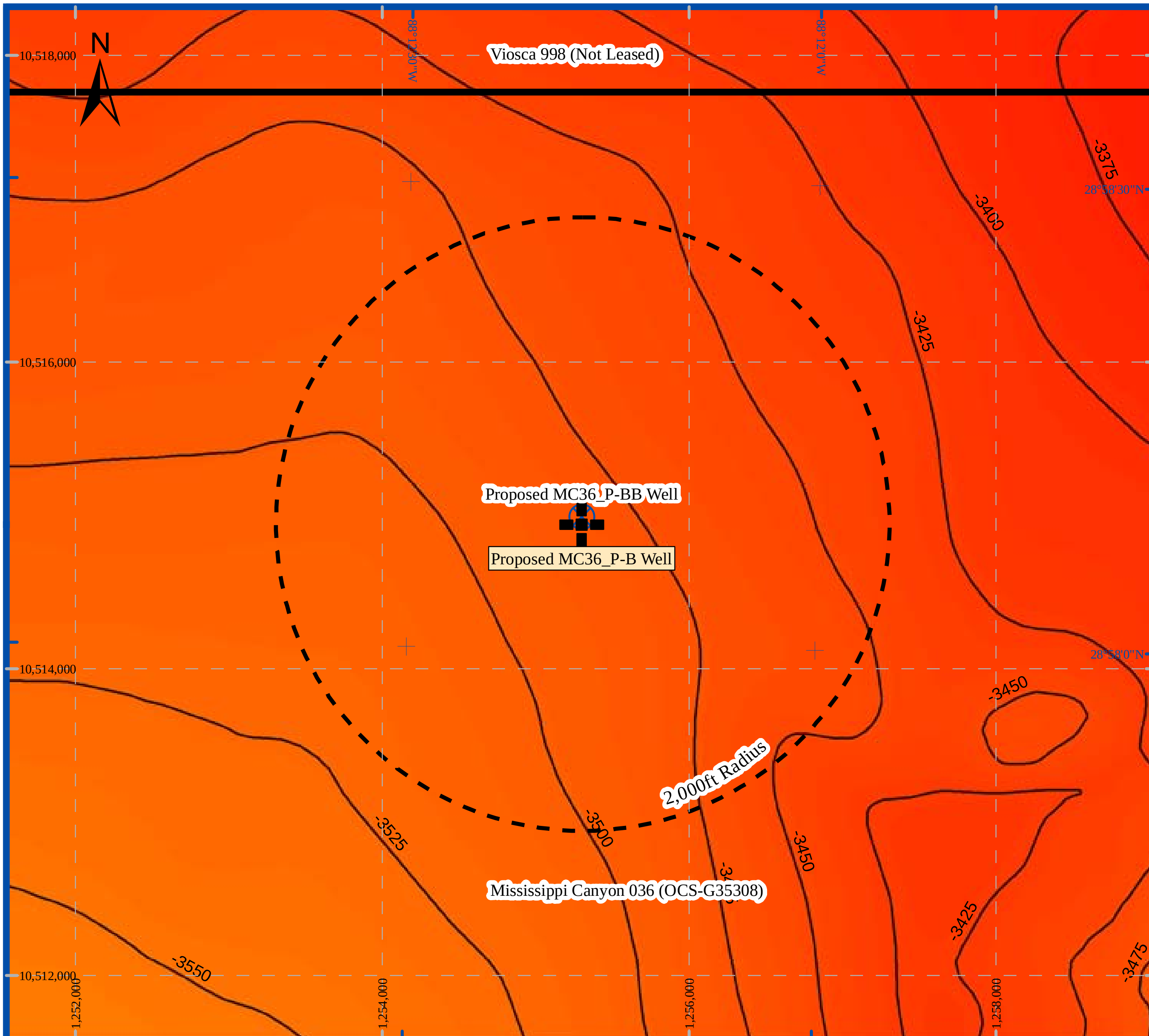
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC36_P-B Well Location
(1,255,300ft E / 10,514,941ft N)

Proposed MC36_P-BB Well Location

Block boundaries

-3484 Depth in feet below sea surface to seabed, contoured at 25ft intervals

Seabed Depth (Feet)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 1
(MC36_P-B)

Seabed Morphology Extract

Proposed MC36_P-B Well Location (1,255,300ft E / 10,514,941ft N)

Proposed MC36_P-BB Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Sonar contacts, interpreted modern debris

BOEM database — EM302 plumes (400ft Diam)

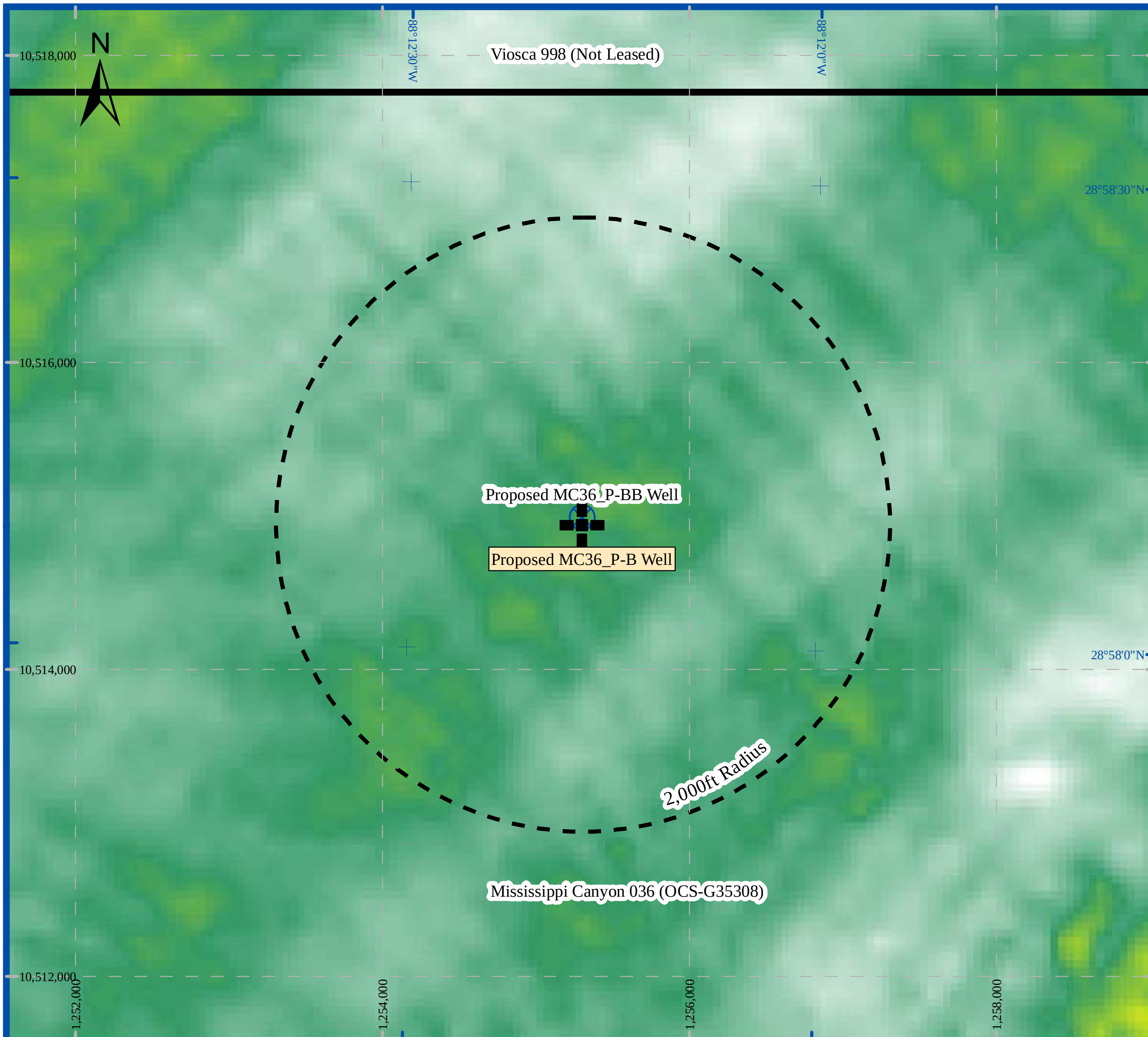
BOEM database — Seep anomaly positives (Cofirmed Organisms)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC36_P-B)



Seabed Amplitude Extract

Proposed MC36_P-B Well Location
(1,255,300ft E / 10,514,941ft N)

Proposed MC36_P-BB Well Location

Block boundaries

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32

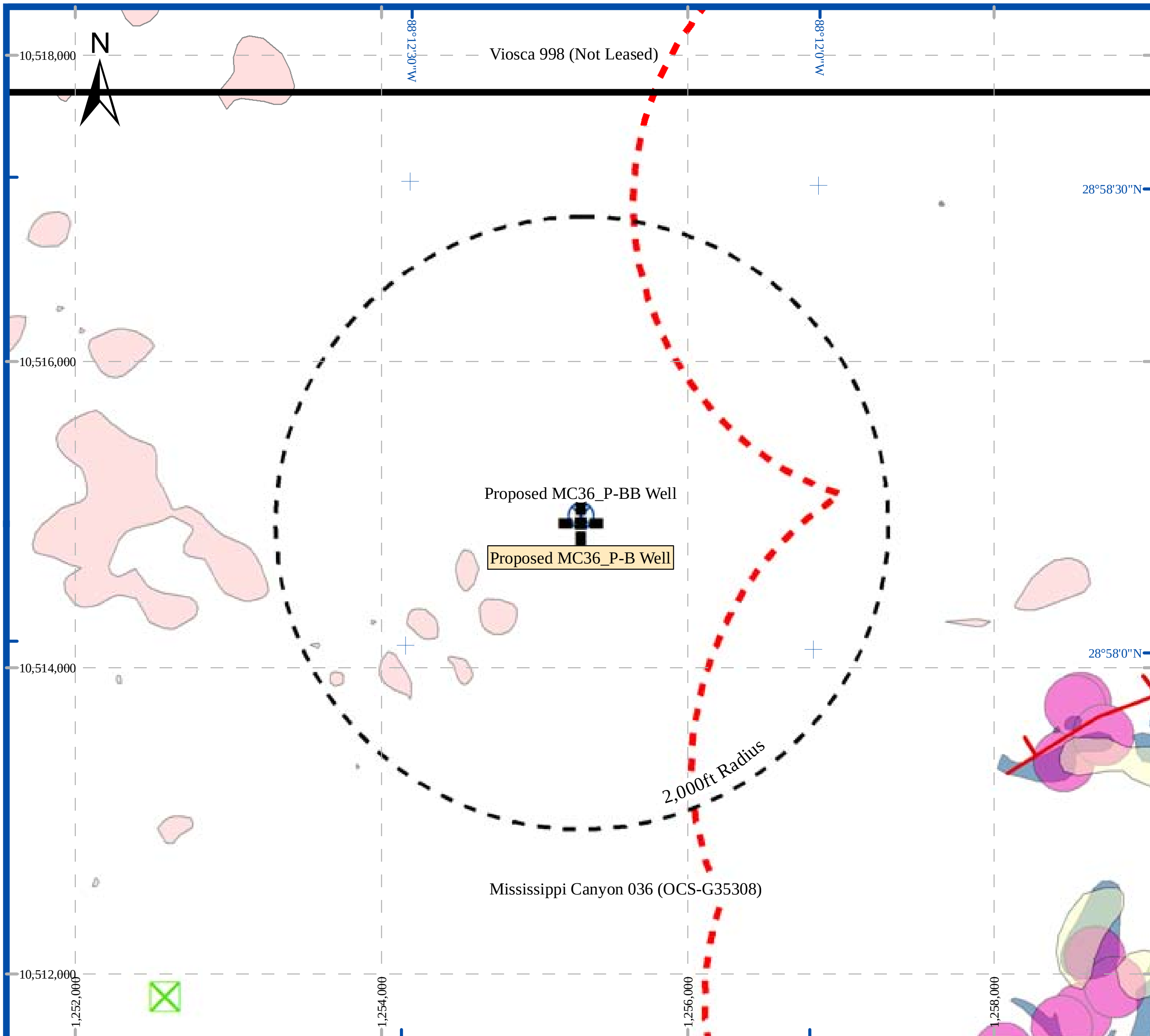
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC36_P-B)



Geohazard Summary Extract

Proposed MC36_P-B Well Location (1,255,300ft E / 10,514,941ft N)

Proposed MC36_P-BB Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Sonar contacts, interpreted modern debris

BOEM database — EM302 plumes (400ft Diam)

BOEM database — Seep anomaly positives (Cofirmed Organisms)

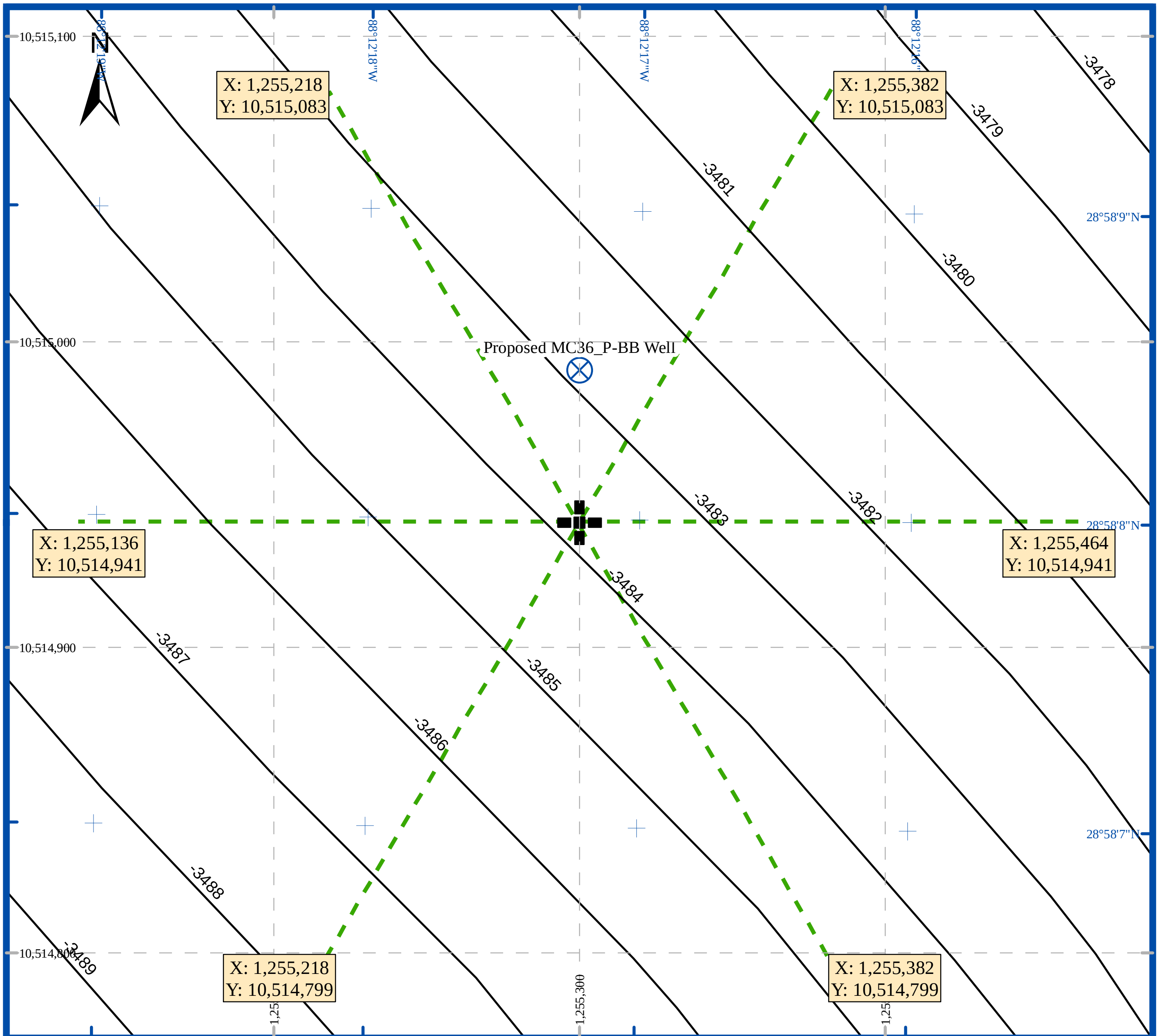
Slight, Moderate, and High Risk of Gas within Unit B

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC36_P-B)



ROV Plat (MC36_P-B)

Proposed MC36_P-B Well Location
(1,255,300ft E / 10,514,941ft N)

Proposed MC36_P-BB Well Location

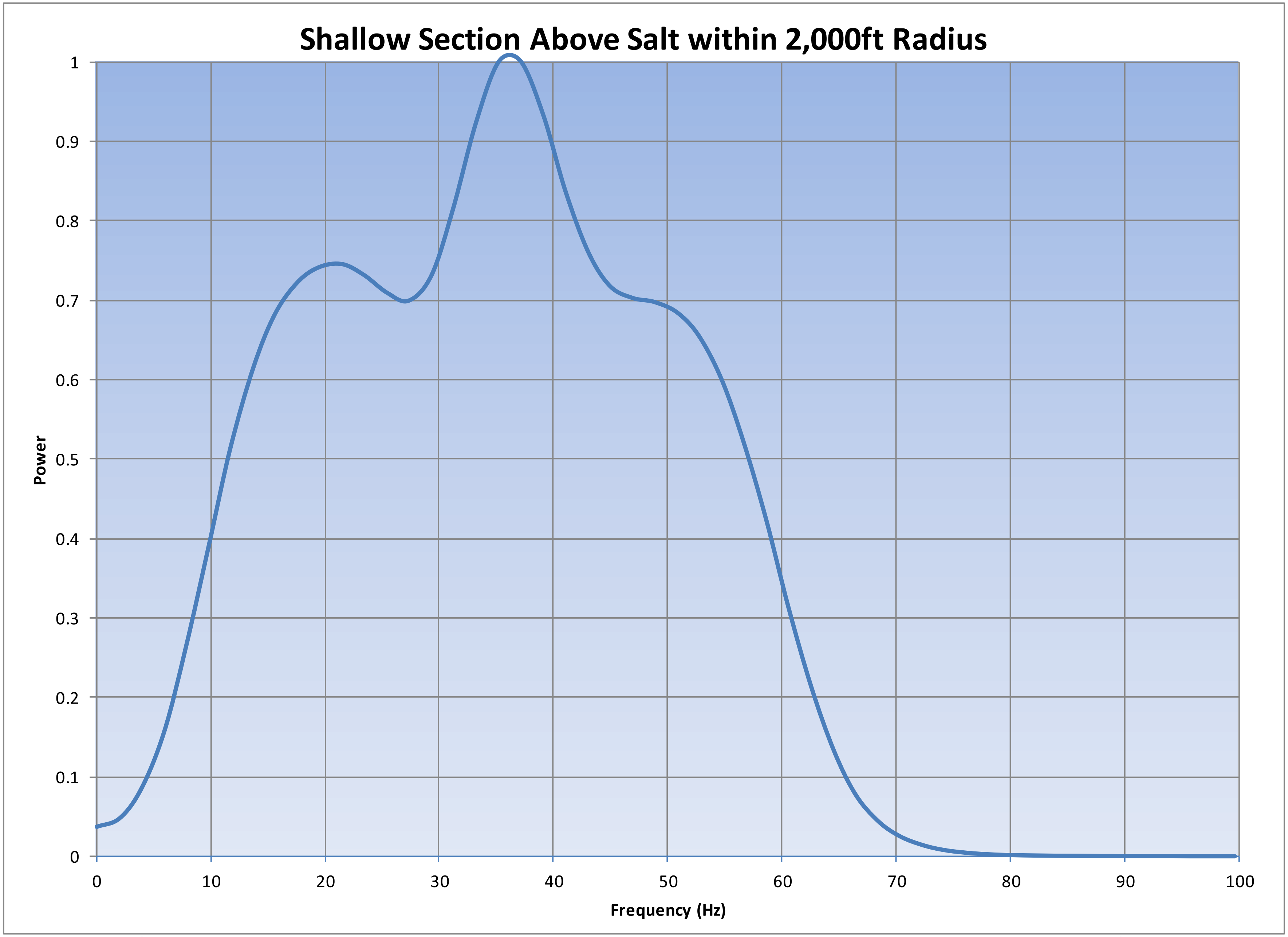
-3484 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC36_P-B)



MC36_P-B	Power Spectrum	Figure 10

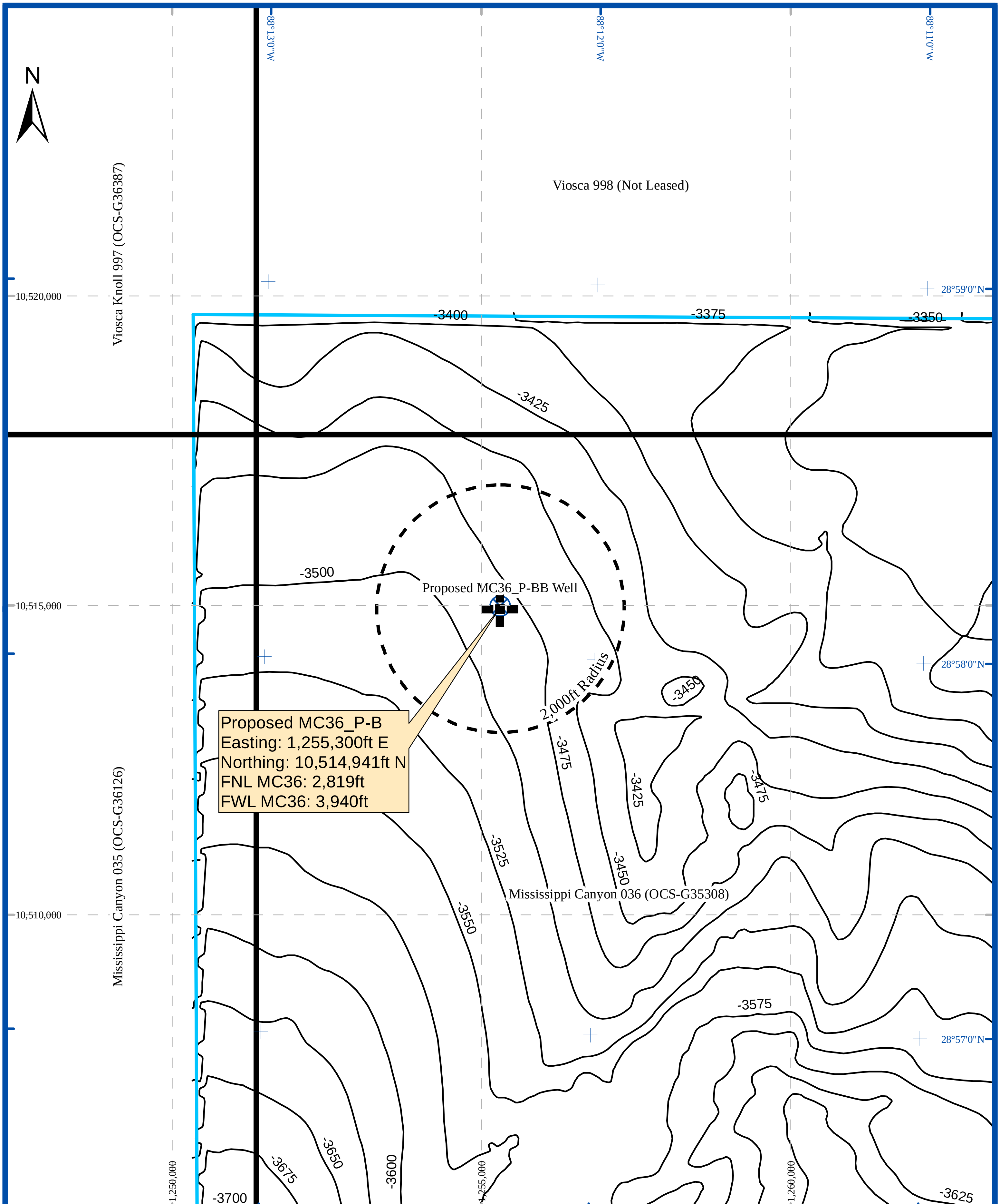


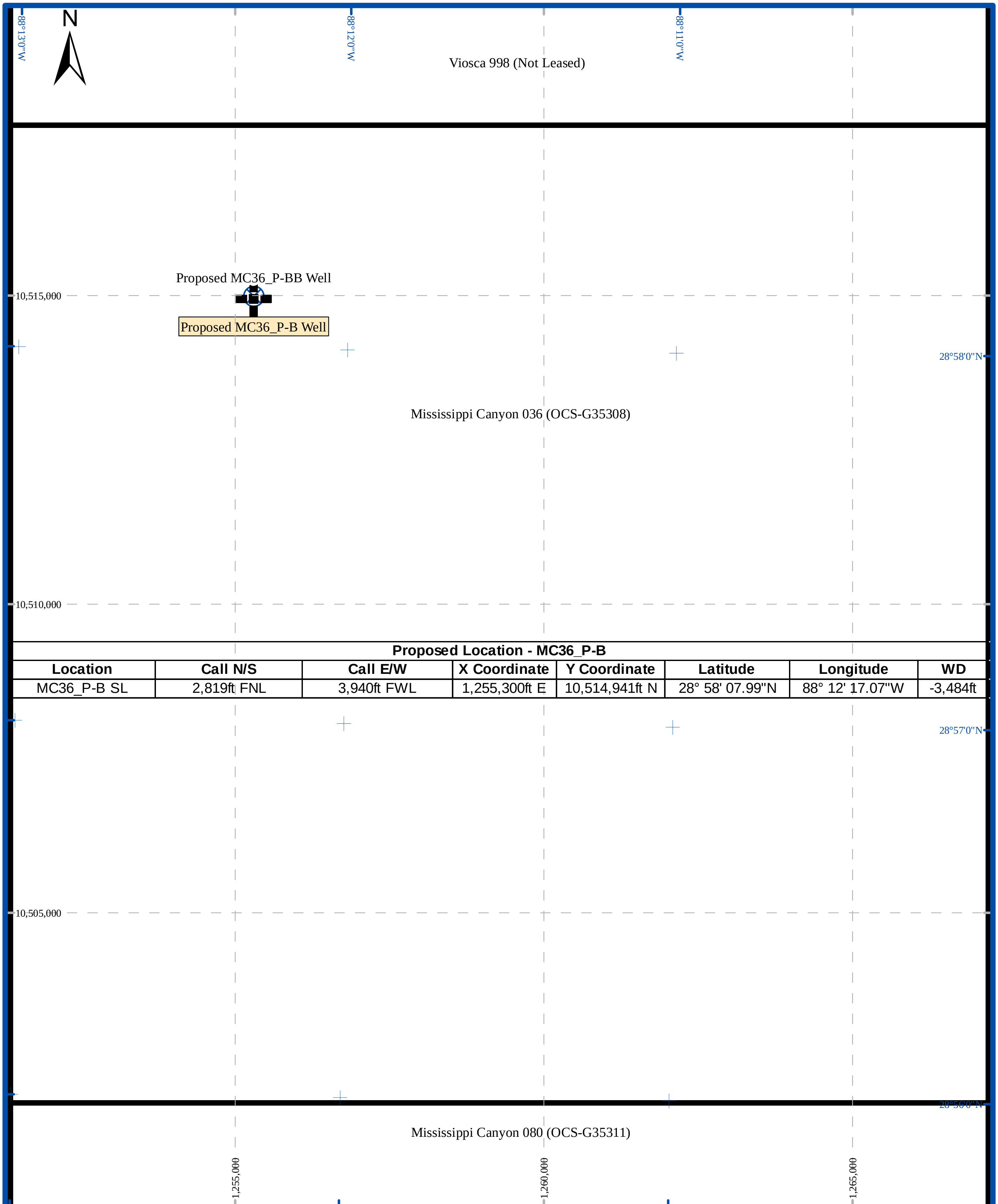
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC36_P-B

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC36_P-B SL	2,819ft FNL	3,940ft FWL	1,255,300ft E	10,514,941ft N	28° 58' 07.99"N	88° 12' 17.07"W	-3,484ft

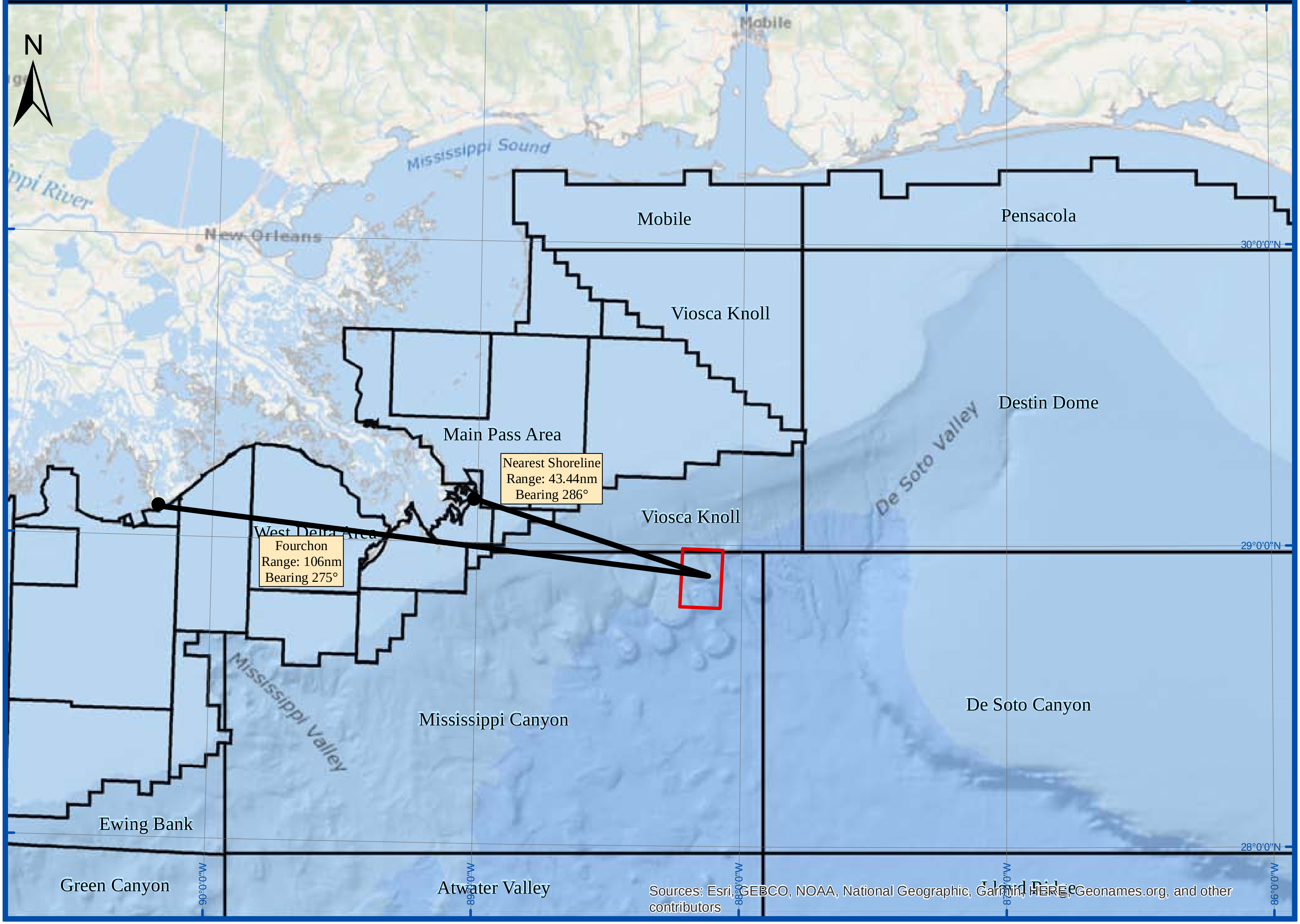
Chart scale 1" = 2,000'
0 500 1,000 2,000 Feet
0 150 300 600 Meters

Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 36

Figure 13



Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 36

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC36_P-B Well Location

August 31, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 36
(OCS-G OCS-G-35308)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-B well location with surface location in Block 036, Mississippi Canyon Area (OCS-G-35308). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.5 seconds two-way time (TWT), -10,405ft below sea surface (6,921ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 1.54° to the southwest. No seabed faults occur within 2,000ft of the proposed well.

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

No seabed infrastructure occurs within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. Several anomalies indicative of shallow gas occur within the 2,000ft radius in Unit B. The vertical borehole will contact a **Slight Risk of Gas** anomaly in Unit B, where an anomaly in Unit B shows connectivity to the well-path.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, E and F.

No major faults intersect the proposed well.

Proposed MC36_P-B Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	07.99"	North	Easting	1,255,300.	US ft. E
Longitude	88°	12'	17.079"	West	Northing	10,514,941	US ft. N
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Water Depth: -3,483ft	Slope: 1.5° SW						
Nearest Shoreline	43 Nautical Miles @ 286°						
Port of Operation	Fourchon	106 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	9.3 Miles @ 47.8°					

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

A **Slight Risk of Gas** is assigned within an interval in Unit B. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, Unit E, and Unit F.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC36_P-B Well Location

Anadarko Petroleum Corporation

August 31, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC36_P-B Well Location (OCS-G 35308)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-B with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 3,042ft to the southeast.

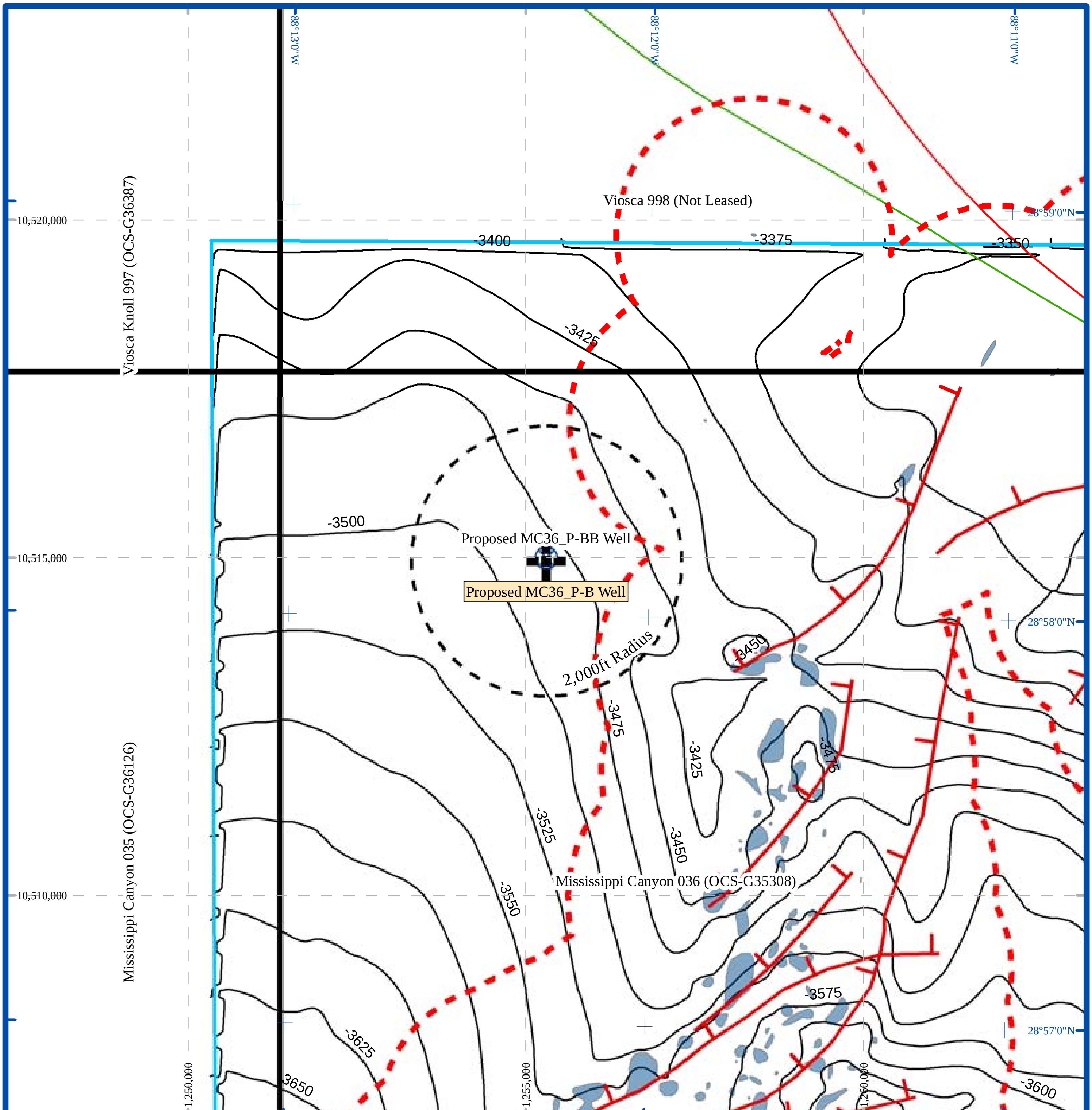
Proposed MC36_P-B Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	07.99"	North	Easting	1,255,300.	US ft. E
Longitude	88°	12'	17.079"	West	Northing	10,514,941	US ft. N
Latitude Decimal			28.9688861				
Longitude Decimal			-88.2047415				
FWL Mississippi Canyon 36			3,940ft	US ft.	Inline	12751	
FNL Mississippi Canyon 36			2,819ft	US ft.	Crossline	18461	
Water Depth: -3,484ft			Slope: 1.54° SW				
Nearest Shoreline			43 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		9.3 Miles @ 47.8°		

Proposed MC36_P-BB Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	58'	08.485"	North	Easting	1,255,300.	US ft. E
Longitude	88°	12'	17.075"	West	Northing	10,514,991	US ft. N
Latitude Decimal			28.9690236				
Longitude Decimal			-88.20474314				
FWL Mississippi Canyon 36			3,940ft	US ft.	Inline	12751	
FNL Mississippi Canyon 36			2,769ft	US ft.	Crossline	18465	
Water Depth: -3,483ft			Slope: 1.5° SW				
Nearest Shoreline			43 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		9.3 Miles @ 47.8°		

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

Conclusions and Recommendations: The proposed MC36_P-B and proposed MC36_P-BB well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC36_P-B Well Location (1,255,300ft E / 10,514,941ft N)

Proposed MC36_P-BB Well Location

Block boundaries

Oil Pipelines

Gas Pipelines

Study area boundary

-3484 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Peach Prospect
Mississippi Canyon, Block MC36,
Offshore Gulf of Mexico

Description:
Proposed MC36_P-C Well Location

Project Number:
2020-306

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	A.H.K ………………… A Haigh
	Quality Assurance	D Haigh ………………… D Haigh

Revision	**Date**	**Title**
0	July 24, 2020	Draft
1	August 31, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

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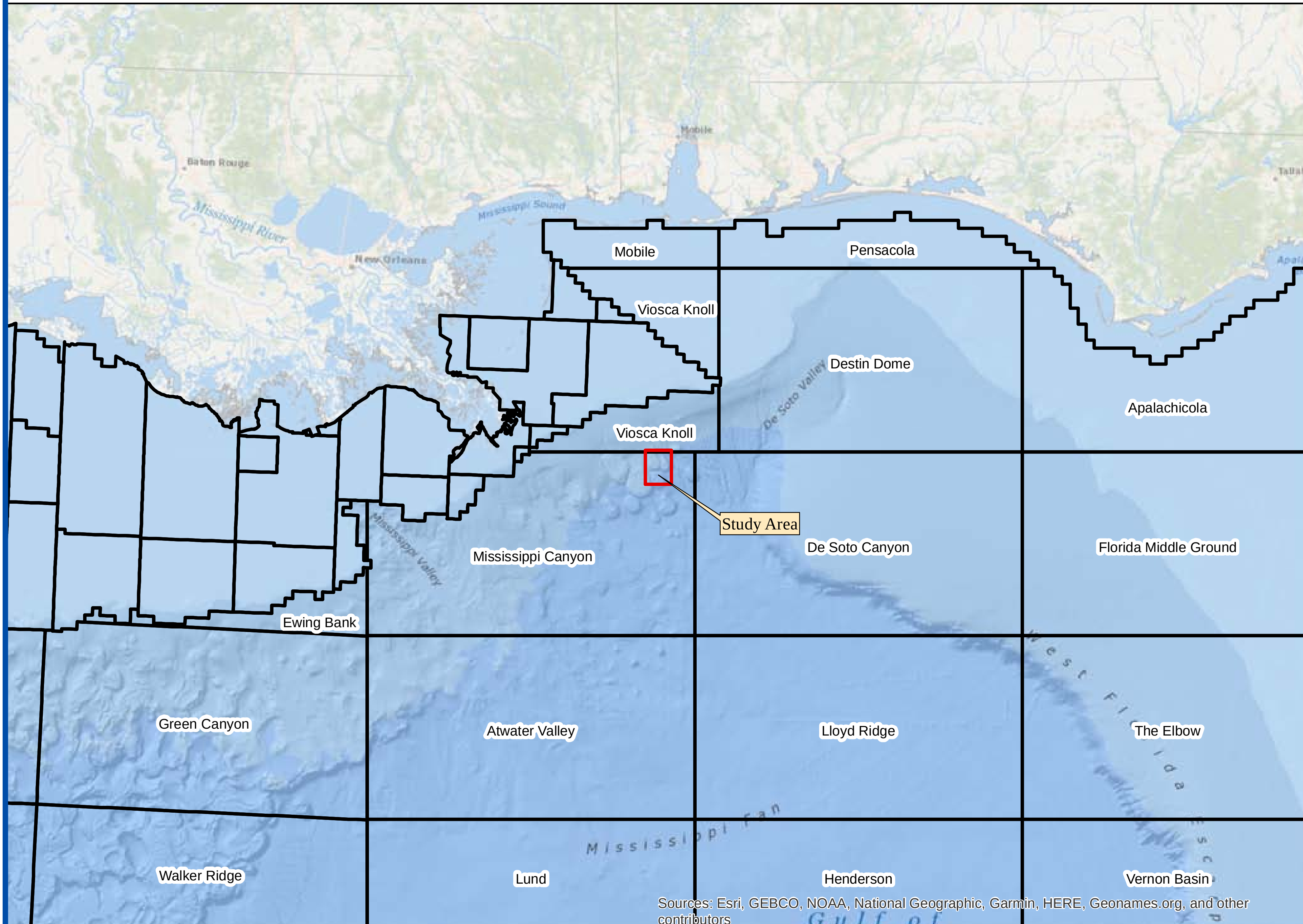
OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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WELL CLEARANCE LETTER – PROPOSED MC36_P-C WELL LOCATION

August 31, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC36_P-C Well Location
Mississippi Canyon Block MC36
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC36_P-C Well Location, Mississippi Canyon Area (OCS-G-35308). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,385ft below sea surface (6,876ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC36_P-C well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC36_P-C Well Location lies in the northwest part of Block MC36 (OCS-G-35308).

Proposed MC36_P-C Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	48.165"	North	Easting	1,254,900.	US ft. E
Longitude	88°	12'	21.344"	West	Northing	10,512,943	US ft. N
Latitude Decimal			28.9633791				
Longitude Decimal			-88.2059289				
FWL Mississippi Canyon 036			3,540ft	US ft.	Inline	12733	
FNL Mississippi Canyon 036			4,817ft	US ft.	Crossline	18409	
Water Depth: -3,509ft			Slope: 1.3° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		9.6 Miles @ 46.4°		

Proposed MC36_P-CC Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	48.660"	North	Easting	1,254,900	US ft. E
Longitude	88°	12'	21.350"	West	Northing	10,512,993	US ft. N
Latitude Decimal			28.9635167				
Longitude Decimal			-88.2059305				
FWL Mississippi Canyon 036			3,540ft	US ft.	Inline	12734	
FNL Mississippi Canyon 036			4,767ft	US ft.	Crossline	18409	
Water Depth: -3,483ft			Slope: 1.3° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		9.6 Miles @ 46.4°		

Location MC36_P-CC is 50ft from MC36_P-C on a bearing of 000°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC36_P-C well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC36_P-C well location is -3,509ft below sea surface (Figure 1). The seafloor slopes to the southwest at 1.3°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC36_P-C well location is in the northwest part of block MC36. The proposed well is located in an area of relatively smooth seabed located within a minibasin to the northwest of Horn Dome.

No seabed fault intersections occur within 2,000ft of the proposed location.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,730ft below sea surface (221ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,730ft below sea surface (221ft below seabed).

4.3 Unit B

The upper part of Unit B, from -3,730ft to -3,819ft below sea surface (221ft to 310ft below seabed), displays generally low-amplitude reflectors, and is interpreted as well-layered clays and silts with occasional sands.

From -3,819ft to -3,970ft below sea surface (310ft to 461ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur. These interpreted sands also show an anomlous character, consistent with possible minor amounts of biogenic shallow gas, approximately 1,050ft to the northwest of the proposed well with direct connectivity to the well-path. Given this setting, and with the proposed well located slightly updip from the anomalous response, a **Slight Risk of Gas** is assigned within this interval.

From –3,970ft below sea surface (461ft below seabed) to -4,240ft below sea surface (731ft below seabed), Unit B is characterized by well-layered, low and occasional moderate--amplitude reflectors interpreted as clays, silts, and occasional sands. A better defined <20ft thick interpreted sand interbed ocurs at -4,021ft below sea surface (512ft below sebaed). Minor wellbore stability and drilling fluid circulation problems may occur at this interbed.

The lower interval of Unit B from -4,240ft below sea surface (731ft below seabed) to -4,518ft below sea surface (1,009ft below seabed) presents acoustically as well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

Horizon H10 marks the base of Unit B, occurring at -4,518ft below sea surface (1,009ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,518ft to -5,232ft below sea surface (1,009ft to 1,723ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit C at the proposed well, or within 2,000ft.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -5,232ft below sea surface (1,723ft below seabed).

4.5 Unit D

The upper part of Unit D from -5,232ft below sea surface (1,723ft below seabed) to -5,603ft below sea surface (2,094ft below seabed) is characterized by well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional sands.

The mid-section of Unit D from -5,603ft to -6,208ft below sea surface (2,094ft to 2,699ft below seabed) is characterized by slightly-chaotic, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sands. This interval appears to have been deposited at a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can, on occasions, induce minor over-pressure, and as such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit D from -6,208ft below sea surface (2,699ft below seabed) to -6,423ft below sea surface (2,914ft below seabed) is interpreted to consist of clays, silts, and occasional sands.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -6,423ft below sea surface (2,914ft below seabed).

4.6 Unit E

The upper part of Unit E from -6,423ft to -7,010ft below sea surface 2,914ft to 3,501ft below seabed) is characterized by low and occasional moderate-amplitude reflectors interpreted as clays, silts, and several sands. Minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit E from -7,010ft below sea surface (3,501ft below seabed) to –7,353ft below sea surface (3,844ft below seabed) presents as well-layered, low amplitude, slightly tilted interbeds interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit E.

Horizon H40 marks the base of Unit E at -7,353ft below sea surface (3,844ft below seabed).

4.7 Unit F

Unit F from -7,353ft to -8,876ft below sea surface (3,844ft to 5,367ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~900ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated granular sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within a 2,000ft radius.

The well-path will not traverse any faults within Unit F.

Horizon H50 marks the base of Unit F at -8,876ft below sea surface (5,367ft below seabed).

4.8 Unit G

Unit G from -8,876ft to -10,385ft below sea surface (5,367ft to 6,876ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit G.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,385ft below sea surface (6,876ft below seabed).

4.9 Shallow Gas Assessment

Within Unit B, a **Slight Risk of Gas** is interpreted within the interval from -3,819ft to -3,970ft below sea surface (310ft to 461ft below seabed).

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,819ft to -3,970ft below sea surface (310ft to 461ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,603ft to -6,208ft below sea surface (2,094ft to 2,699ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,353ft to -8,876ft below sea surface (3,844ft to 5,367ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None predicted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Risk of Gas** and a **Slight Shallow Water Flow Risk** is interpreted within the interval from -3,819ft to -3,970ft below sea surface (310ft to 461ft below seabed). **Drilling Caution** and appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  Minor wellbore and drilling fluid circulation problems may occur at the level of a <20ft thick sand interbed at -4,021ft below sea surface (512ft below seabed).

- Unit C

  None Predicted.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,603ft to -6,208ft below sea surface (2,094ft to 2,699ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Minor wellbore and drilling fluid circulation problems may occur from -6,423ft below sea surface (2,914ft below seabed) to -7,010ft below sea surface (3,501ft below seabed).

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,353ft to -8,876ft below sea surface (3,844ft to 5,367ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit G

  No drilling hazards or problems interpreted.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC36_P-C Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

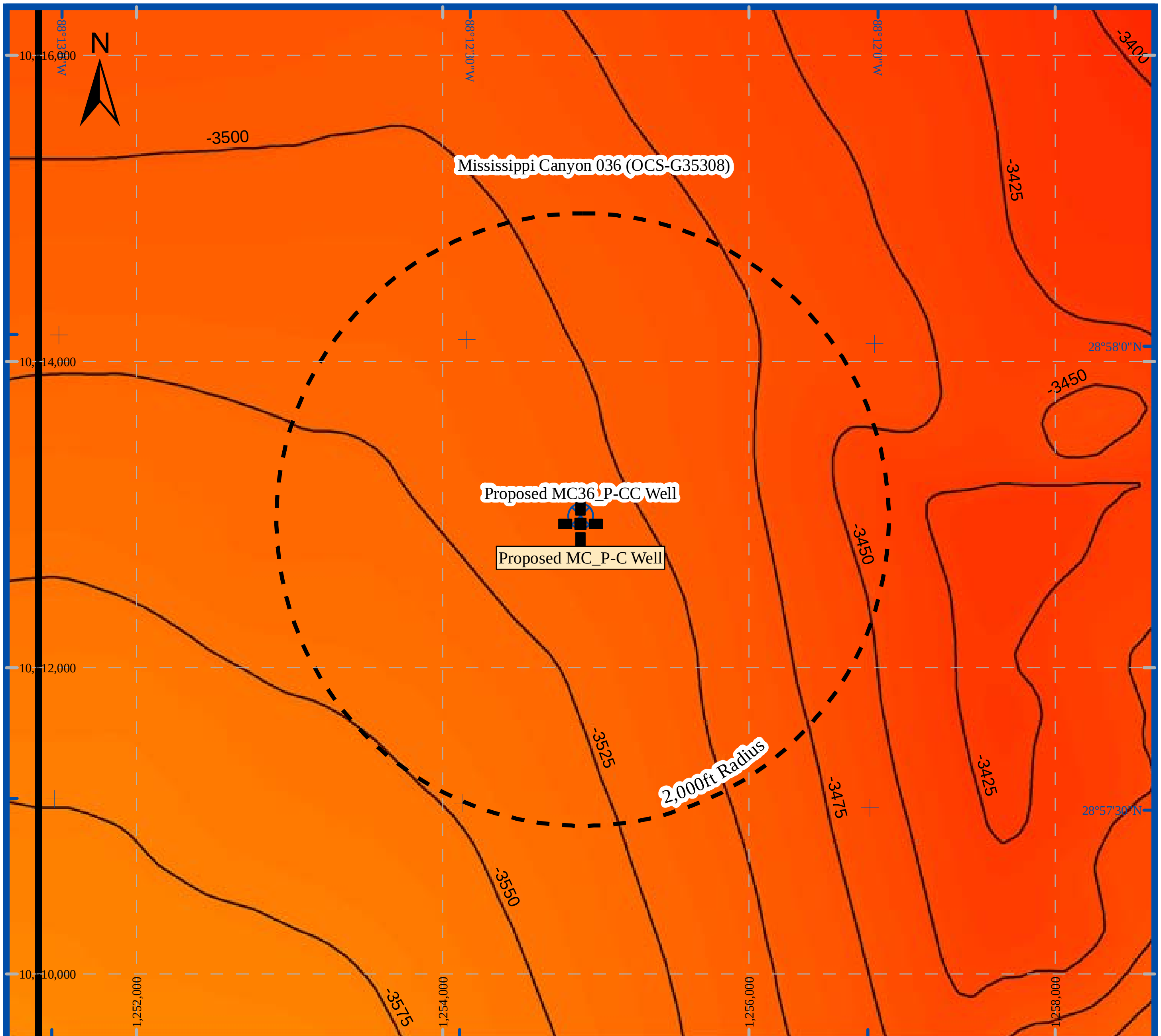
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC36_P-C Well Location (1,254,900ft E / 10,512,943ft N)

Proposed MC36_P-CC Well Location

Block boundaries

-3509 Depth in feet below sea surface to seabed, contoured at 25ft intervals

Seabed Depth (Feet)

Chart Scale 1" = 1,000'

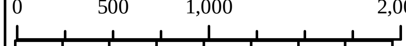
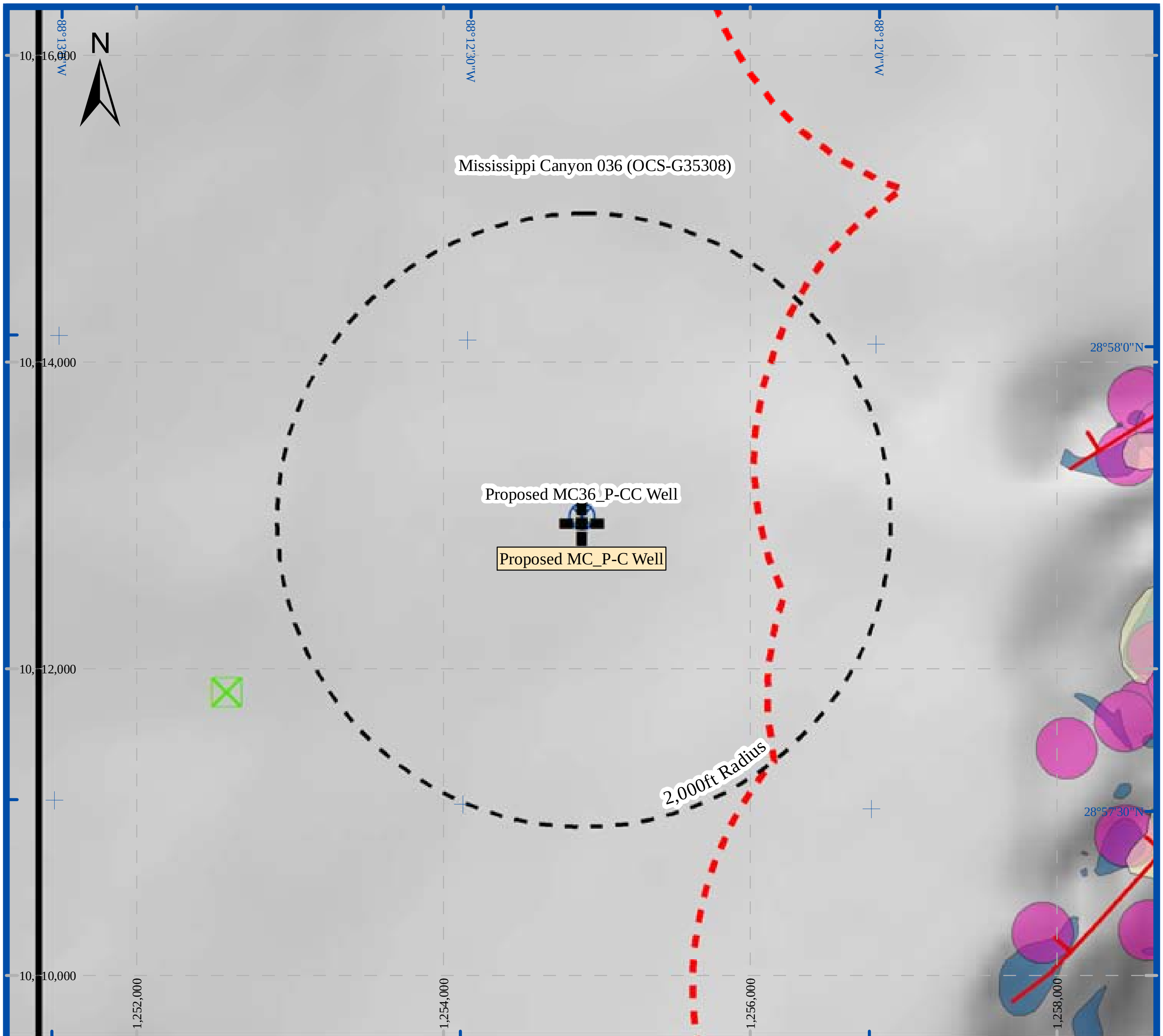


Figure 1
(MC36_P-C)



Seabed Morphology Extract

Proposed MC36_P-C Well Location (1,254,900ft E / 10,512,943ft N)

Proposed MC36_P-CC Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Sonar contacts, interpreted modern debris

BOEM database — EM302 plumes (400ft Diam)

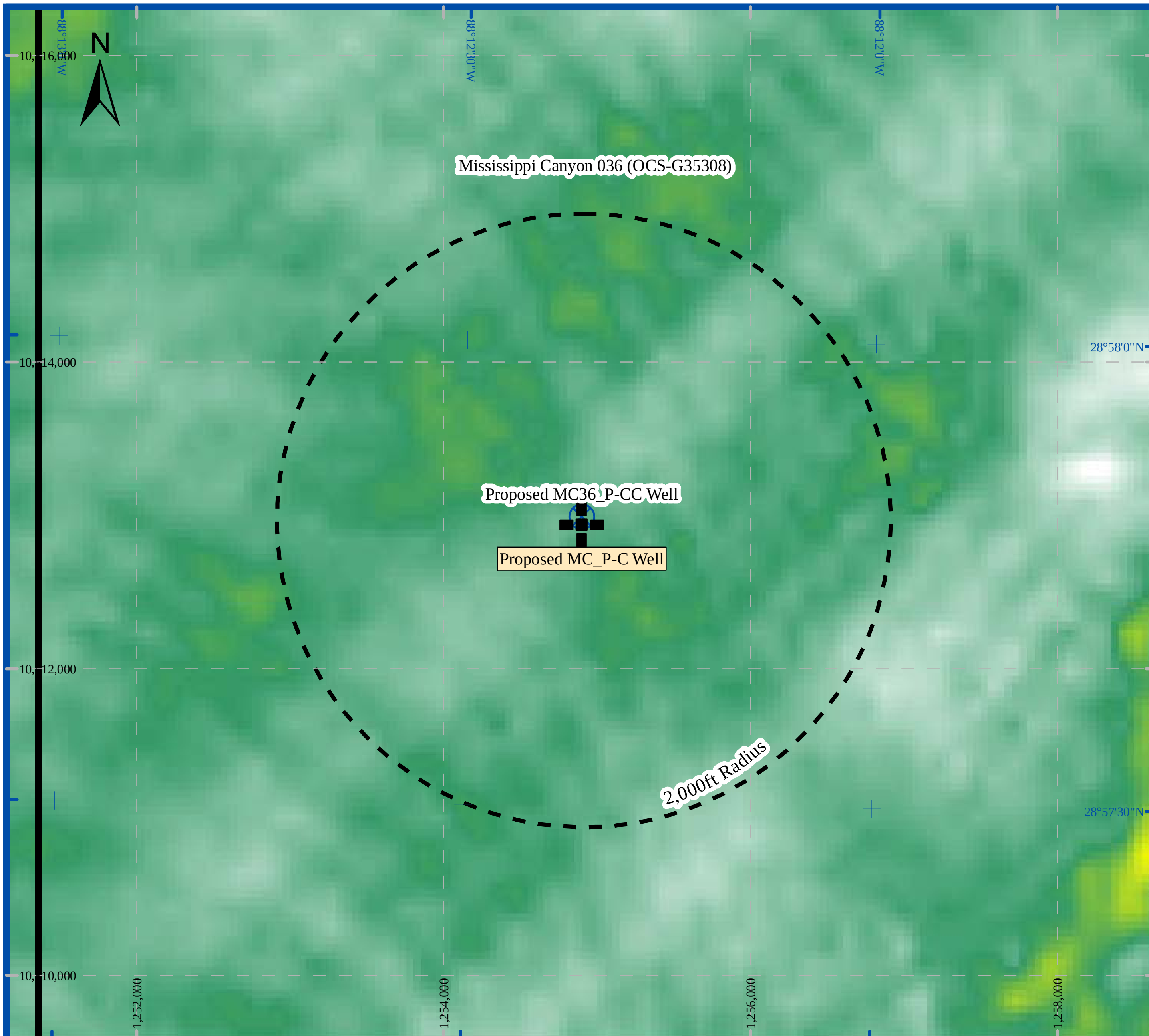
BOEM database — Seep anomaly positives (Cofirmed Organisms)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC36_P-C)



Seabed Amplitude Extract

Proposed MC36_P-C Well Location (1,254,900ft E / 10,512,943ft N)

Proposed MC36_P-CC Well Location

Block boundaries

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32

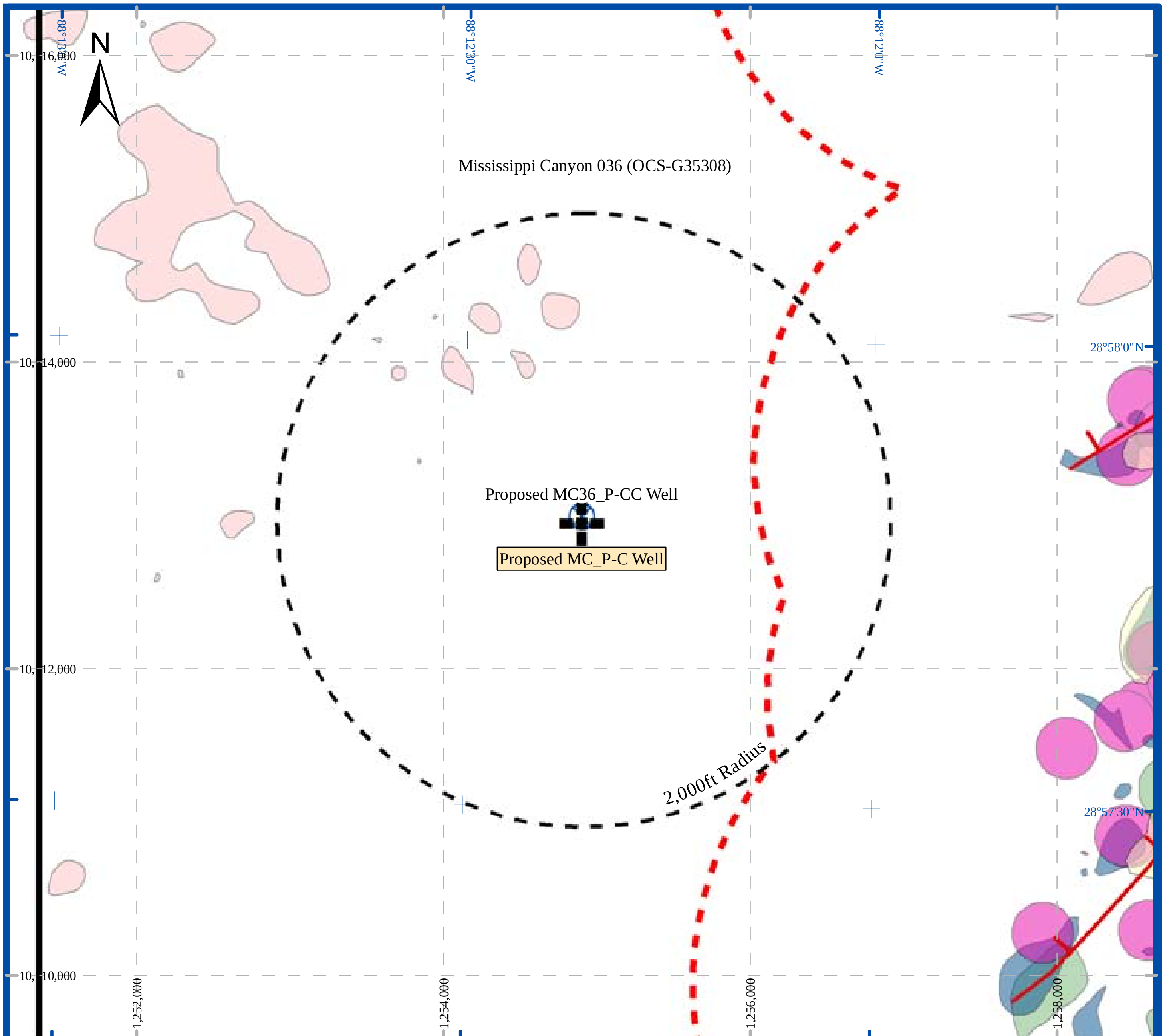
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC36_P-C)



Geohazard Summary Extract

Proposed MC36_P-C Well Location (1,254,900ft E / 10,512,943ft N)

Proposed MC36_P-CC Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Sonar contacts, interpreted modern debris

BOEM database — EM302 plumes (400ft Diam)

BOEM database — Seep anomaly positives (Cofirmed Organisms)

Slight, Moderate, and High Risk of Gas within Unit B

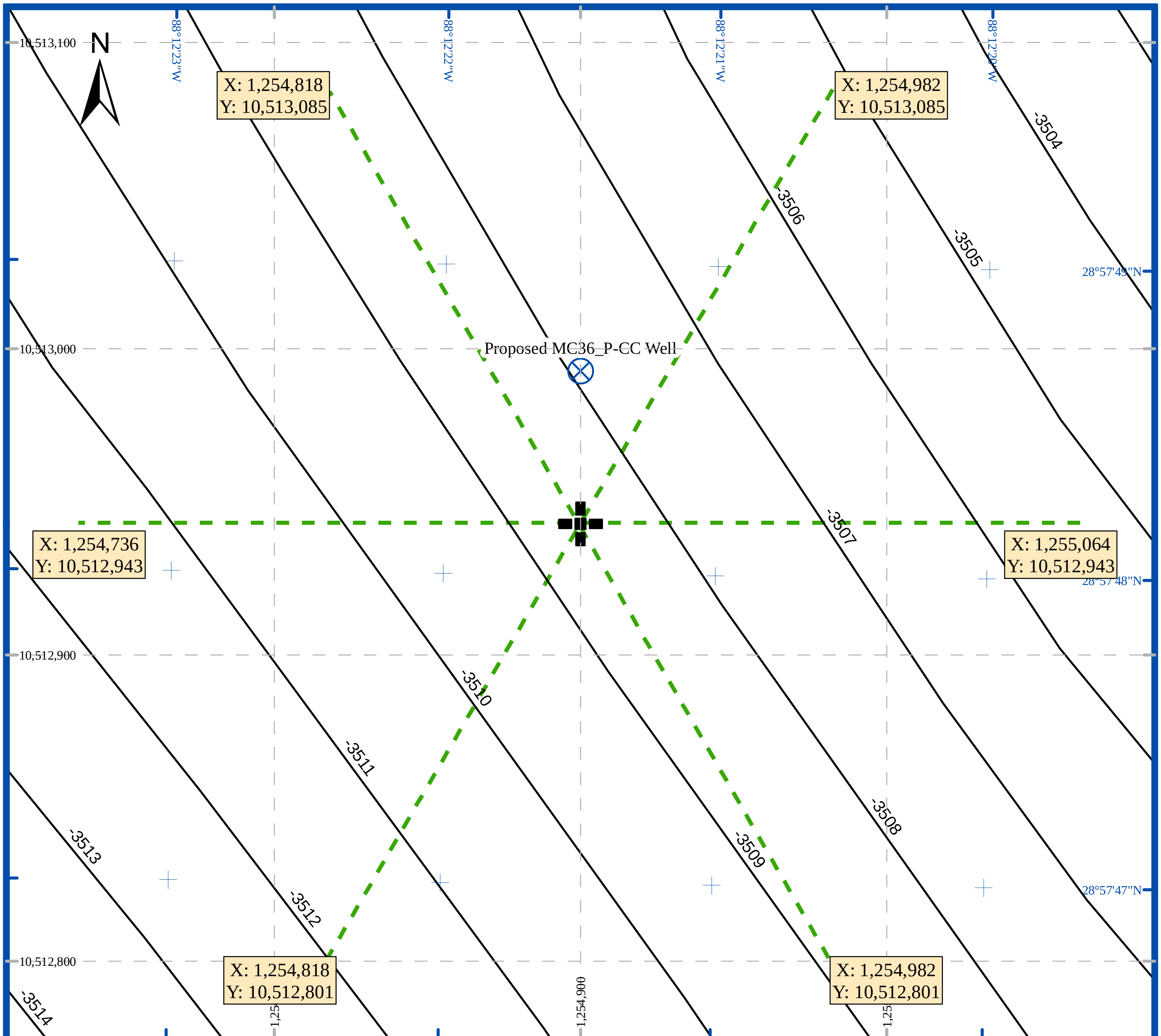
Slight and Moderate Risk of Gas within Unit A

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC36_P-C)



ROV Plat (MC36_P-C)

Proposed MC36_P-C Well Location
(1,254,900ft E / 10,512,943ft N)

Proposed MC36_P-CC Well Location

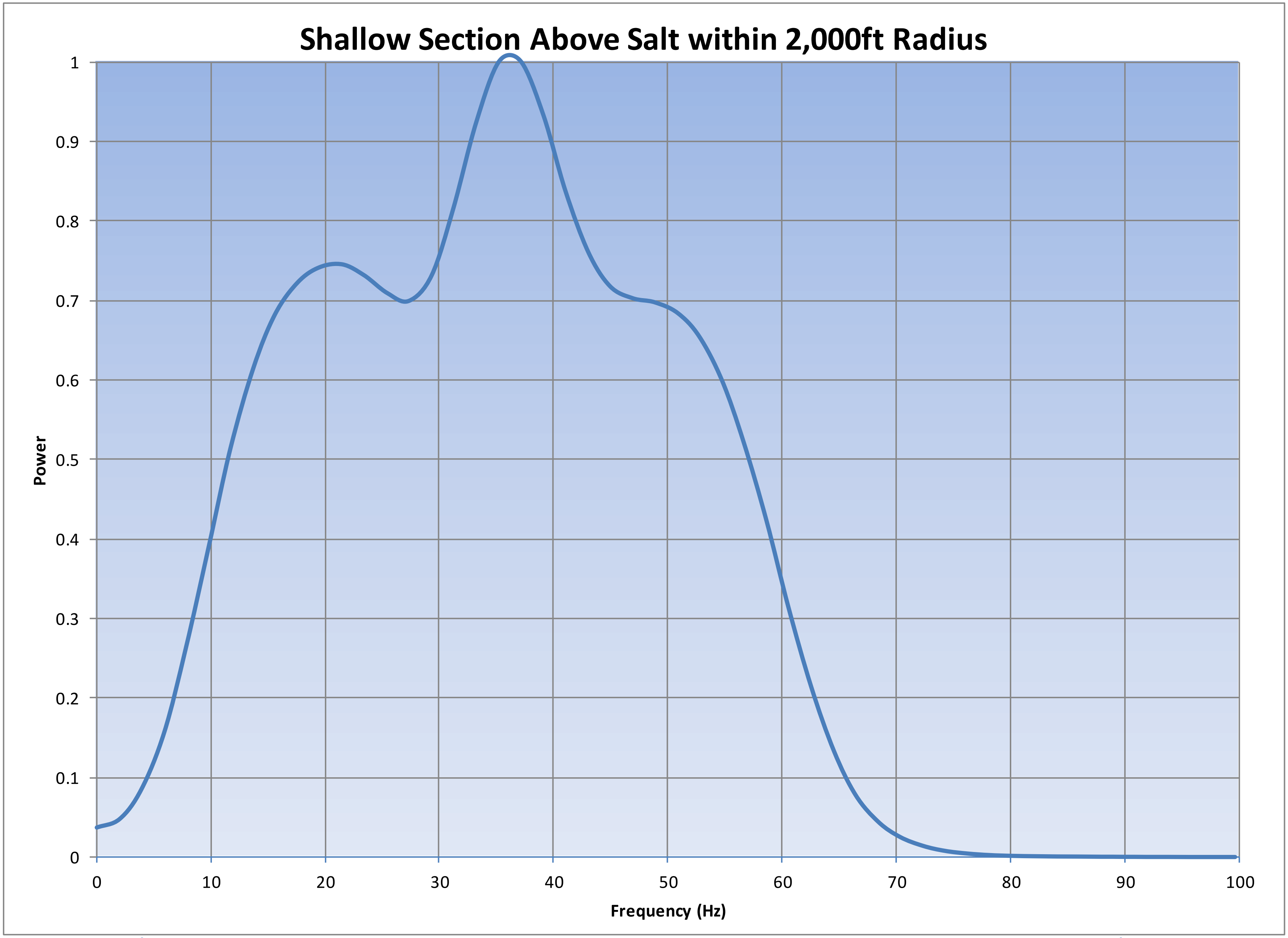
-3509 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC36_P-C)



MC36_P-C	Power Spectrum	Figure 10

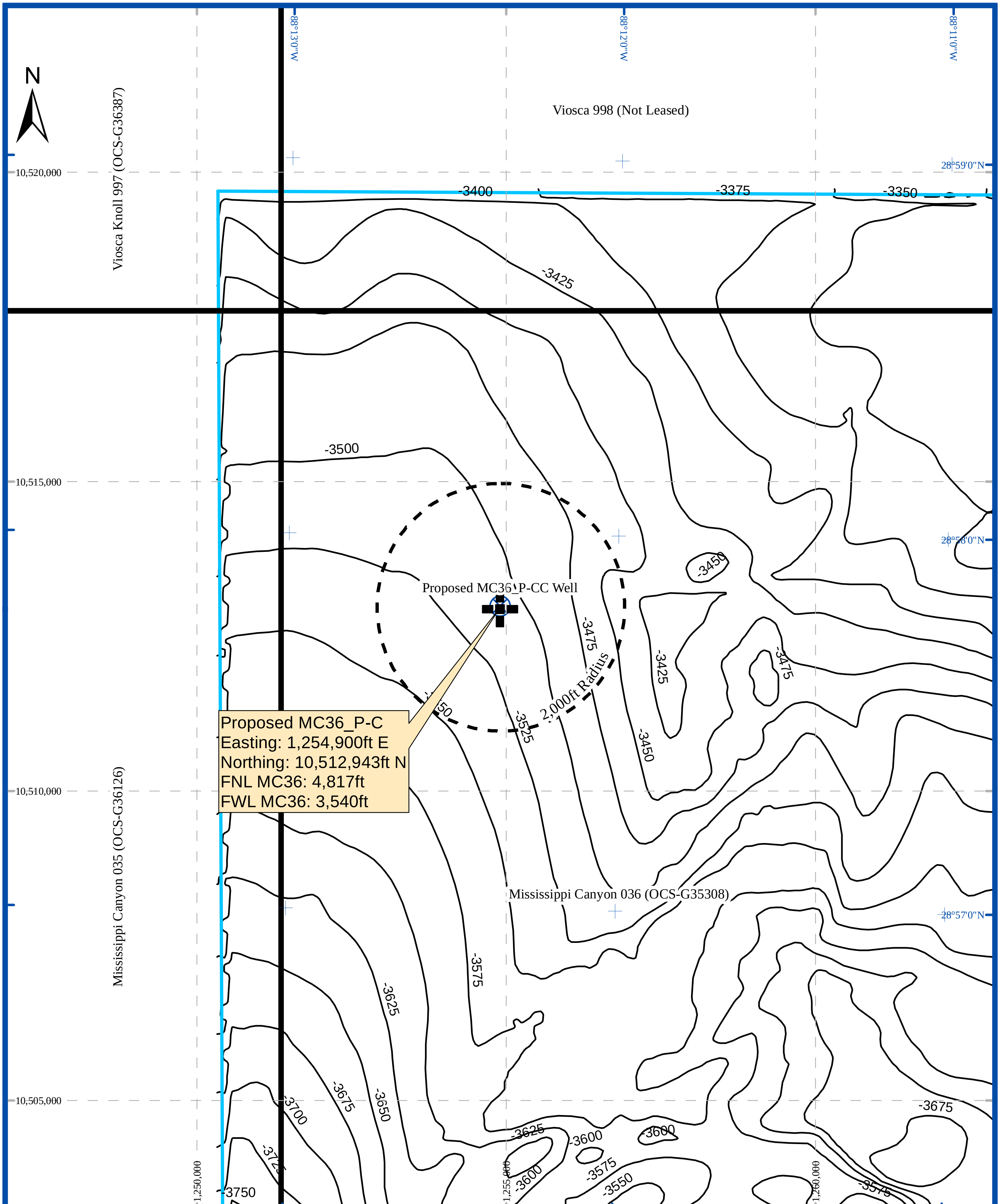


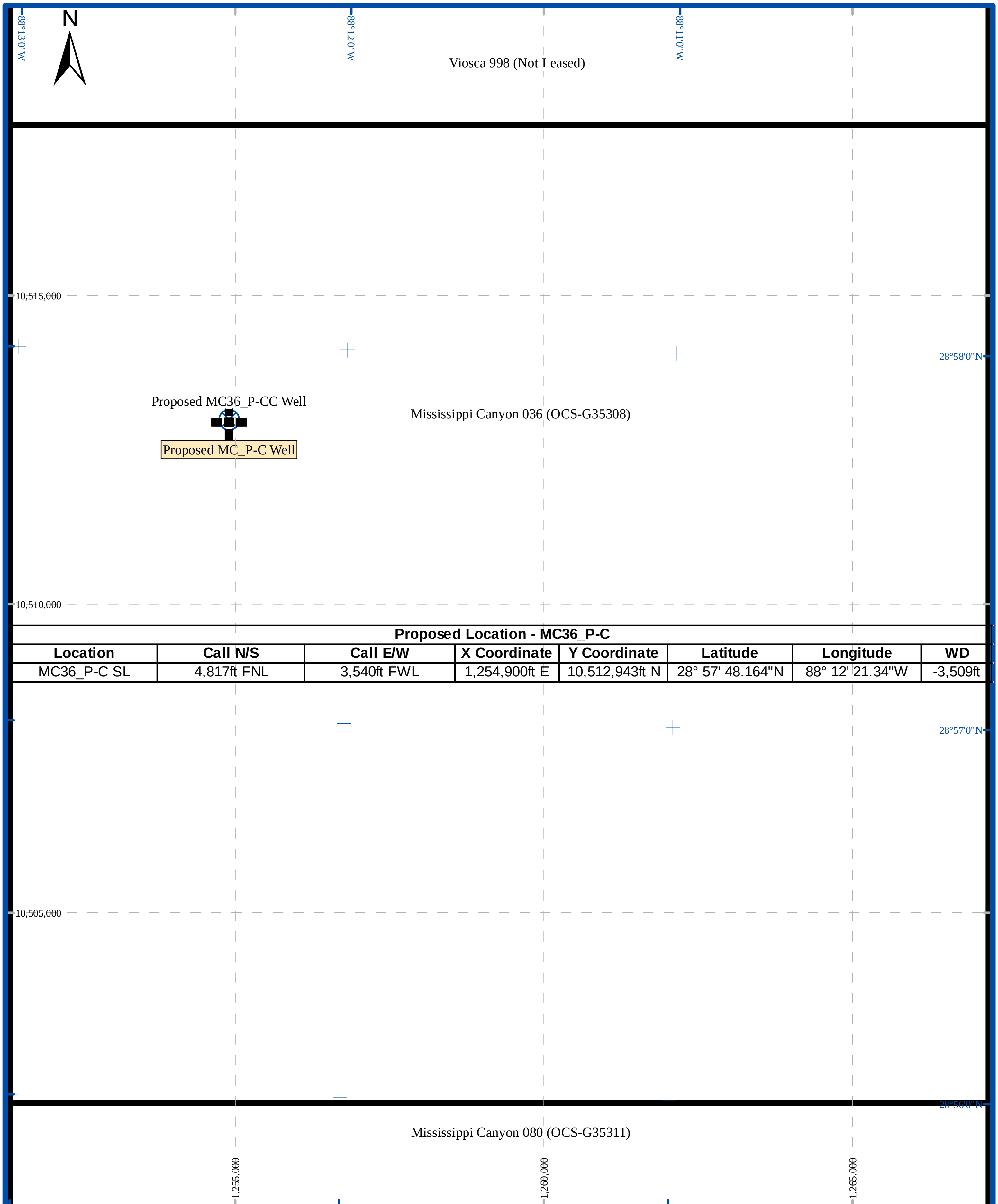
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC36_P-C							
Location	**Call N/S**	**Call E/W**	**X Coordinate**	**Y Coordinate**	**Latitude**	**Longitude**	**WD**
MC36_P-C SL	4,817ft FNL	3,540ft FWL	1,254,900ft E	10,512,943ft N	28° 57' 48.164"N	88° 12' 21.34"W	-3,509ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

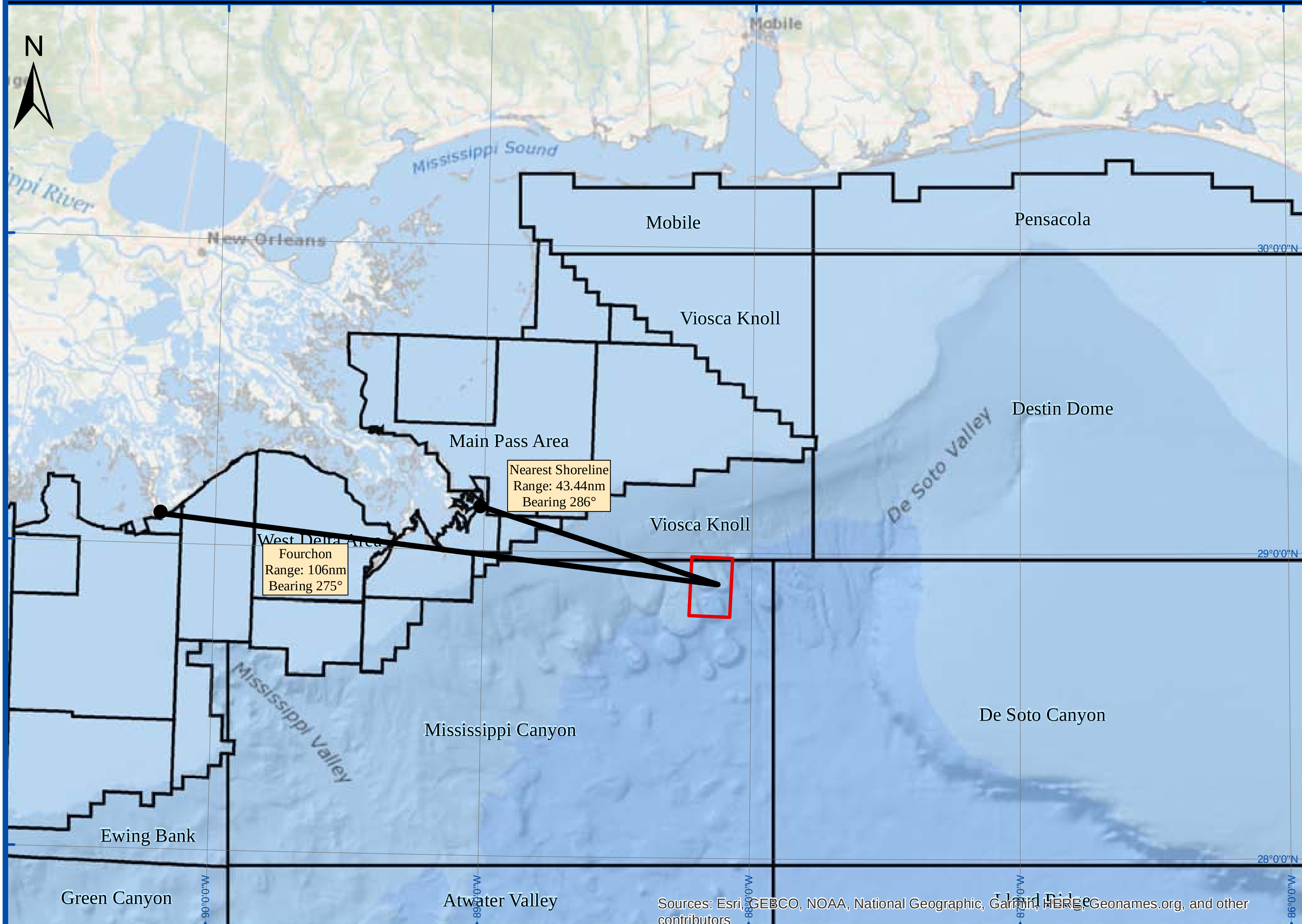
0 150 300 600 Meters

Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 36

Figure 13



Legend

Seabed Well
Platform
Not Leased
Leased
Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 36

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC36_P-C Well Location

August 31, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 36
(OCS-G-35308)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-C well location with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.5 seconds two-way time (TWT), -10,385ft below sea surface (6,876ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 1.3° to the southwest. No seabed faults occur within 2,000ft of the proposed well.

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

No seabed infrastructure occurs within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. Several anomalies indicative of shallow gas occur within the 2,000ft radius in Unit B. The vertical borehole will not directly penetrate any identified risk of gas anomalies, however, the anomalies in Unit B show connectivity to the well-path and a **Slight Risk of Gas** is assigned to an interval in Unit B.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, and throughout Unit F.

No major faults intersect the proposed well.

Proposed MC36_P-C Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	48.165”	North	Easting	1,254,900.	US ft. E
Longitude	88°	12’	21.344”	West	Northing	10,512,943	US ft. N
Latitude Decimal			28.9633791				
Longitude Decimal			-88.2059289				
FWL Mississippi Canyon 036			3,540ft	US ft.	Inline	12733	
FNL Mississippi Canyon 036			4,817ft	US ft.	Crossline	18409	
Water Depth: -3,509ft			Slope: 1.3° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		9.6 Miles @ 46.4°		

Proposed MC36_P-CC Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	48.660”	North	Easting	1,254,900	US ft. E
Longitude	88°	12’	21.350”	West	Northing	10,512,993	US ft. N
Latitude Decimal			28.9635167				
Longitude Decimal			-88.2059305				
FWL Mississippi Canyon 036			3,540ft	US ft.	Inline	12734	
FNL Mississippi Canyon 036			4,767ft	US ft.	Crossline	18409	
Water Depth: -3,483ft			Slope: 1.3° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		9.6 Miles @ 46.4°		

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

A **Slight Risk of Gas** is assigned within an interval in Unit B. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, and throughout Unit F.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC36_P-C Well Location

Anadarko Petroleum Corporation

August 31, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC36_P-C Well Location (OCS-G-35308)

Ladies/Gentlemen:

Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-C with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities

Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 3,150ft to the ENE.

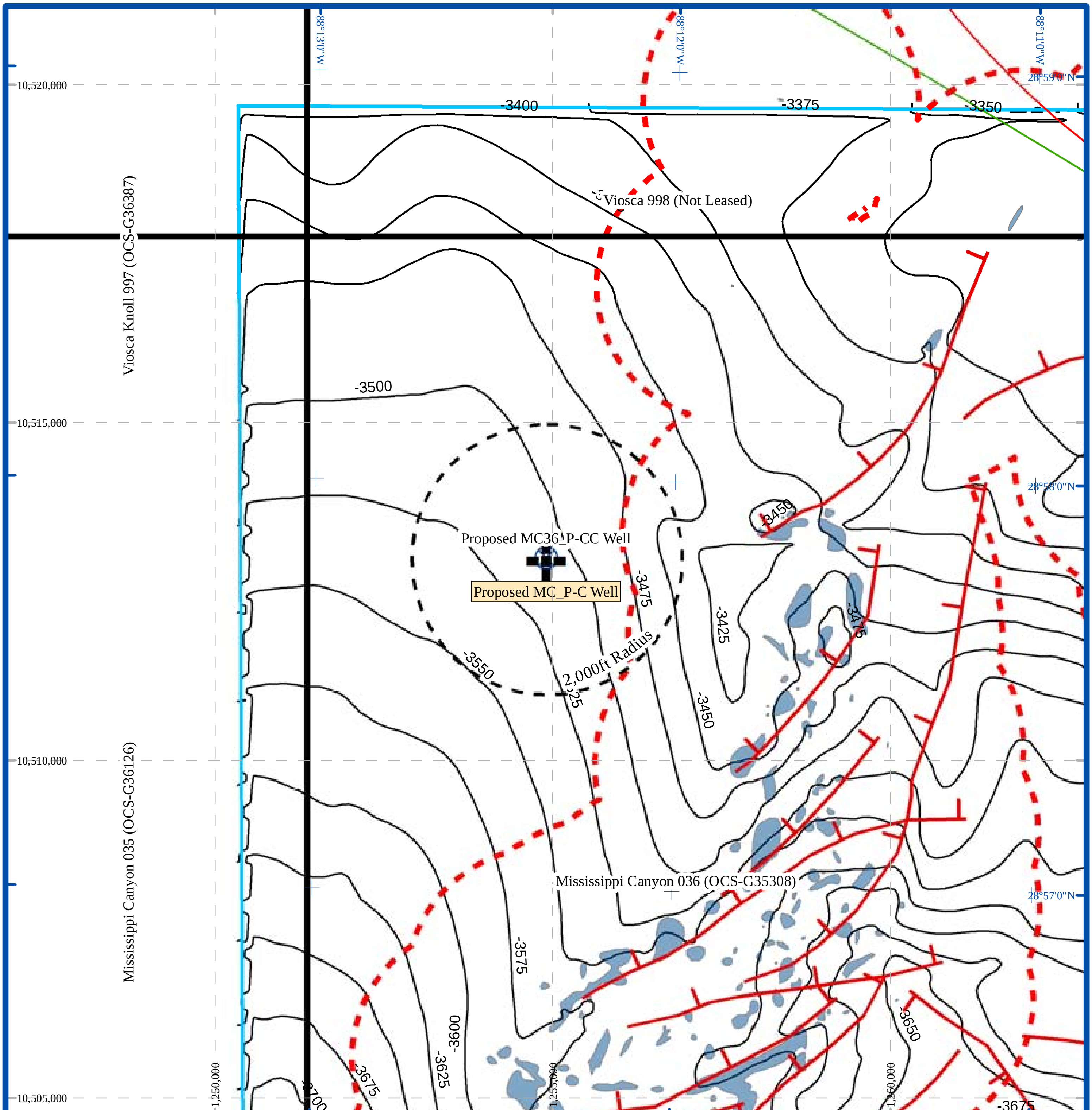
Proposed MC36_P-C Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	48.165"	North	Easting	1,254,900.	US ft. E
Longitude	88°	12'	21.344"	West	Northing	10,512,943	US ft. N
Latitude Decimal	28.9633791						
Longitude Decimal	-88.2059289						
FWL Mississippi Canyon 036	3,540ft			US ft.	Inline	12733	
FNL Mississippi Canyon 036	4,817ft			US ft.	Crossline	18409	
Water Depth: -3,509ft	Slope: 1.3° SW						
Nearest Shoreline	43.44 Nautical Miles @ 286°						
Port of Operation	Fourchon				106 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				9.6 Miles @ 46.4°		

Proposed MC36_P-CC Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	48.660"	North	Easting	1,254,900	US ft. E
Longitude	88°	12'	21.350"	West	Northing	10,512,993	US ft. N
Latitude Decimal	28.9635167						
Longitude Decimal	-88.2059305						
FWL Mississippi Canyon 036	3,540ft			US ft.	Inline	12734	
FNL Mississippi Canyon 036	4,767ft			US ft.	Crossline	18409	
Water Depth: -3,483ft	Slope: 1.3° SW						
Nearest Shoreline	43.44 Nautical Miles @ 286°						
Port of Operation	Fourchon				106 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				9.6 Miles @ 46.4°		

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

Conclusions and Recommendations: The proposed MC36_P-C and proposed MC36_P-CC well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC36_P-C Well Location (1,254,900ft E / 10,512,943ft N)

Proposed MC36_P-CC Well Location

Block boundaries

Oil Pipelines

Gas Pipelines

Study area boundary

-3509 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for
Anadarko Petroleum Corporation

Project:
Peach Prospect
Mississippi Canyon, Block MC36,
Offshore Gulf of Mexico

Description:
Proposed MC36_P-D Well Location

Project Number:
2020-307

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	………………… A Haigh
	Quality Assurance	………………… D Haigh

Revision	**Date**	**Title**
0	July 24, 2020	Draft
1	August 31, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

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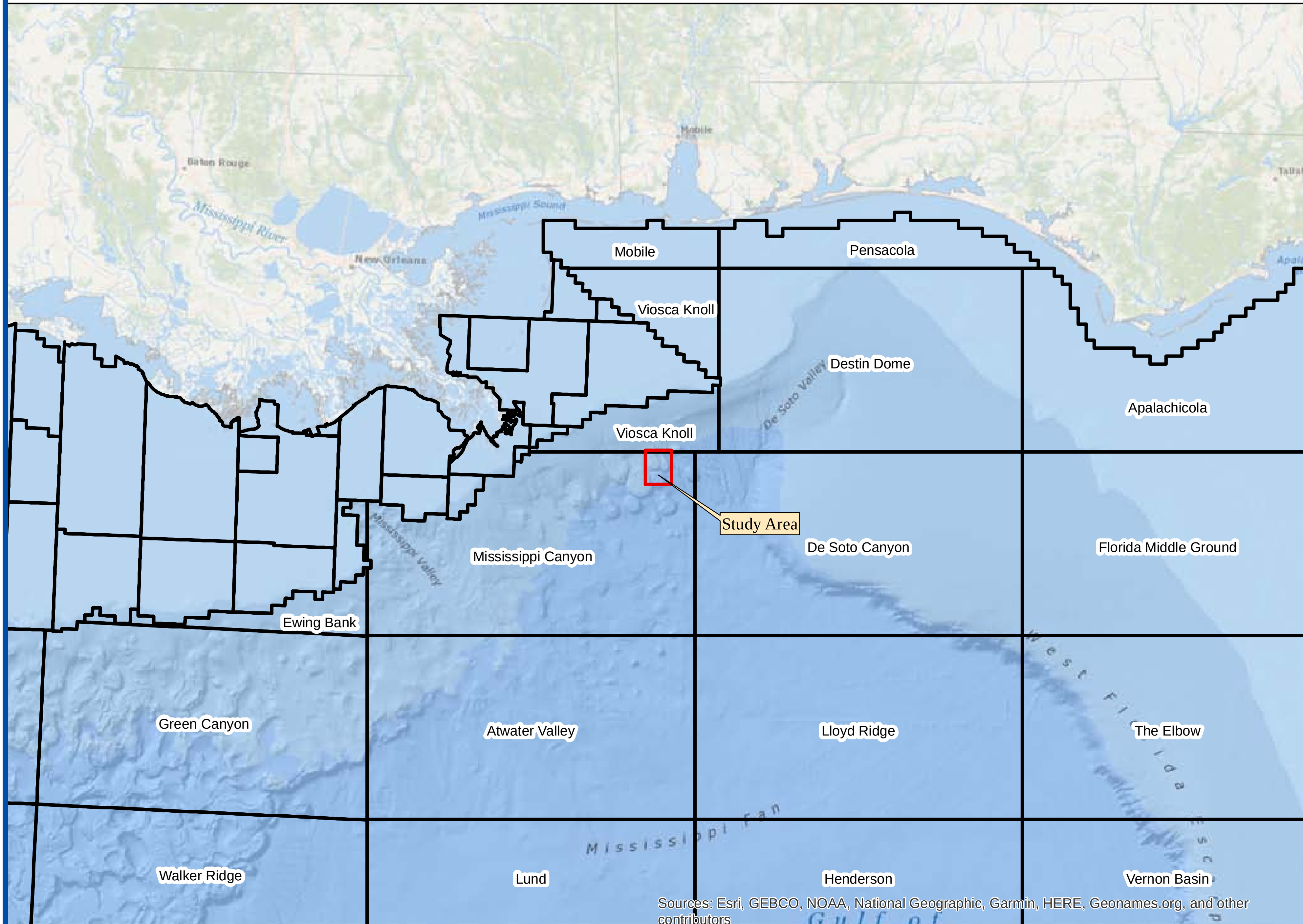
OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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WELL CLEARANCE LETTER – PROPOSED MC36_P-D WELL LOCATION

August 31, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC36_P-D Well Location
Mississippi Canyon Block MC36
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC36_P-D Well Location, Mississippi Canyon Area (OCS-G-35308). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,380ft below sea surface (6,872ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC36_P-D well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC36_P-D Well Location lies in the west-central part of Block MC36 (OCS-G-35308).

Proposed MC36_P-D Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	28.421"	North	Easting	1,255,700.	US ft. E
Longitude	88°	12'	12.108"	West	Northing	10,510,941	US ft. N
Latitude Decimal			28.9578948				
Longitude Decimal			-88.2033632				
FWL Mississippi Canyon 036			4,340ft	US ft.	Inline	12725	
FNL Mississippi Canyon 036			6,819ft	US ft.	Crossline	18313	
Water Depth: -3,508ft			Slope: 2.0° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		9.8 Miles @ 44.3°		

Proposed MC36_P-DD Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	28.916"	North	Easting	1,255,700	US ft. E
Longitude	88°	12'	12.113"	West	Northing	10,510,991	US ft. N
Latitude Decimal			28.9580323				
Longitude Decimal			-88.2033648				
FWL Mississippi Canyon 036			4,340ft	US ft.	Inline	12725	
FNL Mississippi Canyon 036			6,769ft	US ft.	Crossline	18313	
Water Depth: -3,508ft			Slope: 2.0° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		9.8 Miles @ 44.3°		

Location MC36_P-DD is 50ft from MC36_P-D on a bearing of 000°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC36_P-D well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)-(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC36_P-D well location is -3,508ft below sea surface (Figure 1). The seafloor slopes to the WSW at 2.0°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC36_P-D well location is in the west-central part of block MC36. The proposed well is located in an area of relatively smooth seabed located within a minibasin to the northwest of Horn Dome.

No seabed fault intersections occur within 2,000ft of the proposed location.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,700ft below sea surface (192ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,700ft below sea surface (192ft below seabed).

4.3 Unit B

The upper part of Unit B, from -3,700ft to -3,792ft below sea surface (192ft to 284ft below seabed), displays generally low-amplitude reflectors, and is interpreted as well-layered clays and silts with occasional sands.

From -3,792ft to -4,033ft below sea surface (284ft to 525ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -4,033ft below sea surface (525ft below seabed) to -4,422ft below sea surface (914ft below seabed) presents acoustically as well-layered, low-amplitude reflectors with clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft radius from the proposed well.

Horizon H10 marks the base of Unit B, occurring at -4,422ft below sea surface (914ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,422ft to -4,968ft below sea surface (914ft to 1,460ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit C at the proposed well, or within 2,000ft.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -4,968ft below sea surface (1,460ft below seabed).

4.5 Unit D

The upper part of Unit D from -4,968ft below sea surface (1,460ft below seabed) to -5,513ft below sea surface (2,005ft below seabed) is interpreted to consist of well-layered, low-amplitude reflectors with clays, silts, and occasional sands.

Unit D from -5,513ft to -5,686ft below sea surface (2,005ft to 2,178ft below seabed) is characterized by slightly-chaotic, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sands. This interval appears to have been deposited at a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can, on occasions, induce minor over-pressure, and as such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit D from -5,686ft below sea surface (2,178ft below seabed) to -5,914ft below sea surface (2,406ft below seabed) is interpreted to consist of clays, silts, and occasional sands.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -5,914ft below sea surface (2,406ft below seabed).

4.6 Unit E

Unit E from -5,914ft to -6,510ft below sea surface (2,406ft to 3,002ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,050ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit E.

Horizon H40 marks the base of Unit E at -6,510ft below sea surface (3,002ft below seabed).

4.7 Unit F

Unit F from -6,510ft to -7,756ft below sea surface (3,002ft to 4,248ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,300ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft radius of the proposed well.

The well-path will traverse a fault at -6,666ft below sea surface (3,158ft below seabed). This fault is downthrown around 20ft to the southeast. Minor wellbore and drilling fluid circulation problems may occur at the level of the fault.

Horizon H50 marks the base of Unit F at -7,756ft below sea surface (4,248ft below seabed).

4.8 Unit G

Unit G from -7,756ft to -10,380ft below sea surface (4,248ft to 6,872ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit G.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,380ft below sea surface (6,872ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,792ft to -4,033ft below sea surface (284ft to 525ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,513ft to -5,686ft below sea surface (2,005ft to 2,178ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,914ft to -6,510ft below sea surface (2,406ft to 3,002ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -6,510ft to -7,757ft below sea surface (3,002ft to 4,248ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None predicted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,792ft to -4,033ft below sea surface (284ft to 525ft below seabed). Drilling Caution and appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  None Predicted.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,513ft to -5,686ft below sea surface (2,005ft to 2,178ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,914ft to -6,510ft below sea surface (2,406ft to 3,002ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -6,510ft to -7,756ft below sea surface (3,002ft to 4,248ft below seabed).

  Minor wellbore stability and drilling fluid circulation problems are also considered possible within this unit.

The well-path will traverse a fault at -6,666ft below sea surface (3,158ft below seabed). Minor wellbore stability and drilling fluid circulation problmes may occur at the level of the fault. Casing seats shold avoid all fault intersections as formation integrity could be compromised.

- Unit G

No drilling hazards or problems interpreted.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

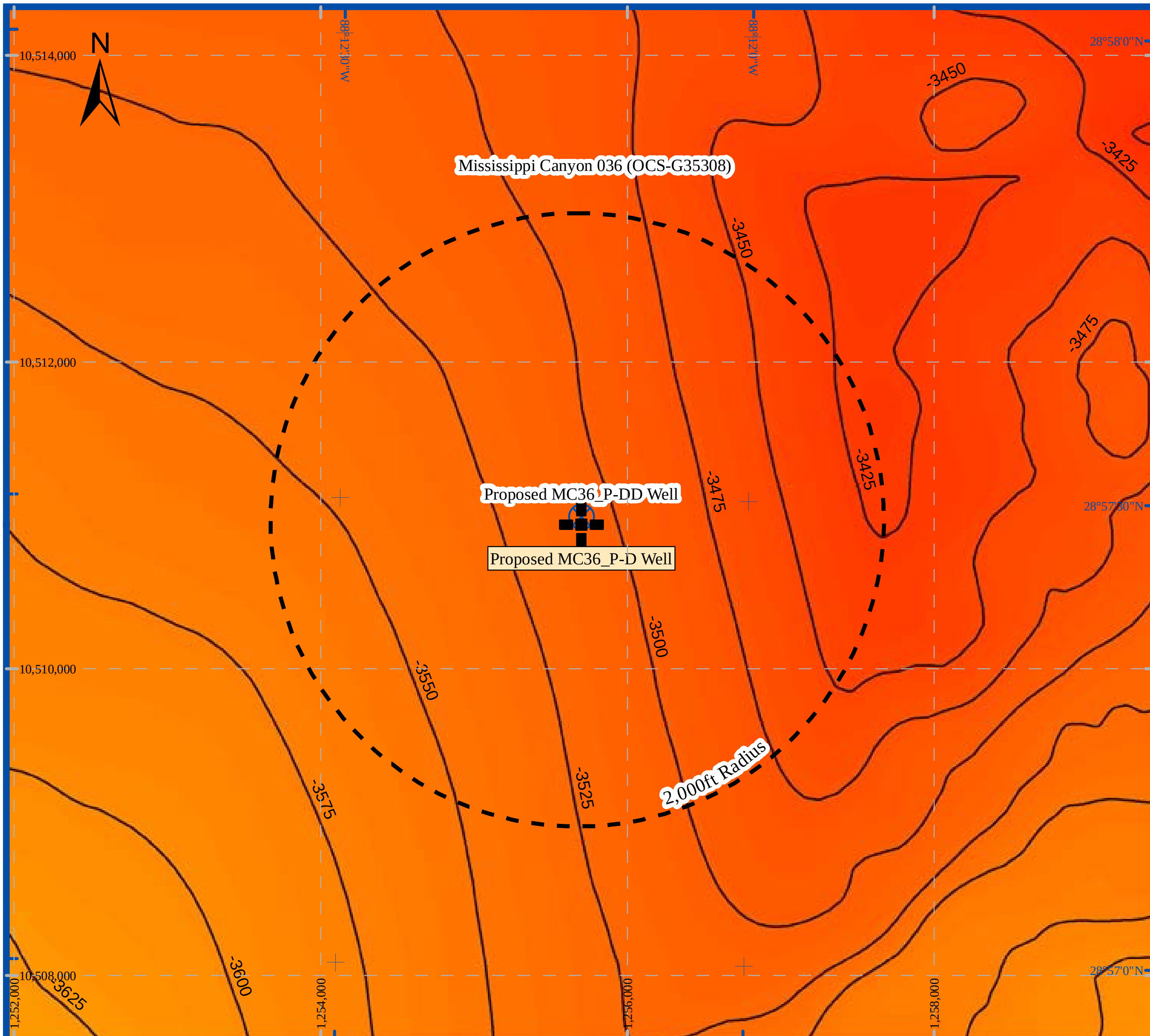
Andrew Haigh
Geophysical Manager

Denise Haigh
Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC36_P-D Well Location

Seabed Depth Extract
Seabed Morphology Extract
Seabed Amplitude Extract
Geohazard Summary Extract
Sand Lithology Summary Extract
Inline Data Example
Crossline Data Example
Top Hole Prognosis
ROV Plat
Power Spectrum
Bathymetry Plat
Public Information Plat
Vicinity Plat
10-Mile Radius Plat



Seabed Depth Extract

Proposed MC36_P-D Well Location
(1,255,700ft E / 10,510,941ft N)

Proposed MC36_P-DD Well Location

-3508 Depth in feet below sea surface to seabed, contoured at 25ft intervals

Seabed Depth (Feet)

Chart Scale 1" = 1,000'

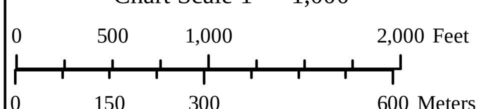
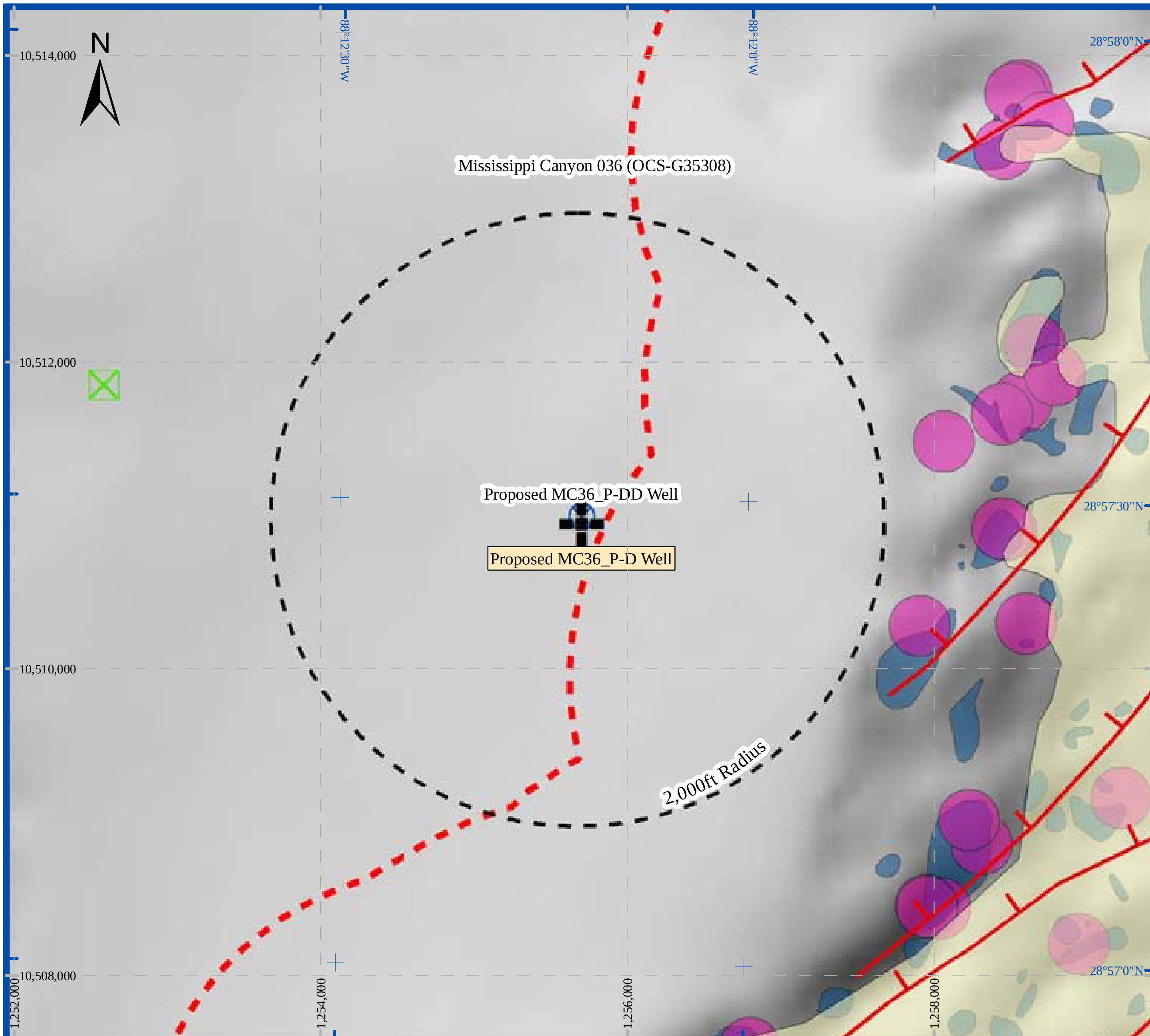


Figure 1
(MC36_P-D)



Seabed Morphology Extract

Proposed MC36_P-D Well Location (1,255,700ft E / 10,510,941ft N)

Proposed MC36_P-DD Well Location

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Sonar contacts, interpreted modern debris

BOEM database — EM302 plumes (400ft Diam)

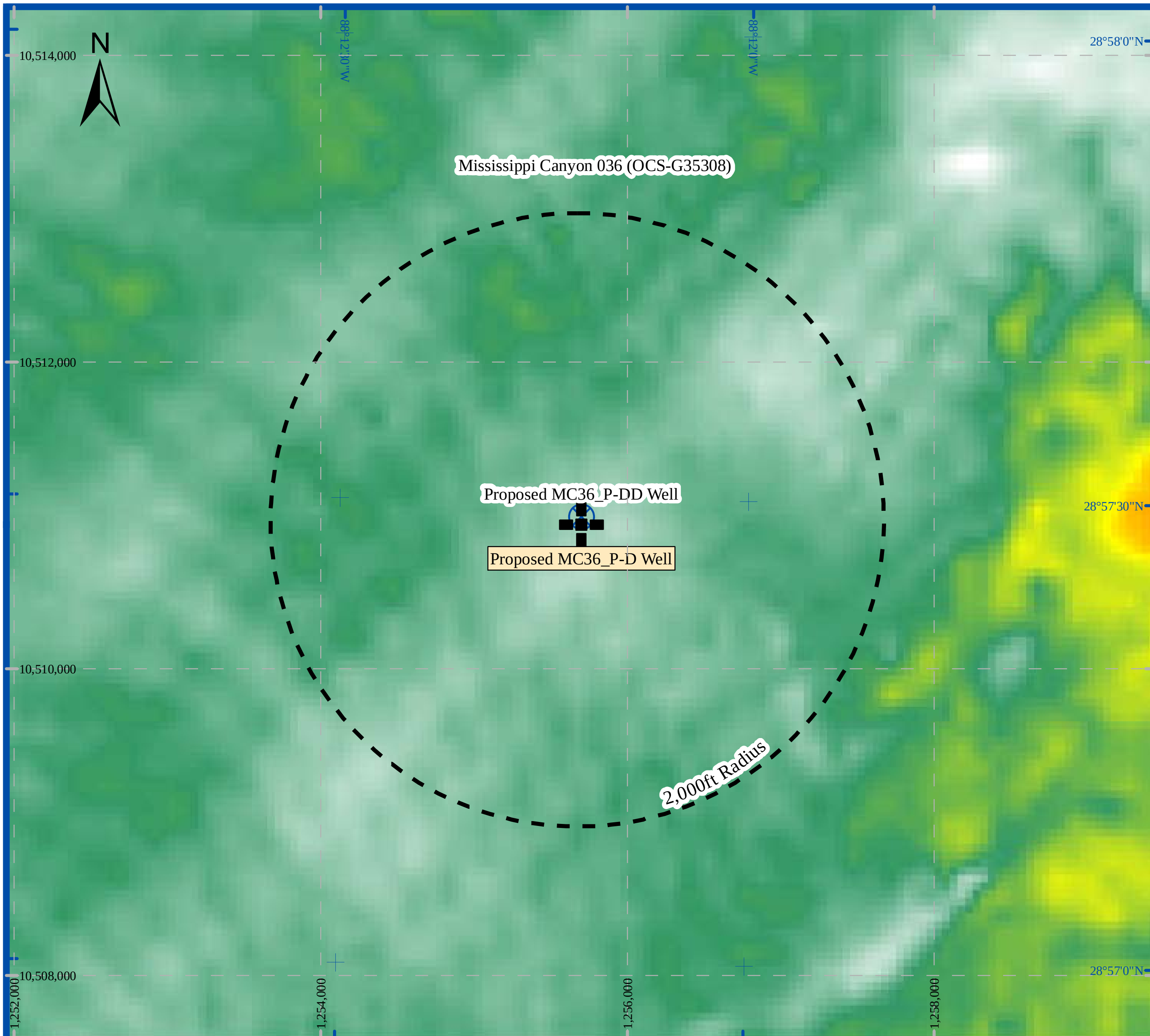
BOEM database — Seep anomaly positives (Cofirmed Organisms)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2 (MC36_P-D)



Seabed Amplitude Extract

Proposed MC36_P-D Well Location
(1,255,700ft E / 10,510,941ft N)

Proposed MC36_P-DD Well Location

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32

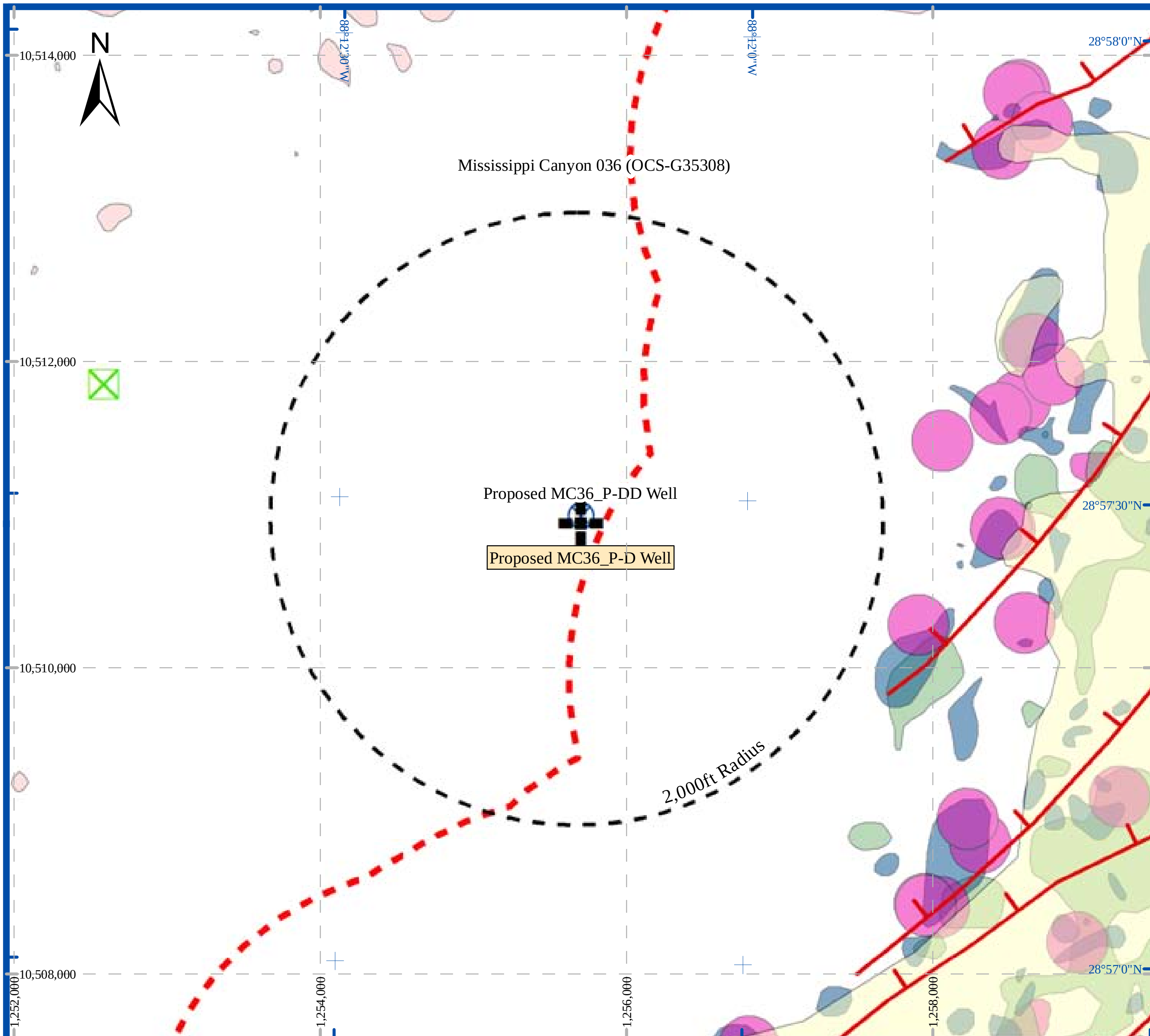
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC36_P-D)



Geohazard Summary Extract

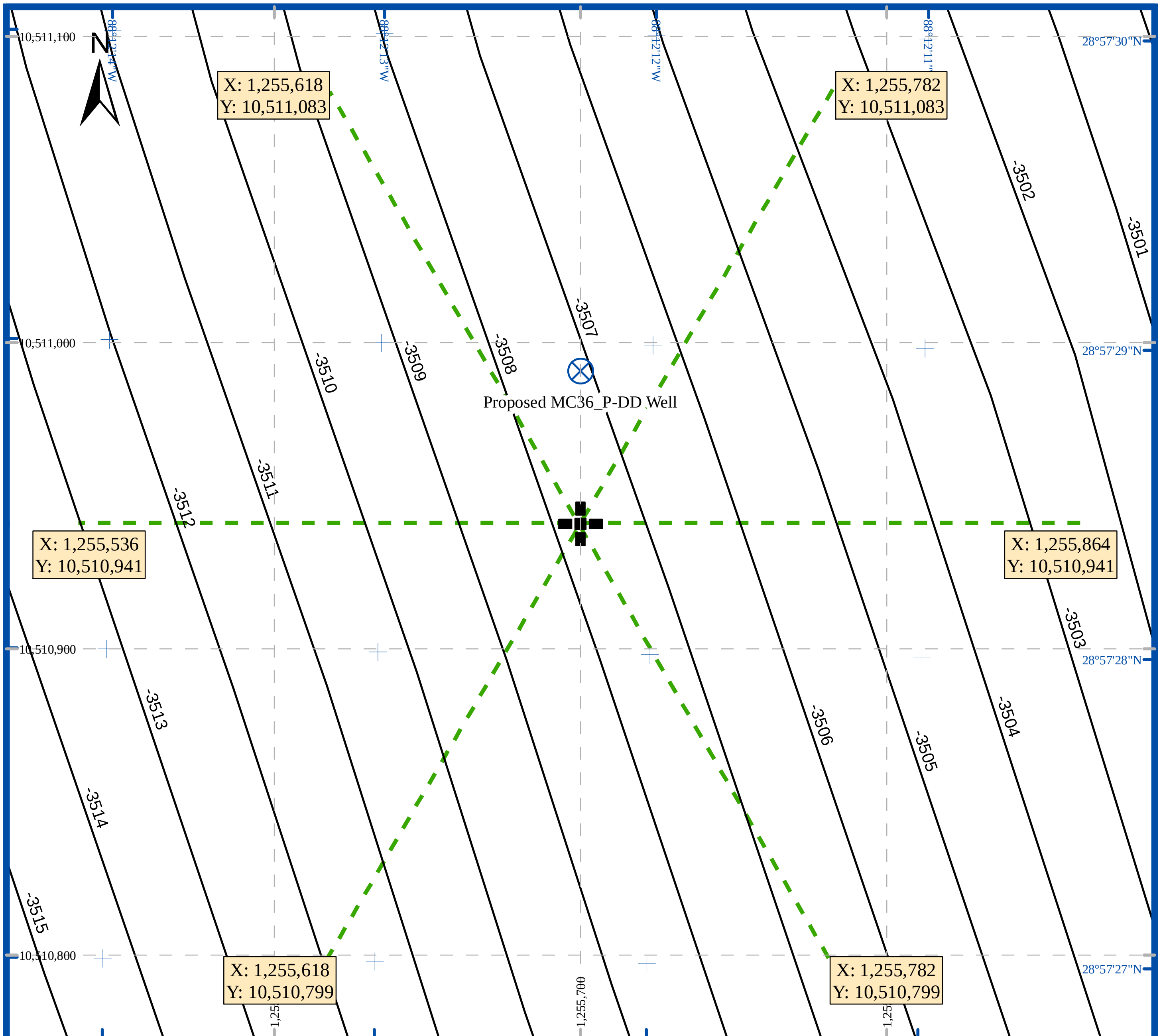
- Proposed MC36_P-D Well Location (1,255,700ft E / 10,510,941ft N)
- Proposed MC36_P-DD Well Location
- Block boundaries
- Seafloor fault intersection. Tick denotes downthrown block
- 2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar
- Hardgrounds exposures at seabed mapped from side scan sonar data
- Sonar contacts, interpreted modern debris
- BOEM database — EM302 plumes (400ft Diam)
- BOEM database — Seep anomaly positives (Cofirmed Organisms)
- Slight, Moderate, and High Risk of Gas within Unit B
- Slight and Moderate Risk of Gas within Unit A

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC36_P-D)



ROV Plat (MC36_P-D)

Proposed MC36_P-D Well Location
(1,255,700ft E / 10,510,941ft N)

Proposed MC36_P-DD Well Location

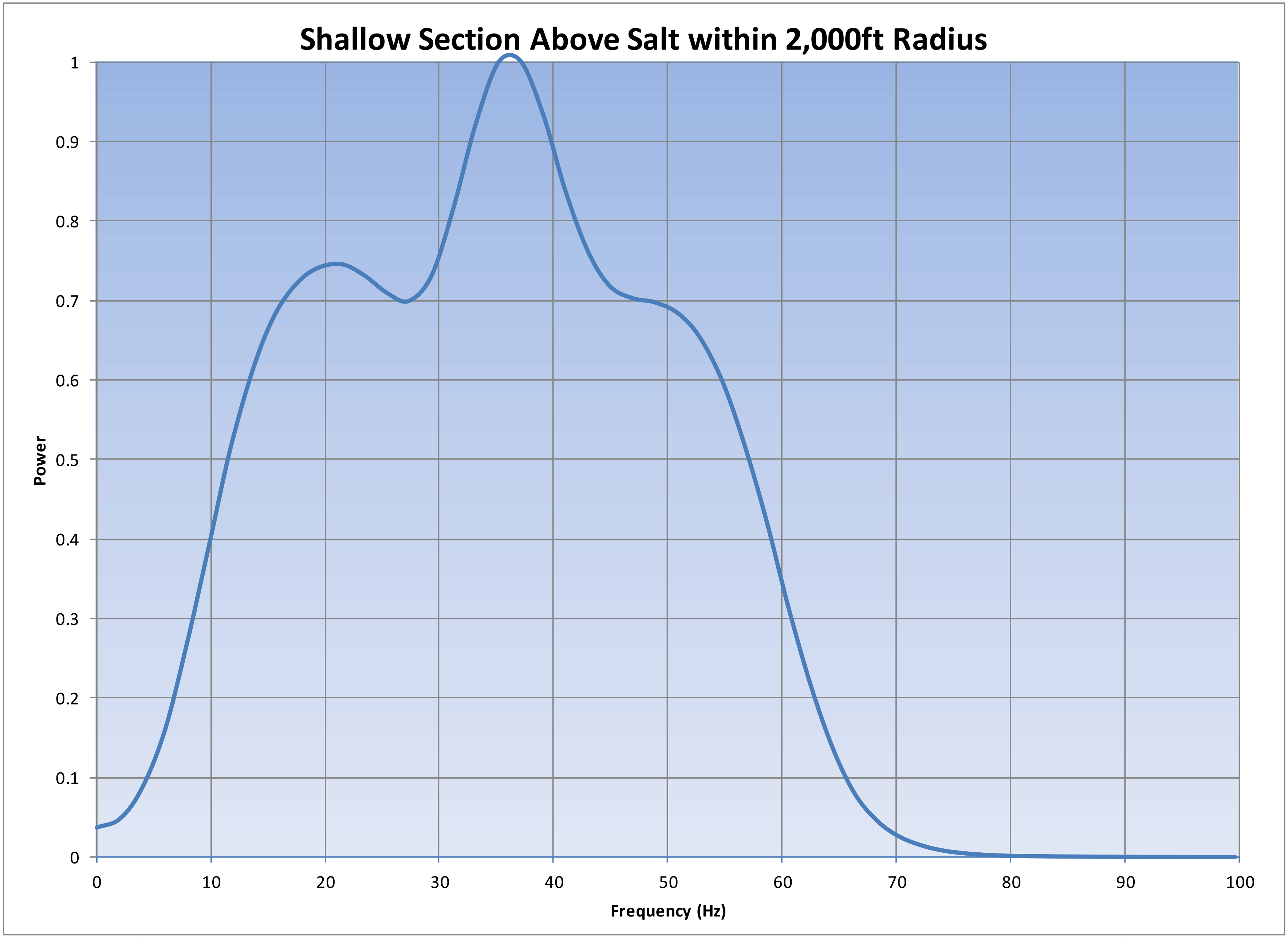
-3508 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC36_P-D)



MC36_P-D	Power Spectrum	Figure 10

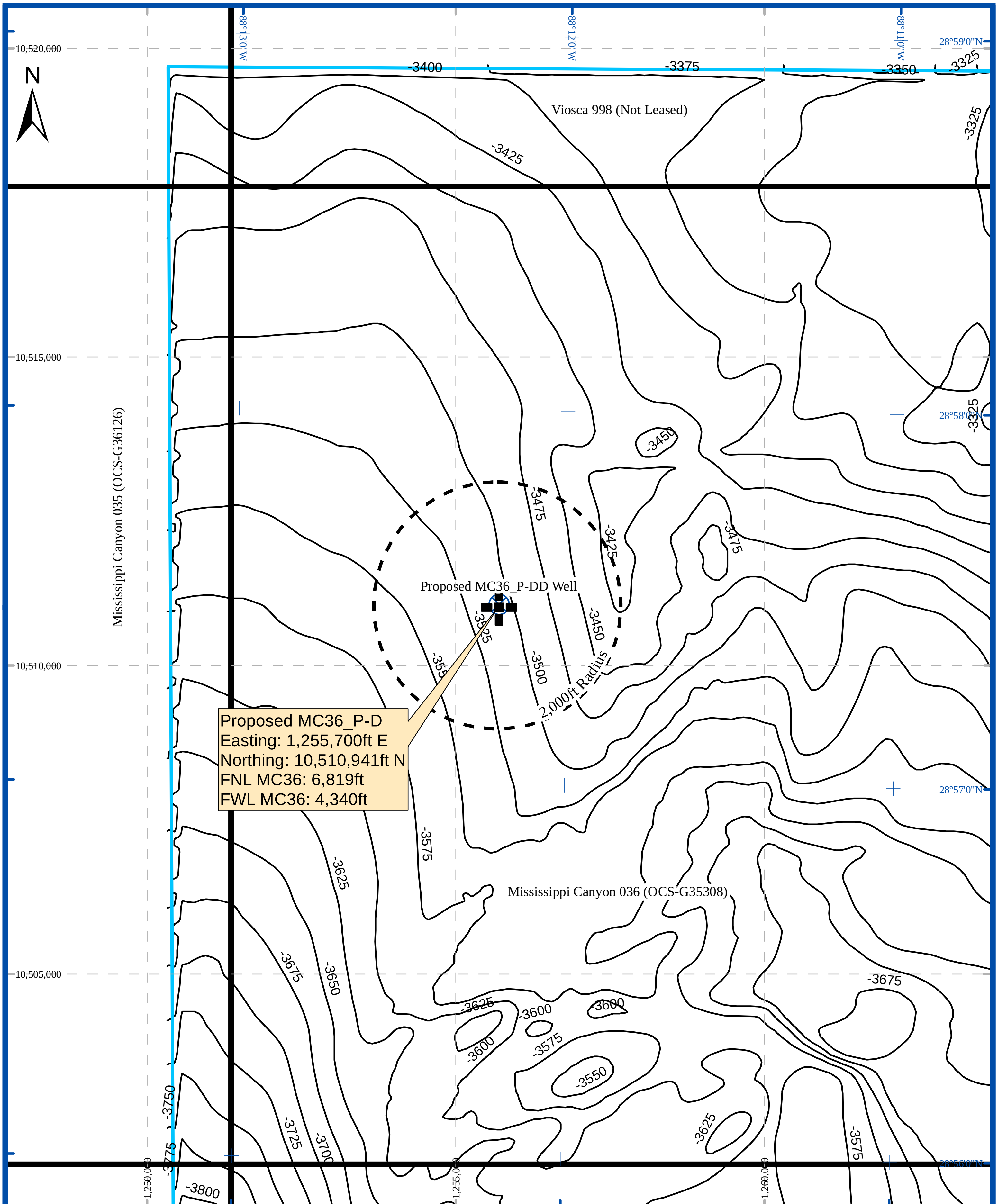


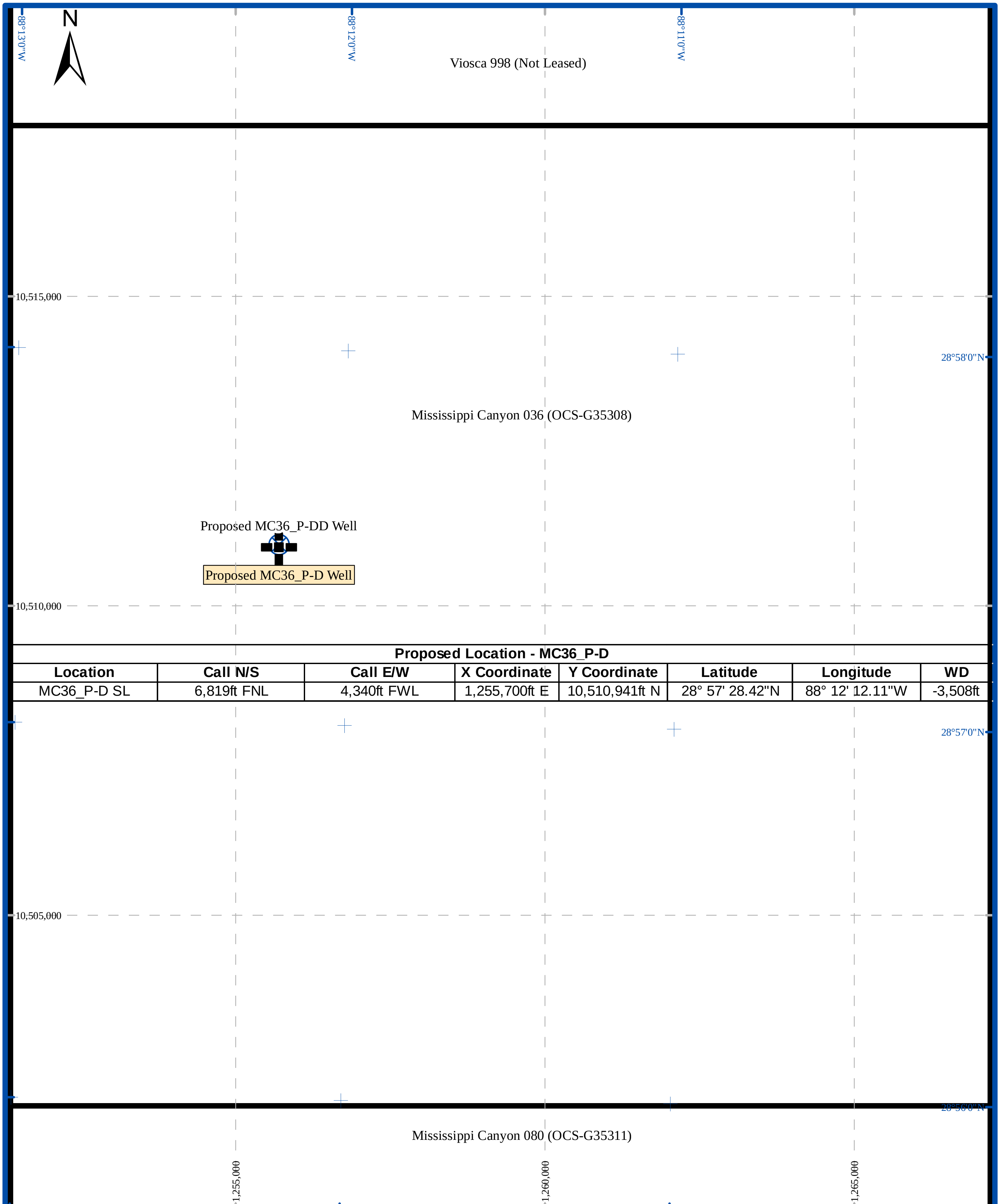
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC36_P-D

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC36_P-D SL	6,819ft FNL	4,340ft FWL	1,255,700ft E	10,510,941ft N	28° 57' 28.42"N	88° 12' 12.11"W	-3,508ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

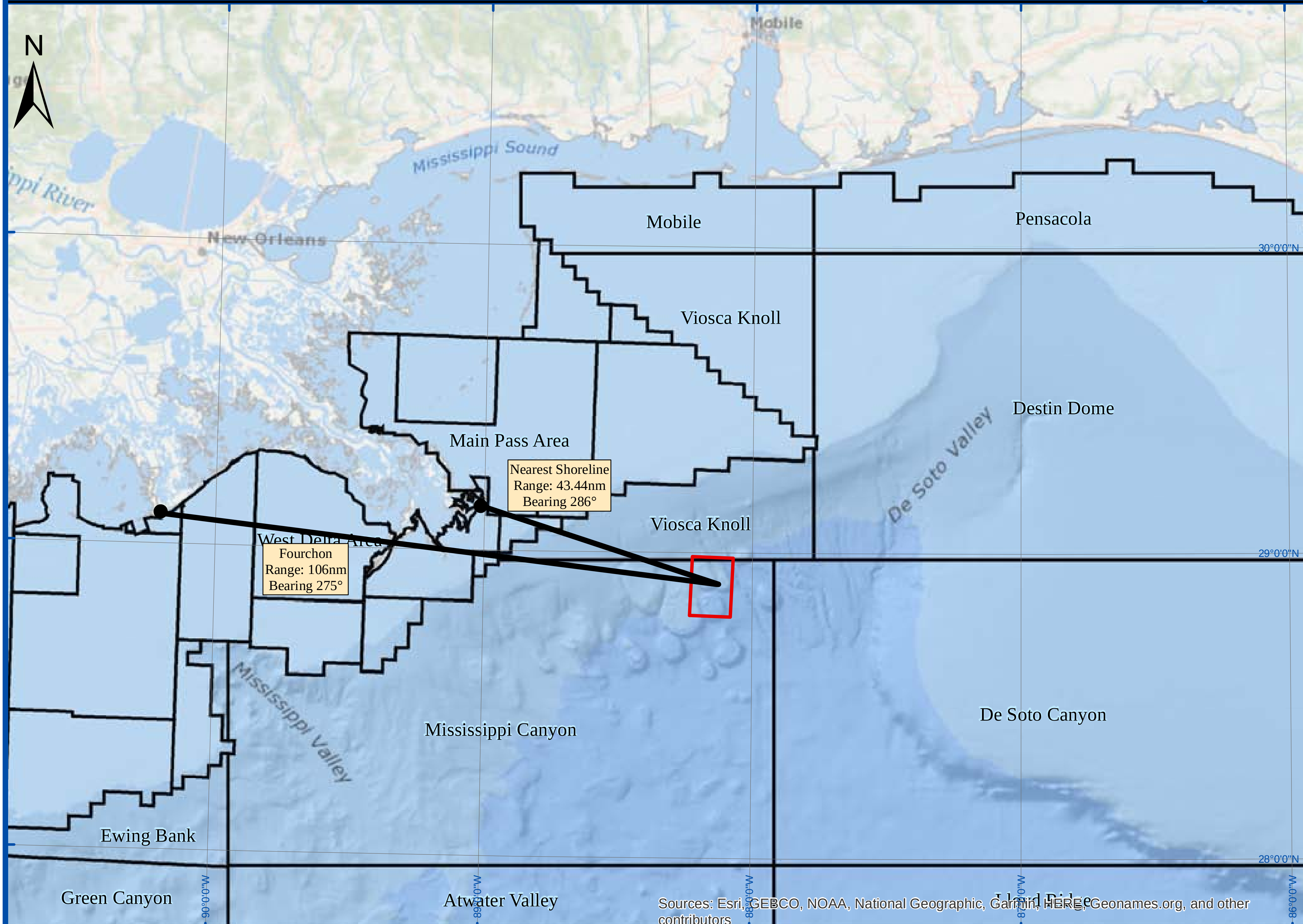
0 150 300 600 Meters

Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 36

Figure 13



Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 36

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC36_P-D Well Location

August 31, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 36
(OCS-G OCS-G-35308)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-D well location with surface location in Block 036, Mississippi Canyon Area (OCS-G-35308). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.5 seconds two-way time (TWT), -10,380ft below sea surface (6,872ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 2.0° to the WSW No seabed faults occur within 2,000ft of the proposed well.

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

No seabed infrastructure occurs within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No anomalies indicative of shallow gas occur within the 2,000ft radius.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect a fault within Unit F.

Proposed MC36_P-D Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	28.421"	North	Easting	1,255,700.	US ft. E
Longitude	88°	12'	12.108"	West	Northing	10,510,941	US ft. N
Latitude Decimal	28.9578948						
Longitude Decimal	-88.2033632						
FWL Mississippi Canyon 036	4,340ft			US ft.	Inline	12725	
FNL Mississippi Canyon 036	6,819ft			US ft.	Crossline	18313	
Water Depth: -3,508ft	Slope: 2.0° WSW						
Nearest Shoreline	43.44 Nautical Miles @ 286°						
Port of Operation	Fourchon				106 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				9.8 Miles @ 44.3°		

Proposed MC36_P-DD Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	28.916"	North	Easting	1,255,700	US ft. E
Longitude	88°	12'	12.113"	West	Northing	10,510,991	US ft. N
Latitude Decimal	28.9580323						
Longitude Decimal	-88.2033648						
FWL Mississippi Canyon 036	4,340ft			US ft.	Inline	12725	
FNL Mississippi Canyon 036	6,769ft			US ft.	Crossline	18313	
Water Depth: -3,508ft	Slope: 2.0° WSW						
Nearest Shoreline	43.44 Nautical Miles @ 286°						
Port of Operation	Fourchon				106 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				9.8 Miles @ 44.3°		

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

No risk of gas is assigned at the propsoed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect a fault within Unit F.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC36_P-D Well Location

Anadarko Petroleum Corporation

August 31, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC36_P-D Well Location (OCS-G-35308)

Ladies/Gentlemen:

Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-D with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities

Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 2,167ft to the ESE.

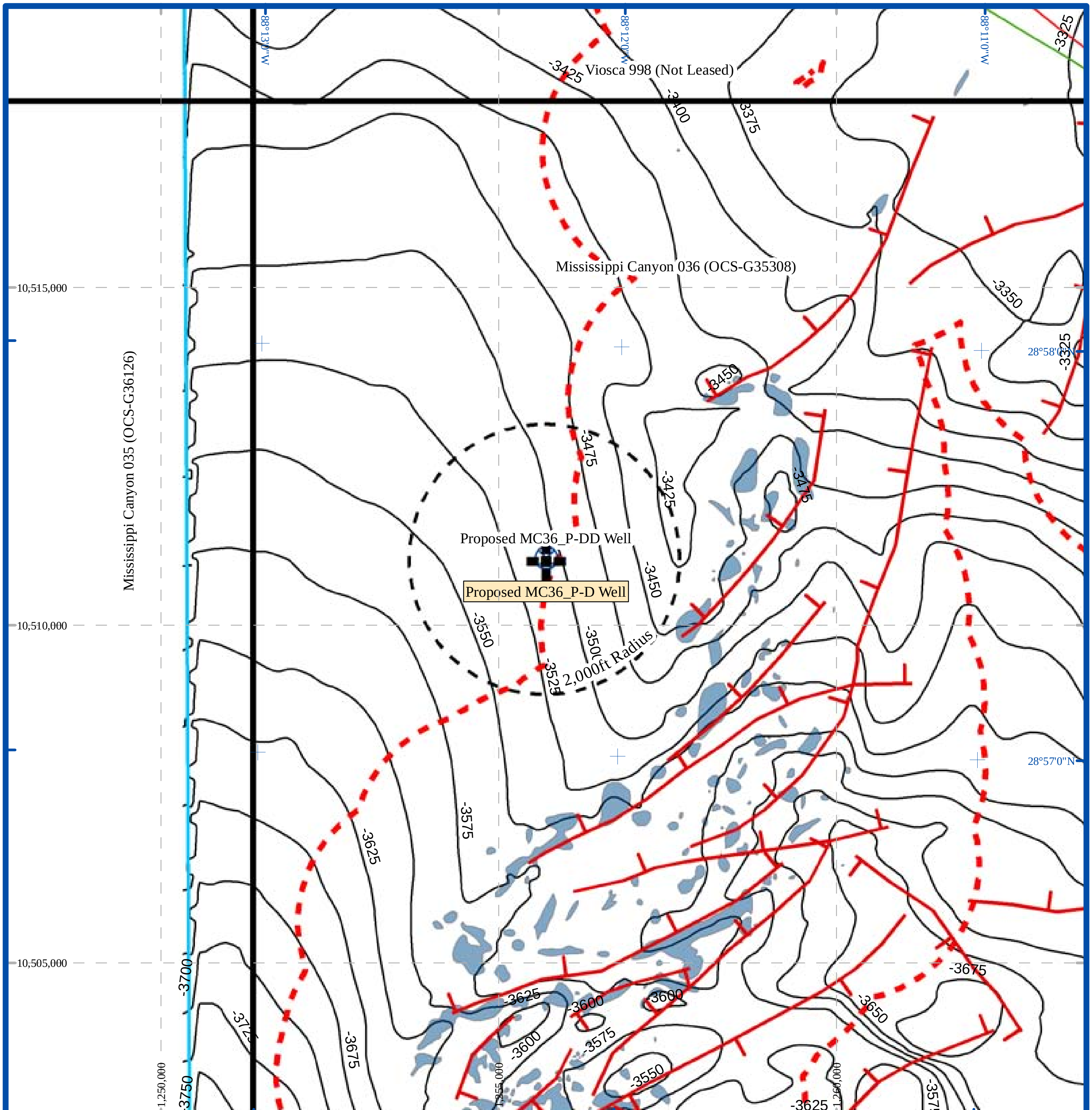
Proposed MC36_P-D Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	28.421"	North	Easting	1,255,700.	US ft. E
Longitude	88°	12'	12.108"	West	Northing	10,510,941	US ft. N
Latitude Decimal			28.9578948				
Longitude Decimal			-88.2033632				
FWL Mississippi Canyon 036			4,340ft	US ft.	Inline	12725	
FNL Mississippi Canyon 036			6,819ft	US ft.	Crossline	18313	
Water Depth: -3,508ft			Slope: 2.0° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		9.8 Miles @ 44.3°		

Proposed MC36_P-DD Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	28.916"	North	Easting	1,255,700	US ft. E
Longitude	88°	12'	12.113"	West	Northing	10,510,991	US ft. N
Latitude Decimal			28.9580323				
Longitude Decimal			-88.2033648				
FWL Mississippi Canyon 036			4,340ft	US ft.	Inline	12725	
FNL Mississippi Canyon 036			6,769ft	US ft.	Crossline	18313	
Water Depth: -3,508ft			Slope: 2.0° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		9.8 Miles @ 44.3°		

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

Conclusions and Recommendations: The proposed MC36_P-D and proposed MC36_P-DD well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC36_P-D Well Location (1,255,700ft E / 10,510,941ft N)

Proposed MC36_P-DD Well Location

Block boundaries

Oil Pipelines

Gas Pipelines

Study area boundary

-3508 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Peach Prospect
Mississippi Canyon, Block MC36,
Offshore Gulf of Mexico

Description:
Proposed MC36_P-E Well Location

Project Number:
2020-308

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	A Haigh
	Quality Assurance	D Haigh

Revision	**Date**	**Title**
0	July 28, 2020	Draft
1	August 31, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

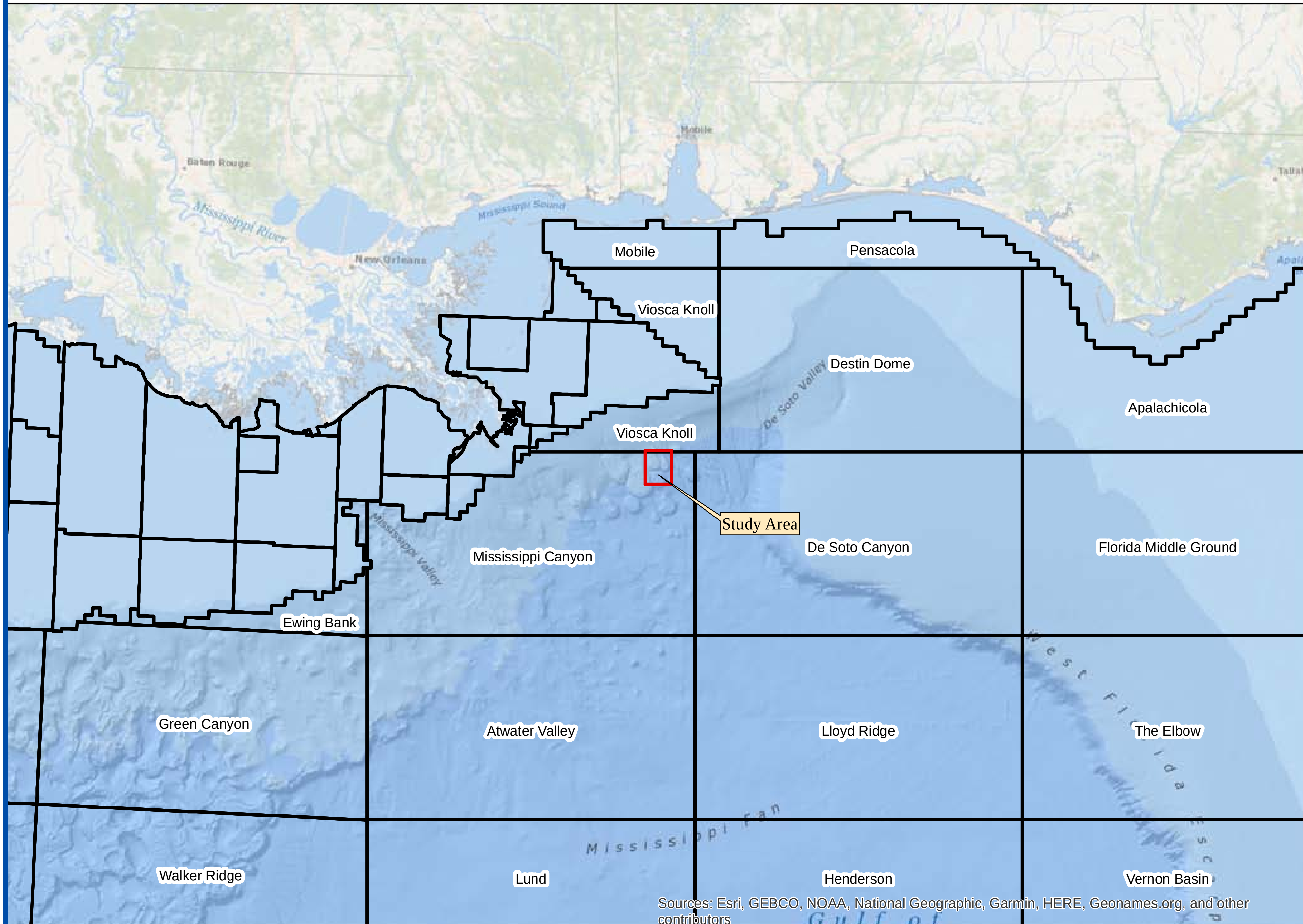
This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

Please be aware that further distribution of this report, in whole or part, or the use of the data for a purpose not expressly stated within the contractual work scope is at the client's sole risk, and Ocean Geo Solutions, Inc recommends that this disclaimer is included in any such distribution.

OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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LIST OF FIGURES

WELL CLEARANCE LETTER – PROPOSED MC36_P-E WELL LOCATION

August 31, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC36_P-E Well Location
Mississippi Canyon Block MC36
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC36_P-E Well Location, Mississippi Canyon Area (OCS-G-35308). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,348ft below sea surface (6,791ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC36_P-E well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC36_P-E Well Location lies in the west-central part of Block MC36 (OCS-G-35308).

Proposed MC36_P-E Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	08.536"	North	Easting	1,254,700.	US ft. E
Longitude	88°	12'	23.137"	West	Northing	10,508,943	US ft. N
Latitude Decimal			28.952371				
Longitude Decimal			-88.2064268				
FWL Mississippi Canyon 36			3,340ft	US ft.	Inline	12703	
FSL Mississippi Canyon 36			7,023ft	US ft.	Crossline	18277	
Water Depth: -3,557ft			Slope: 1.7° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		10.184 Miles @ 43.52°		

Proposed MC36_P-EE Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	09.031"	North	Easting	1,254,700	US ft. E
Longitude	88°	12'	23.142"	West	Northing	10,508,993	US ft. N
Latitude Decimal			28.9525085				
Longitude Decimal			-88.2064284				
FWL Mississippi Canyon 36			3,340ft	US ft.	Inline	12704	
FSL Mississippi Canyon 36			7,073ft	US ft.	Crossline	18277	
Water Depth: -3,557ft			Slope: 1.7° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		10.186 Miles @ 43.50°		

Location MC36_P-EE is 50ft from MC36_P-E on a bearing of 000°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC36_P-E well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)-(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC36_P-E well location is -3,557ft below sea surface (Figure 1). The seafloor slopes to the WSW at 1.7°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC36_P-E well location is in the west-central part of block MC36. The proposed well is located in an area of relatively smooth seabed located within a minibasin to the northwest of Horn Dome.

No seabed fault intersections occur within 2,000ft of the proposed location.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,762ft below sea surface (205ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,762ft below sea surface (205ft below seabed).

4.3 Unit B

The upper part of Unit B, from -3,762ft to -3,856ft below sea surface (205ft to 299ft below seabed), displays generally low-amplitude reflectors, and is interpreted as well-layered clays and silts with occasional sands.

From -3,856ft to -4,096ft below sea surface (299ft to 539ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -4,096ft below sea surface (539ft below seabed) to -4,490ft below sea surface (933ft below seabed) presents acoustically as well-layered, low-amplitude reflectors with clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft radius from the proposed well.

Horizon H10 marks the base of Unit B, occurring at -4,490ft below sea surface (933ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,490ft to -5,061ft below sea surface (933ft to 1,504ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit C at the proposed well. A risk of gas anomaly occurs approximately 1,924ft to the ESE of the proposed well. This anomaly is not connected to the proosed well-path.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -5,061ft below sea surface (1,504ft below seabed).

4.5 Unit D

The upper part of Unit D from -5,061ft below sea surface (1,504ft below seabed) to -5,443ft below sea surface (1,886ft below seabed) is interpreted to consist of well-layered, low-amplitude reflectors with clays, silts, and occasional sands.

Unit D from -5,443ft to -5,812ft below sea surface (1,886ft to 2,225ft below seabed) is characterized by slightly-chaotic, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sands. This interval appears to have been deposited at a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can, on occasions, induce minor over-pressure and as such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit D from -5,812ft below sea surface (2,255ft below seabed) to -5,963ft below sea surface (2,406ft below seabed) is interpreted to consist of clays, silts, and occasional sands.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -5,963ft below sea surface (2,406ft below seabed).

4.6 Unit E

Unit E from -5,963ft to -6,612ft below sea surface (2,406ft to 3,055ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,300ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight**

Shallow Water Flow Risk is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit E.

Horizon H40 marks the base of Unit E at -6,612ft below sea surface (3,055ft below seabed).

4.7 Unit F

Unit F from -6,612ft to -8,212ft below sea surface (3,055ft to 4,655ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~1,700ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft radius of the proposed well.

The well-path will traverse a fault at -7,495ft below sea surface (3,938ft below seabed). This fault is downthrown around 20ft to the southeast. Minor wellbore and drilling fluid circulation problmes may occur at the level of the fault.

Horizon H50 marks the base of Unit F at -8,212ft below sea surface (4,655ft below seabed).

4.8 Unit G

Unit G from -8,212ft to -10,348ft below sea surface (4,655ft to 6,791ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit G.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,348ft below sea surface (6,791ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,856ft to -4,096ft below sea surface (299ft to 539ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,443ft to -5,812ft below sea surface (1,886ft to 2,255ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,963ft to -6,612ft below sea surface (2,406ft to 3,055ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -6,612ft to -8,212ft below sea surface (3,055ft to 4,655ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None predicted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,856ft to -4,096ft below sea surface (299ft to 539ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  None Predicted.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,443ft to -5,812ft below sea surface (1,886ft to 2,255ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -5,963ft to -6,612ft below sea surface (2,406ft to 3,055ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -6,612ft to -8,212ft below sea surface (3,055ft to 4,655ft below seabed).

  Minor wellbore stability and drilling fluid circulation problems are also considered possible within this unit.

The well-path will traverse a fault at -7,495ft below sea surface (3,938ft below seabed). Minor wellbore stability and drilling fluid circulation problmes may occur at the level of the fault. Casing seats shold avoid all fault intersections as formation integrity could be compromised.

- Unit G

No drilling hazards or problems interpreted.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

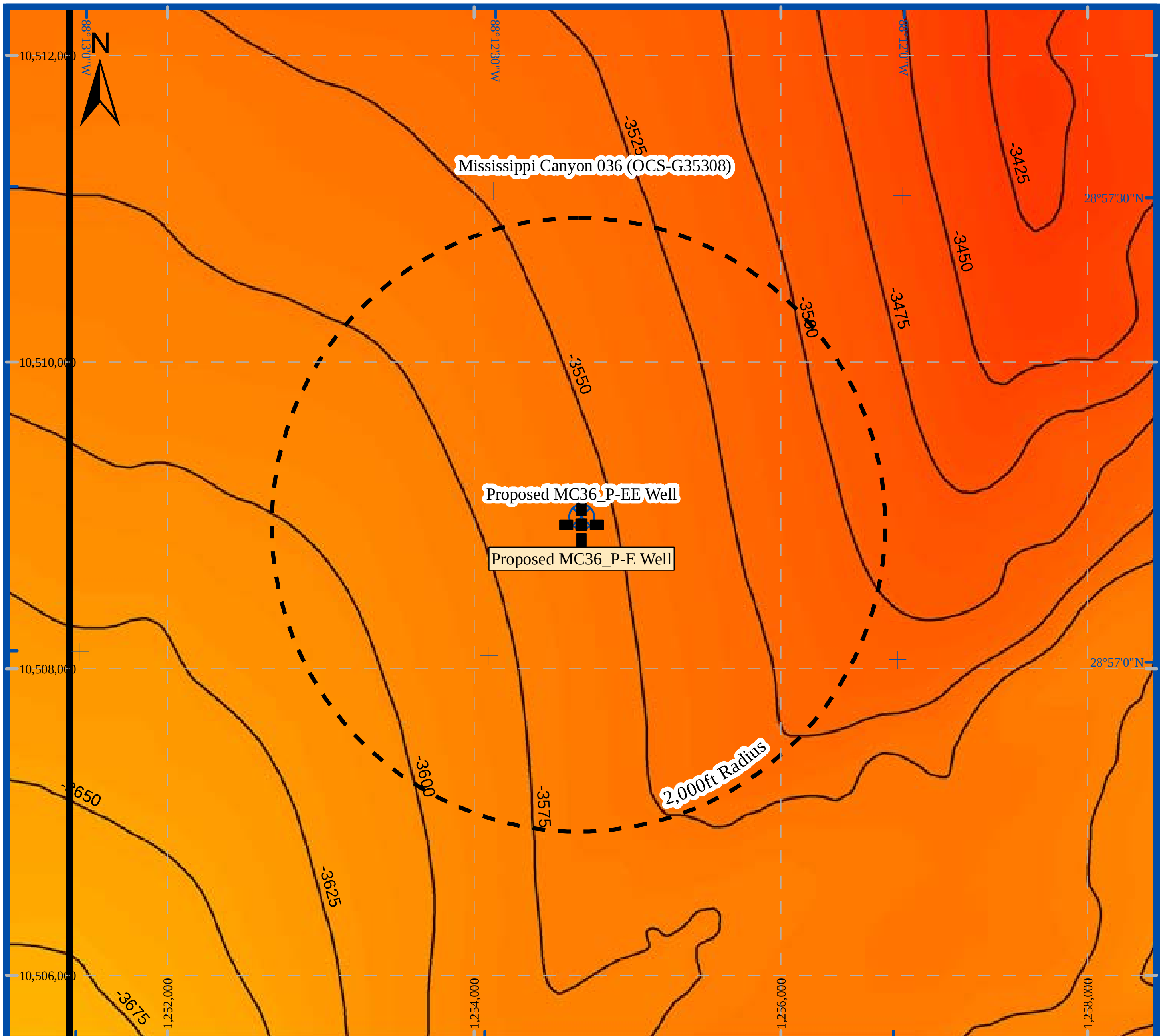
Andrew Haigh
Geophysical Manager

Denise Haigh
Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC36_P-E Well Location

Seabed Depth Extract
Seabed Morphology Extract
Seabed Amplitude Extract
Geohazard Summary Extract
Sand Lithology Summary Extract
Inline Data Example
Crossline Data Example
Top Hole Prognosis
ROV Plat
Power Spectrum
Bathymetry Plat
Public Information Plat
Vicinity Plat
10-Mile Radius Plat



Seabed Depth Extract

Proposed MC36_P-E Well Location
(1,254,700ft E / 10,508,943ft N)

Proposed MC36_P-EE Well Location

Block boundaries

-3557 Depth in feet below sea surface to seabed, contoured at 25ft intervals

Seabed Depth (Feet)

Chart Scale 1" = 1,000'

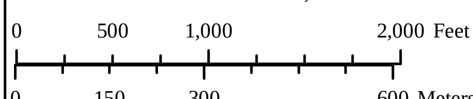
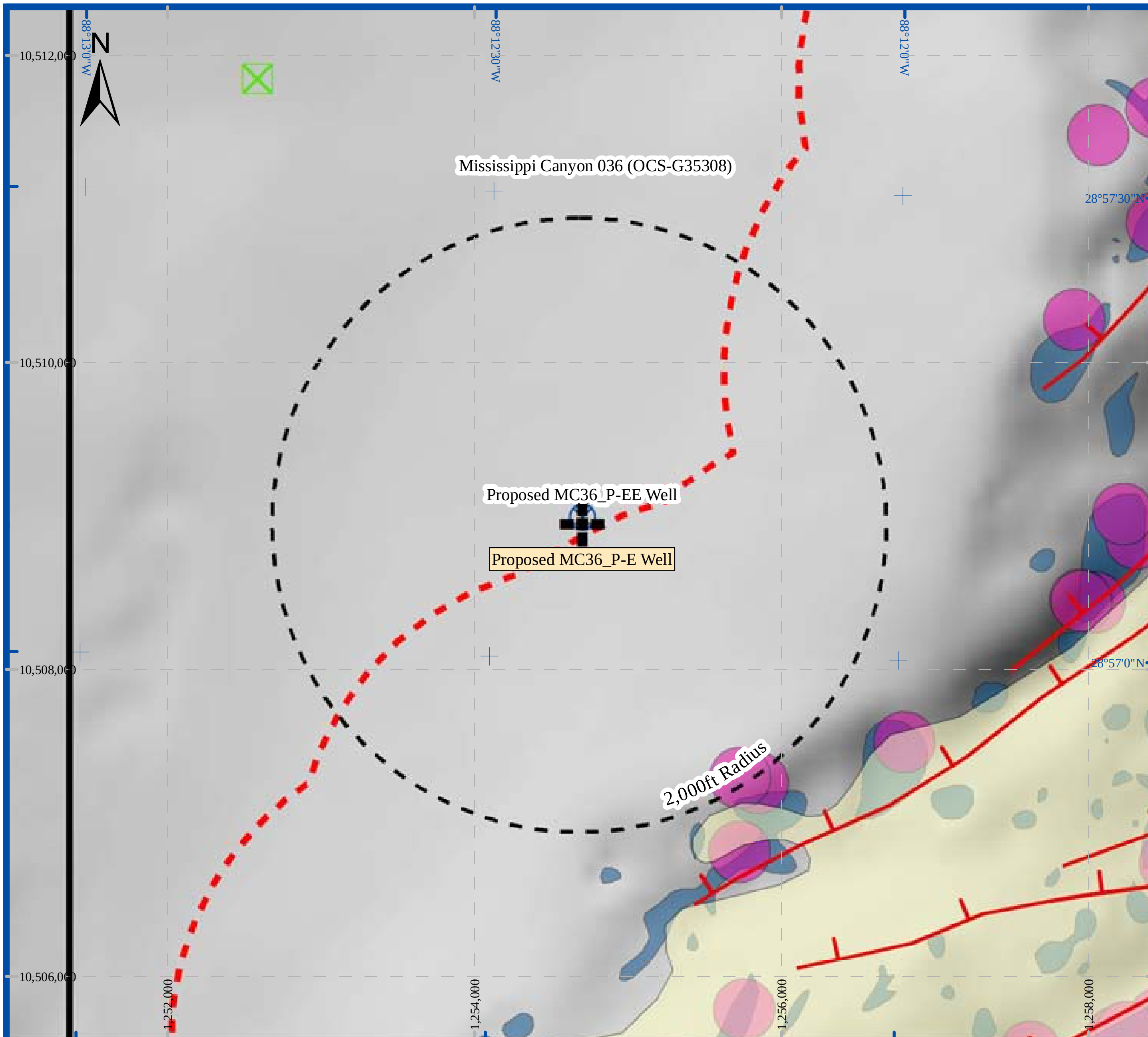


Figure 1
(MC36_P-E)



Seabed Morphology Extract

Proposed MC36_P-E Well Location (1,254,700ft E / 10,508,943ft N)

Proposed MC36_P-EE Well Location

Block boundaries

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Sonar contacts, interpreted modern debris

BOEM database — EM302 plumes (400ft Diam)

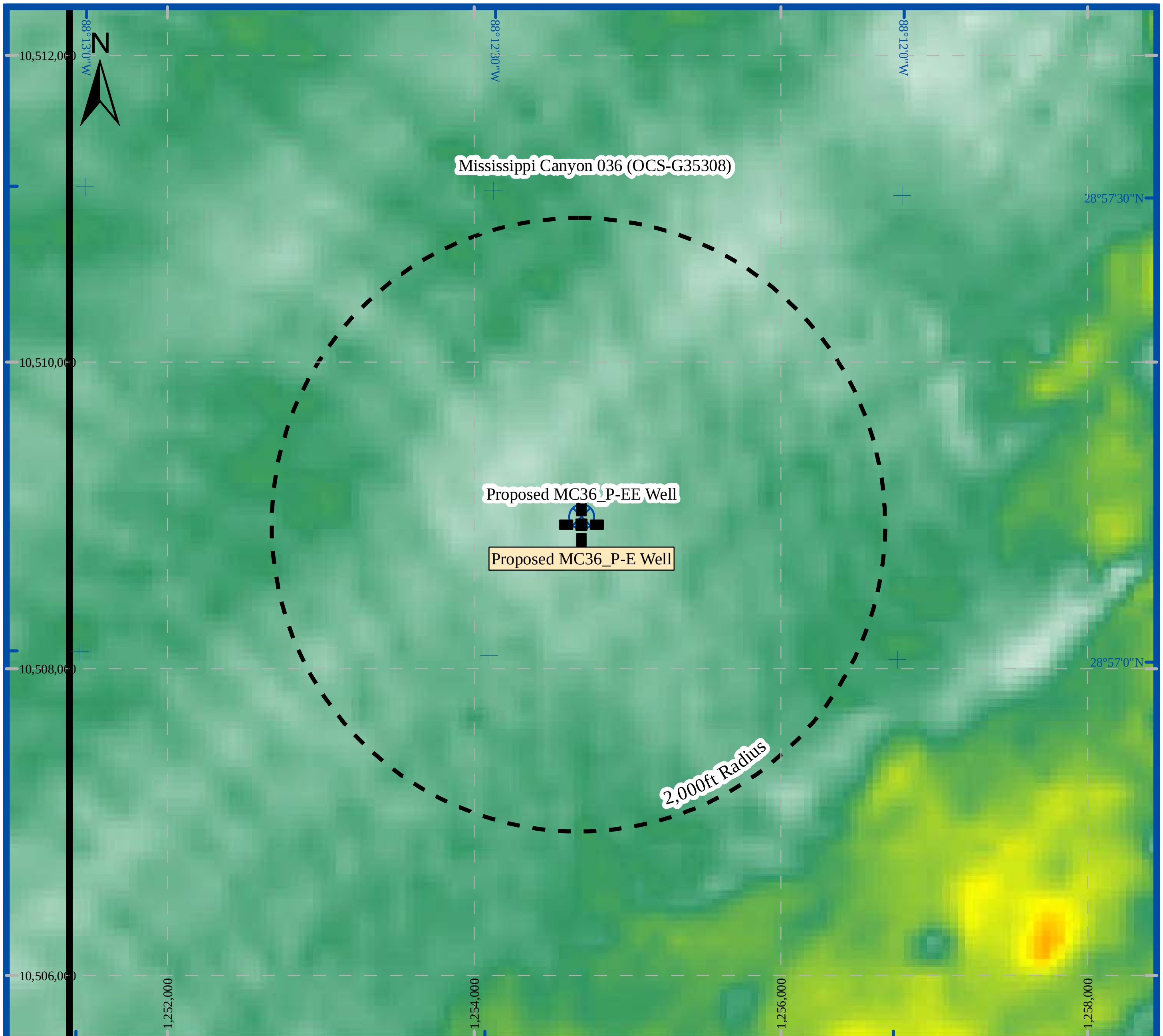
BOEM database — Seep anomaly positives (Cofirmed Organisms)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC36_P-E)

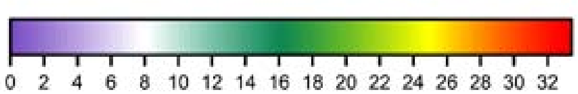


Seabed Amplitude Extract

Proposed MC36_P-E Well Location
(1,254,700ft E / 10,508,943ft N)

Proposed MC36_P-EE Well Location

Block boundaries



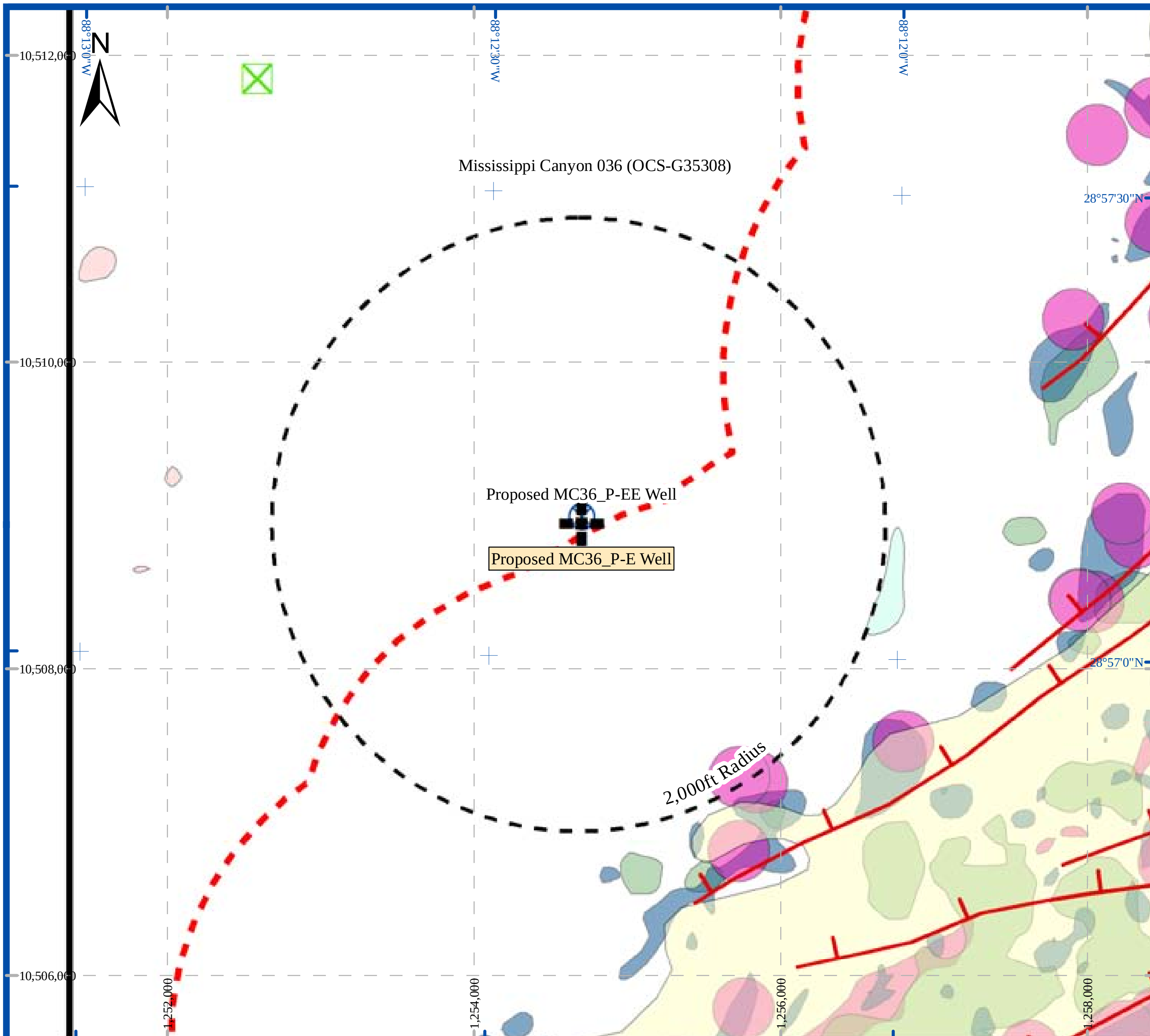
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC36_P-E)



Geohazard Summary Extract

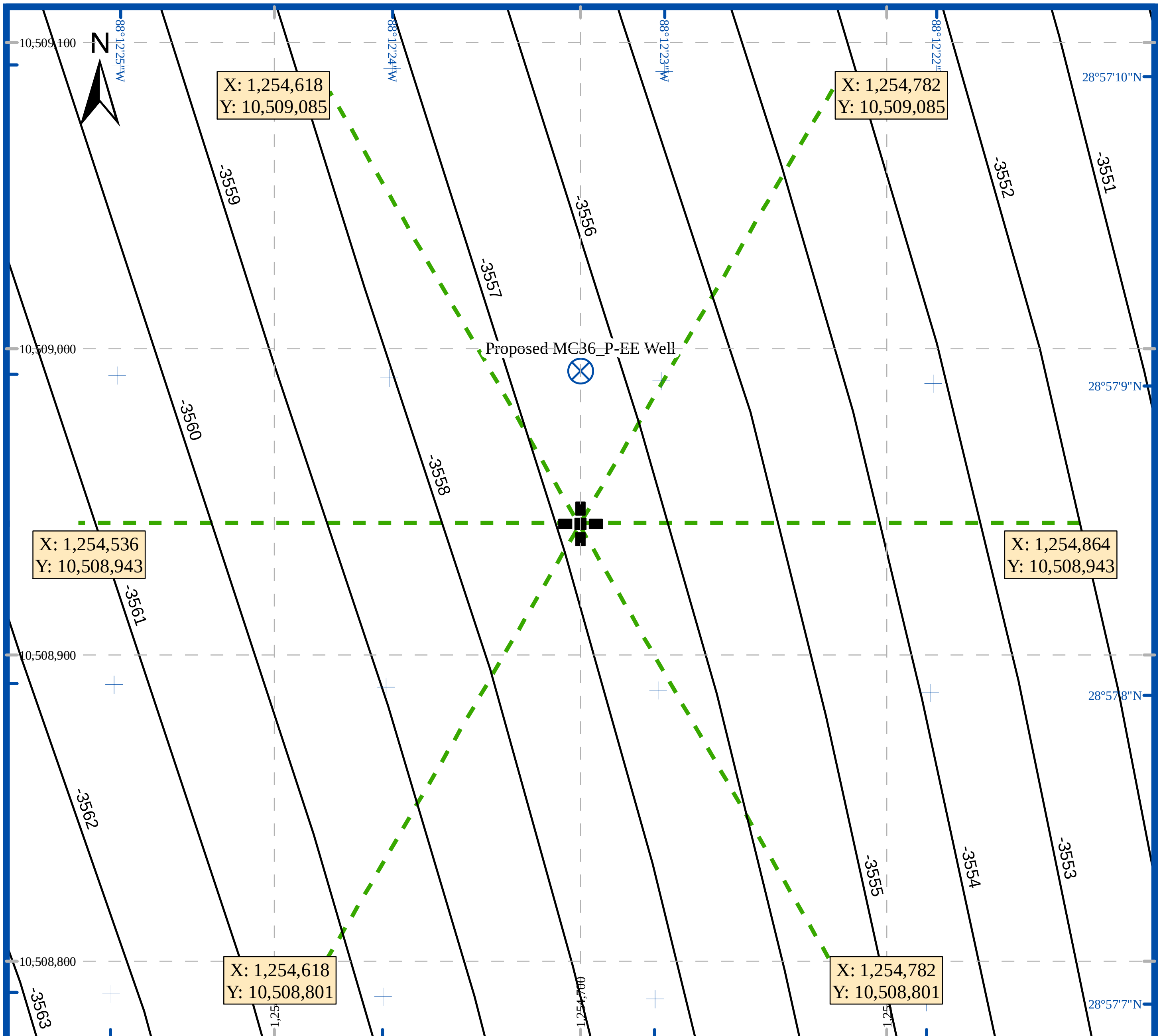
Proposed MC36_P-E Well Location (1,254,700ft E / 10,508,943ft N)	
Proposed MC36_P-EE Well Location	
Block boundaries	
Seafloor fault intersection. Tick denotes downthrown block	
2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar	
Hardgrounds exposures at seabed mapped from side scan sonar data	
Sonar contacts, interpreted modern debris	
BOEM database	EM302 plumes (400ft Diam)
BOEM database	Seep anomaly positives (Cofirmed Organisms)
	Slight and Moderate Risk of Gas within Unit A
	Slight, Moderate, and High Risk of Gas within Unit B
	Moderate and High Risk of Gas within Unit C

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC36_P-E)



ROV Plat (MC36_P-E)

Proposed MC36_P-E Well Location (1,254,700ft E / 10,508,943ft N)

Proposed MC36_P-EE Well Location

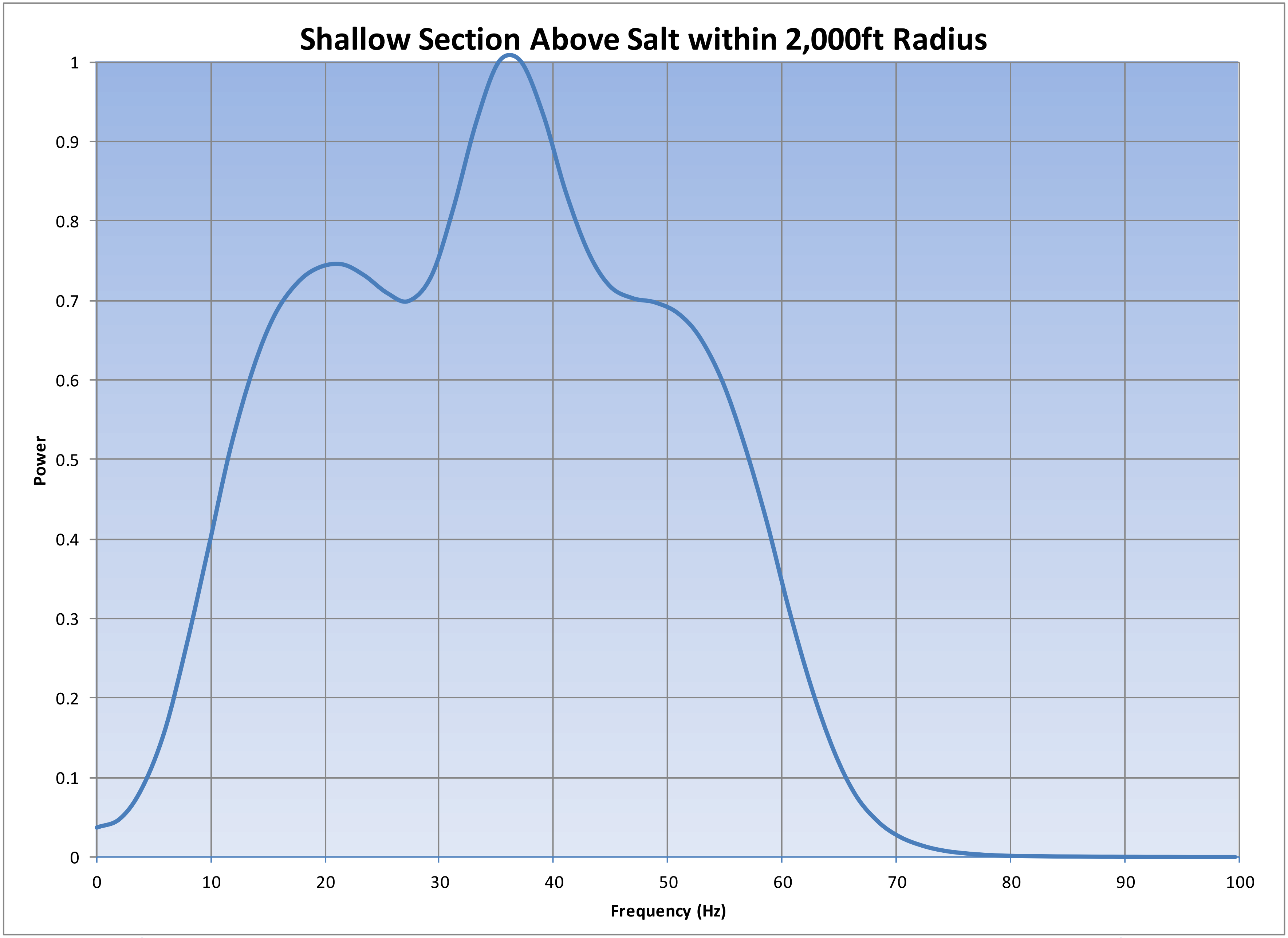
-3557 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9 (MC36_P-E)



MC36_P-E	Power Spectrum	Figure 10

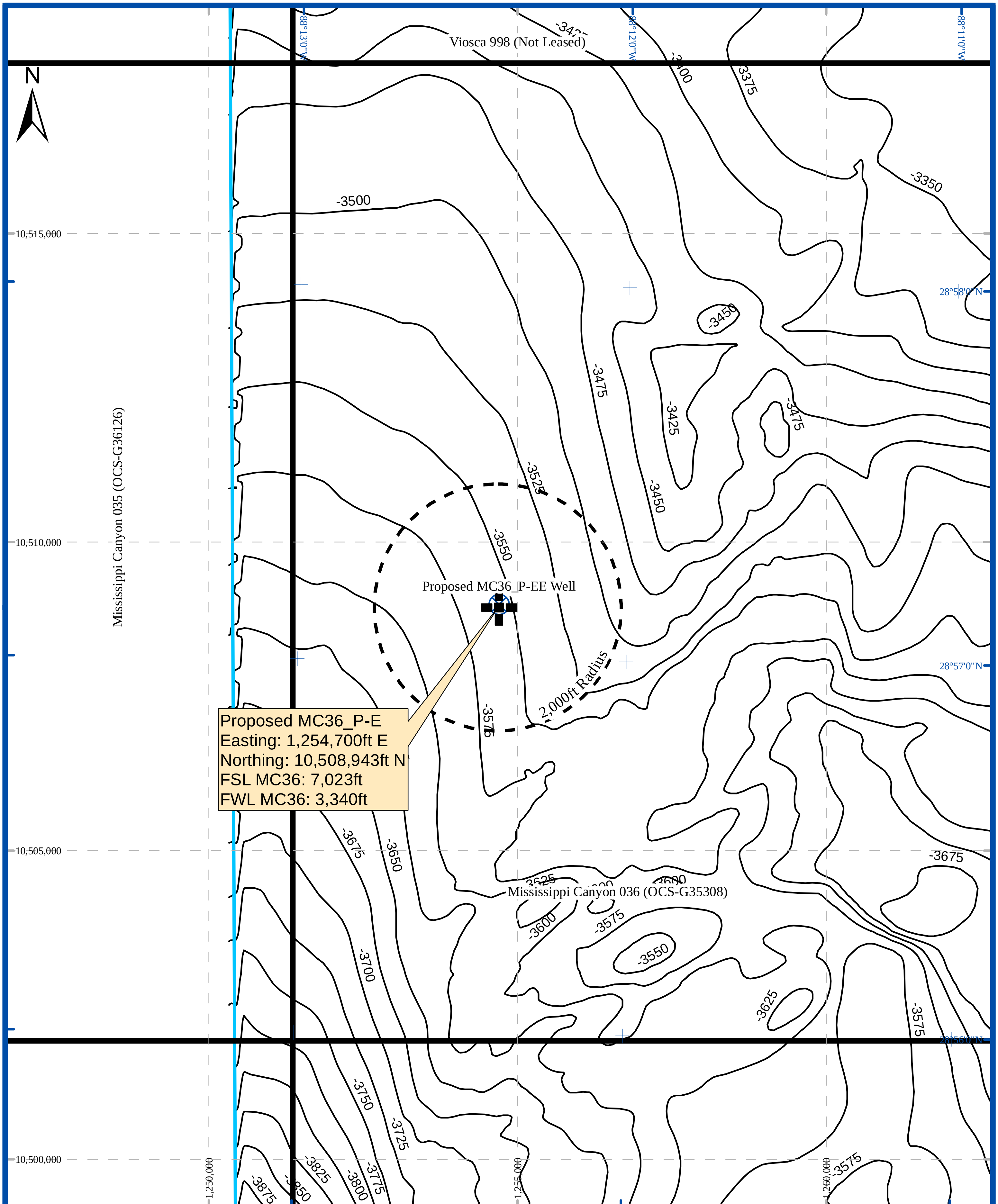


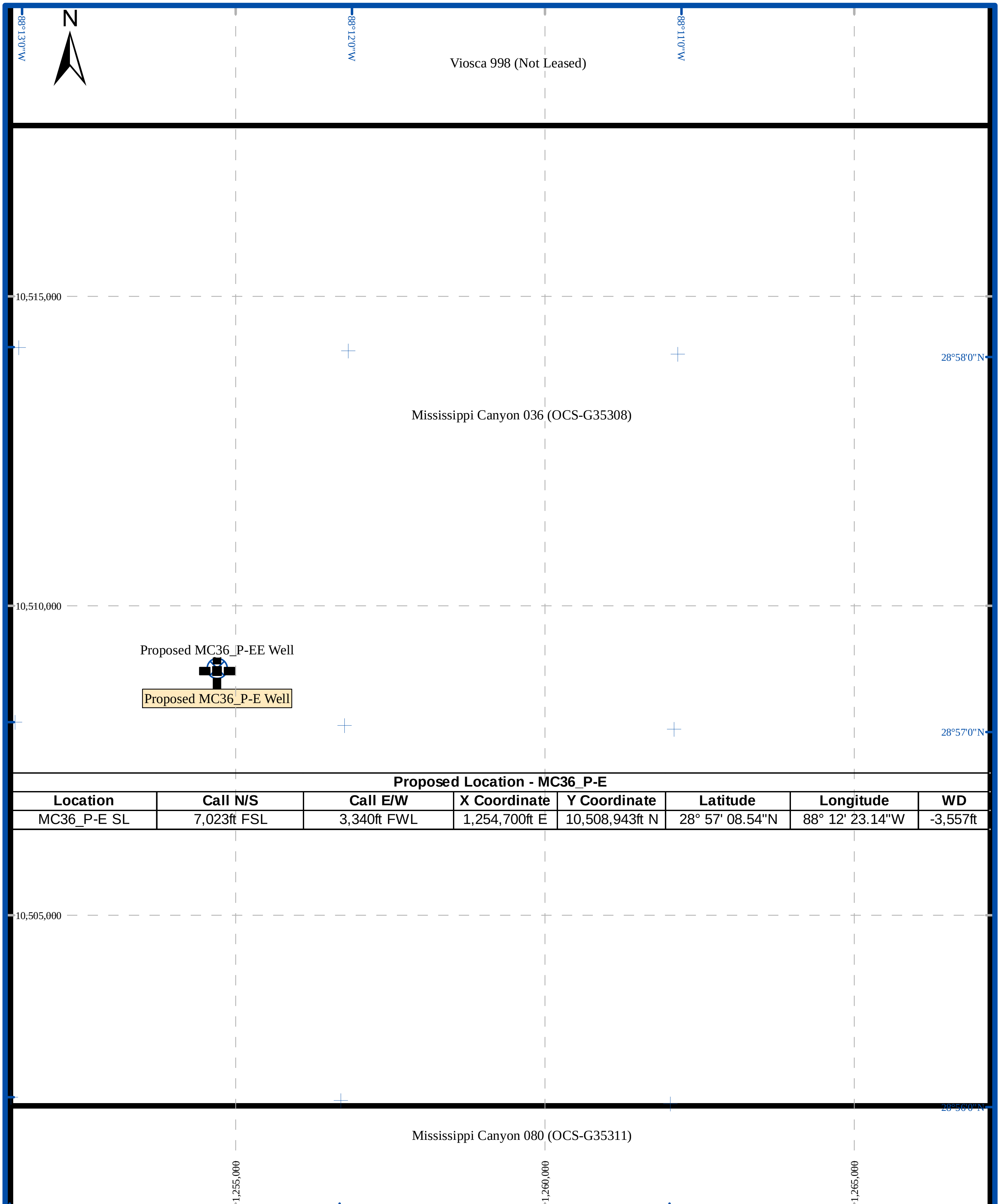
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC36_P-E							
Location	**Call N/S**	**Call E/W**	**X Coordinate**	**Y Coordinate**	**Latitude**	**Longitude**	**WD**
MC36_P-E SL	7,023ft FSL	3,340ft FWL	1,254,700ft E	10,508,943ft N	28° 57' 08.54"N	88° 12' 23.14"W	-3,557ft

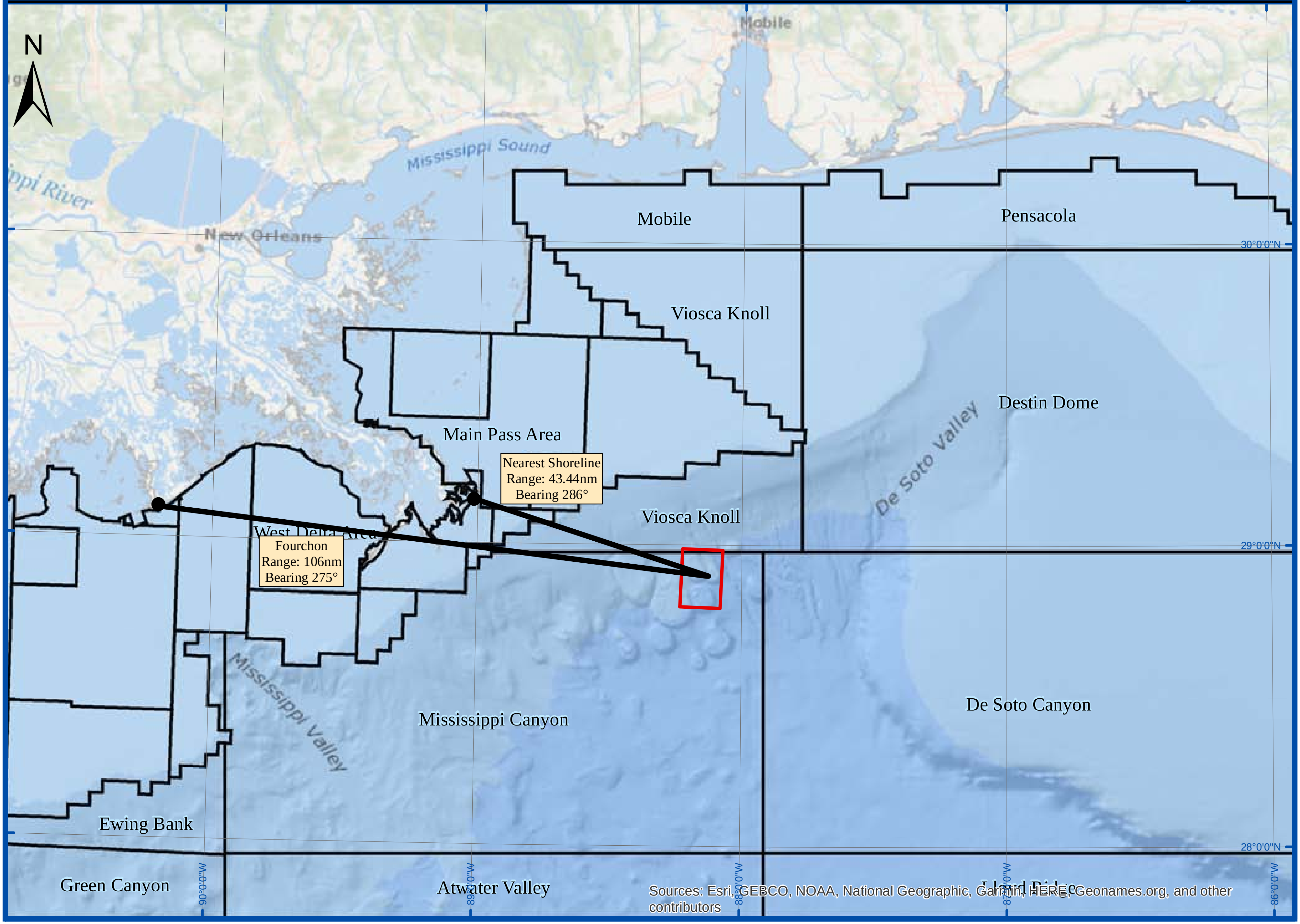
Chart scale 1" = 2,000'
0 500 1,000 2,000 Feet
0 150 300 600 Meters

Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 36

Figure 13



Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 36

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC36_P-E Well Location

August 31, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 36
(OCS-G OCS-G-35308)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-E well location with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.5 seconds two-way time (TWT), -10,348ft below sea surface (6,791ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 1.7° to the WSW No seabed faults occur within 2,000ft of the proposed well.

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

No seabed infrastructure occurs within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. Anomalies indicative of shallow gas occur within the 2,000ft radius in Unit C.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect a fault within Unit F.

Proposed MC36_P-E Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	08.536"	North	Easting	1,254,700.	US ft. E
Longitude	88°	12'	23.137"	West	Northing	10,508,943	US ft. N
Latitude Decimal	28.952371						
Longitude Decimal	-88.2064268						
FWL Mississippi Canyon 36	3,340ft	US ft.	Inline	12703			
FSL Mississippi Canyon 36	7,023ft	US ft.	Crossline	18277			
Water Depth: -3,557ft	Slope: 1.7° WSW						
Nearest Shoreline	43.44 Nautical Miles @ 286°						
Port of Operation	Fourchon	106 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	10.184 Miles @ 43.52°					

Proposed MC36_P-EE Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57'	09.031"	North	Easting	1,254,700	US ft. E
Longitude	88°	12'	23.142"	West	Northing	10,508,993	US ft. N
Latitude Decimal	28.9525085						
Longitude Decimal	-88.2064284						
FWL Mississippi Canyon 36	3,340ft	US ft.	Inline	12704			
FSL Mississippi Canyon 36	7,073ft	US ft.	Crossline	18277			
Water Depth: -3,557ft	Slope: 1.7° WSW						
Nearest Shoreline	43.44 Nautical Miles @ 286°						
Port of Operation	Fourchon	106 Nautical Miles @ 275°					
Nearest Manned Platform	A Ram-Powell in VK956	10.186 Miles @ 43.50°					

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

No risk of gas is assigned at the propsoed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect a fault within Unit F.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC36_P-E Well Location

Anadarko Petroleum Corporation

August 31, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC36_P-E Well Location (OCS-G-35308)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-E with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 2,127ft to the ESE.

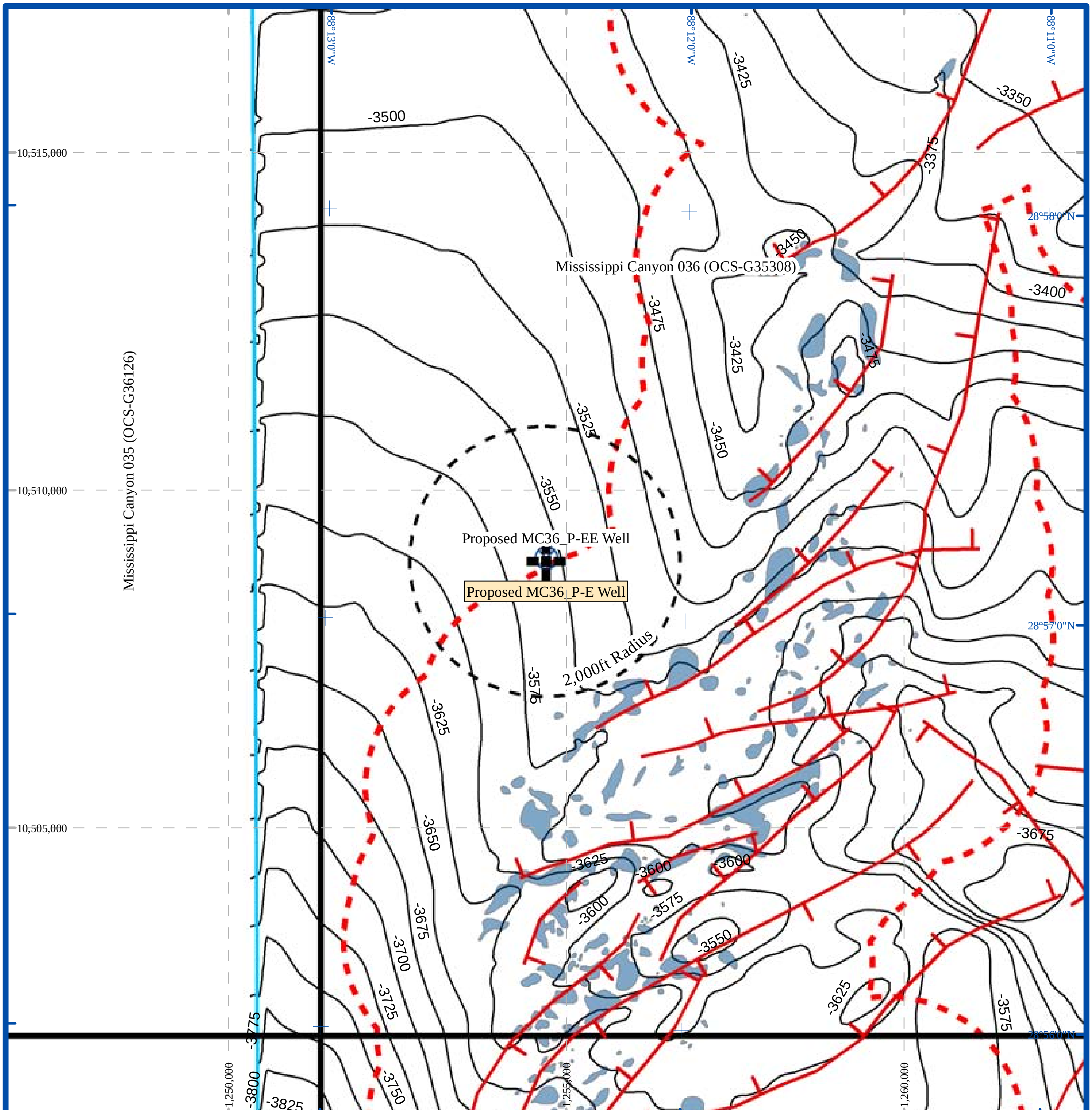
Proposed MC36_P-E Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	08.536”	North	Easting	1,254,700.	US ft. E
Longitude	88°	12’	23.137”	West	Northing	10,508,943	US ft. N
Latitude Decimal			28.952371				
Longitude Decimal			-88.2064268				
FWL Mississippi Canyon 36			3,340ft	US ft.	Inline	12703	
FSL Mississippi Canyon 36			7,023ft	US ft.	Crossline	18277	
Water Depth: -3,557ft			Slope: 1.7° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		10.184 Miles @ 43.52°		

Proposed MC36_P-EE Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	57’	09.031”	North	Easting	1,254,700	US ft. E
Longitude	88°	12’	23.142”	West	Northing	10,508,993	US ft. N
Latitude Decimal			28.9525085				
Longitude Decimal			-88.2064284				
FWL Mississippi Canyon 36			3,340ft	US ft.	Inline	12704	
FSL Mississippi Canyon 36			7,073ft	US ft.	Crossline	18277	
Water Depth: -3,557ft			Slope: 1.7° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		10.186 Miles @ 43.50°		

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

Conclusions and Recommendations: The proposed MC36_P-E and proposed MC36_P-EE well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC36_P-E Well Location (1,254,700ft E / 10,508,943ft N)

Proposed MC36_P-EE Well Location

Block boundaries

Study area boundary

-3557 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Peach Prospect
Mississippi Canyon, Block MC36,
Offshore Gulf of Mexico

Description:
Proposed MC36_P-F Well Location

Project Number:
2020-309

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	A.A.H ………………… A Haigh
	Quality Assurance	D Haigh ………………… D Haigh

Revision	**Date**	**Title**
0	July 29, 2020	Draft
1	August 31, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

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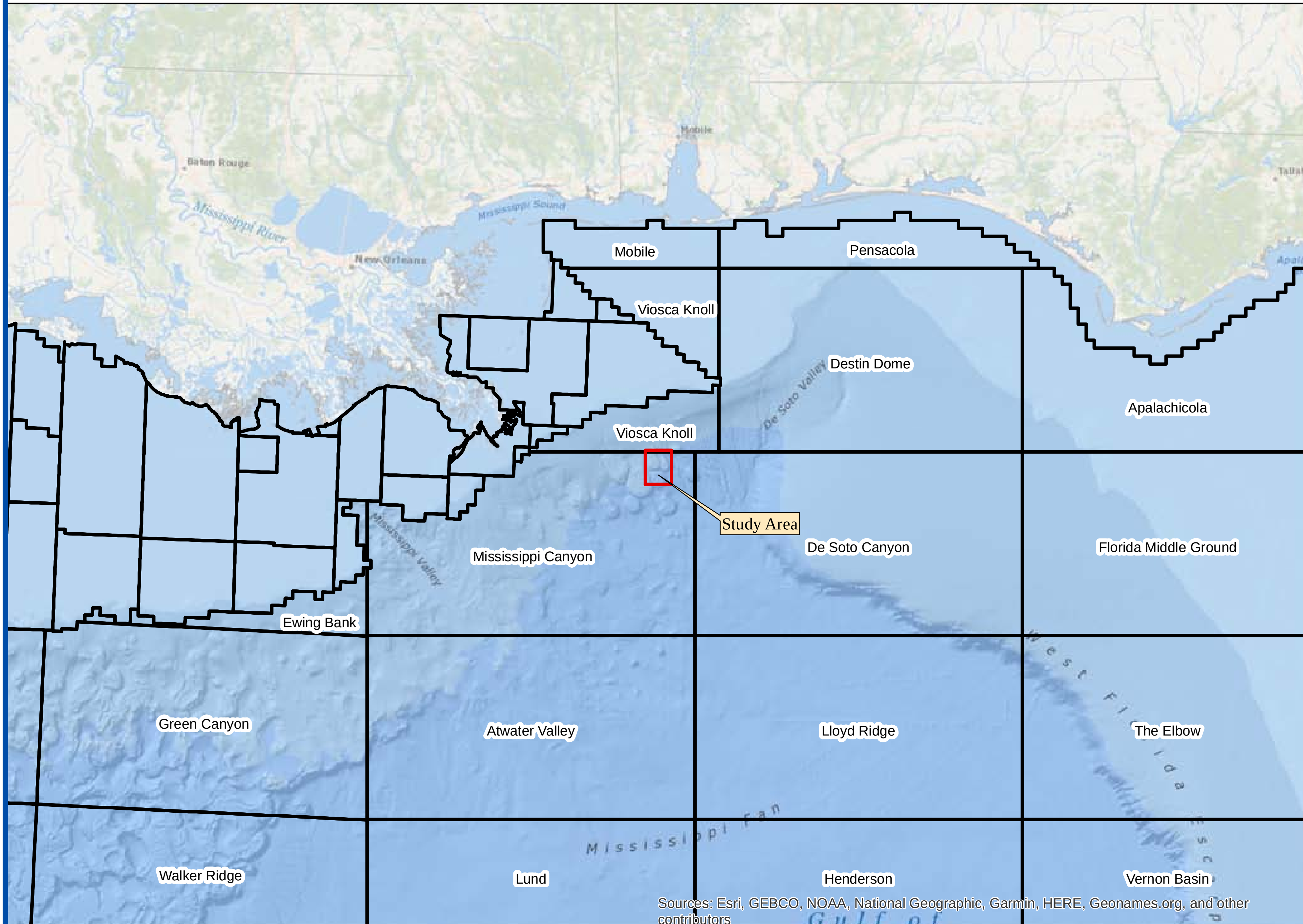
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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WELL CLEARANCE LETTER – PROPOSED MC36_P-F WELL LOCATION

August 31, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC36_P-F Well Location
Mississippi Canyon Block MC36
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC36_P-F Well Location, Mississippi Canyon Area (OCS-G-35308). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,293ft below sea surface (6,654ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC36_P-F well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC36_P-F Well Location lies in the west-central part of Block MC36 (OCS-G-35308).

Proposed MC36_P-F Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56’	48.478”	North	Easting	1,252,400	US ft. E
Longitude	88°	12’	48.799”	West	Northing	10,506,941	US ft. N
Latitude Decimal			28.9467996				
Longitude Decimal			-88.2135552				
FWL Mississippi Canyon 036			1,040ft	US ft.	Inline	12672	
FSL Mississippi Canyon 036			5,021ft	US ft.	Crossline	18285	
Water Depth: -3,639ft			Slope: 1.7° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		10.57 Miles @ 43.817°		

Proposed MC36_P-FF Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56’	48.974”	North	Easting	1,252,400	US ft. E
Longitude	88°	12’	48.804”	West	Northing	10,506,991	US ft. N
Latitude Decimal			28.9469371				
Longitude Decimal			-88.2135568				
FWL Mississippi Canyon 036			1,040ft	US ft.	Inline	12673	
FSL Mississippi Canyon 036			5,071ft	US ft.	Crossline	18289	
Water Depth: -3,638ft			Slope: 1.7° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		10.55 Miles @ 43.818°		

Location MC36_P-FF is 50ft from MC36_P-F on a bearing of 000°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC36_P-F well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)-(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC36_P-F well location is -3,639ft below sea surface (Figure 1). The seafloor slopes to the WSW at 1.7°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC36_P-F well location is in the west-central part of block MC36. The proposed well is located in an area of relatively smooth seabed located within a minibasin to the northwest of Horn Dome.

No seabed fault intersections occur within 2,000ft of the proposed location.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,860ft below sea surface (221ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,860ft below sea surface (221ft below seabed).

4.3 Unit B

The upper part of Unit B, from -3,860ft to -3,949ft below sea surface (221ft to 310ft below seabed), displays generally low-amplitude reflectors, and is interpreted as well-layered clays and silts with occasional sands.

From -3,949ft to -4,210ft below sea surface (310ft to 571ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -4,210ft below sea surface (571ft below seabed) to -4,679ft below sea surface (1,040ft below seabed) presents acoustically as well-layered, low-amplitude reflectors with clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well. A localized small anomaly just within the amplitude threshold for shallow gas occurs around 1,850ft to the NNW. There is no connectivity to the proposed well-path.

Horizon H10 marks the base of Unit B, occurring at -4,679ft below sea surface (1,040ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,679ft to -5,456ft below sea surface (1,040ft to 1,817ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit C at the proposed well or within 2,000ft radius.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -5,456ft below sea surface (1,817ft below seabed).

4.5 Unit D

The upper part of Unit D from -5,456ft below sea surface (1,817ft below seabed) to -5,807ft below sea surface (2,168ft below seabed) is interpreted to consist of well-layered, low-amplitude reflectors with clays, silts, and occasional sands.

Unit D from -5,807ft to -6,638ft below sea surface (2,168ft to 2,999ft below seabed) is characterized by slightly-chaotic, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sands. This interval appears to have been deposited at a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can, on occasions, induce minor over-pressure and as such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit D from -6,638ft below sea surface (2,999ft below seabed) to -6,810ft below sea surface (3,171ft below seabed) is interpreted to consist of clays, silts, and occasional sands.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -6,810ft below sea surface (3,171ft below seabed).

4.6 Unit E

Unit E from -7,778ft to -9,496ft below sea surface (4,139ft to 5,857ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~350ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight**

Shallow Water Flow Risk is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft.

The well-path will traverse a fault at -7,362ft below sea surface (3,723ft below seabed). This fault is downthrown around 20ft to the northeast. Minor wellbore and drilling fluid circulation problmes may occur at the level of the fault.

Horizon H40 marks the base of Unit E at -7,778ft below sea surface (4,139ft below seabed).

4.7 Unit F

Unit F from -7,778ft to -9,496ft below sea surface (4,139ft to 5,857ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~700ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit F.

Horizon H50 marks the base of Unit F at -9,496ft below sea surface (5,857ft below seabed).

4.8 Unit G

Unit G from -9,496ft to -10,293ft below sea surface (5,857ft to 6,654ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit G.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,293ft below sea surface (6,654ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,949ft to -4,210ft below sea surface (310ft to 571ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,807ft to -6,638ft below sea surface (2,168ft to 2,999ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,810ft to -7,778ft below sea surface (3,171ft to 4,139ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,778ft to -9,496ft below sea surface (4,139ft to 5,857ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None predicted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -3,949ft to -4,210ft below sea surface (310ft to 571ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  None Predicted.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,807ft to -6,638ft below sea surface (2,168ft to 2,999ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,810ft to -7,778ft below sea surface (3,171ft to 4,139ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  The well-path will traverse a fault at -7,362ft below sea surface (3,723ft below seabed). This fault is downthrown around 20ft to the northeast. Minor wellbore and drilling fluid circulation problmes may occur at the level of the fault.

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,778ft to -9,496ft below sea surface (4,139ft to 5,857ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit G

  No drilling hazards or problems interpreted.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:

Proposed MC36_P-F Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

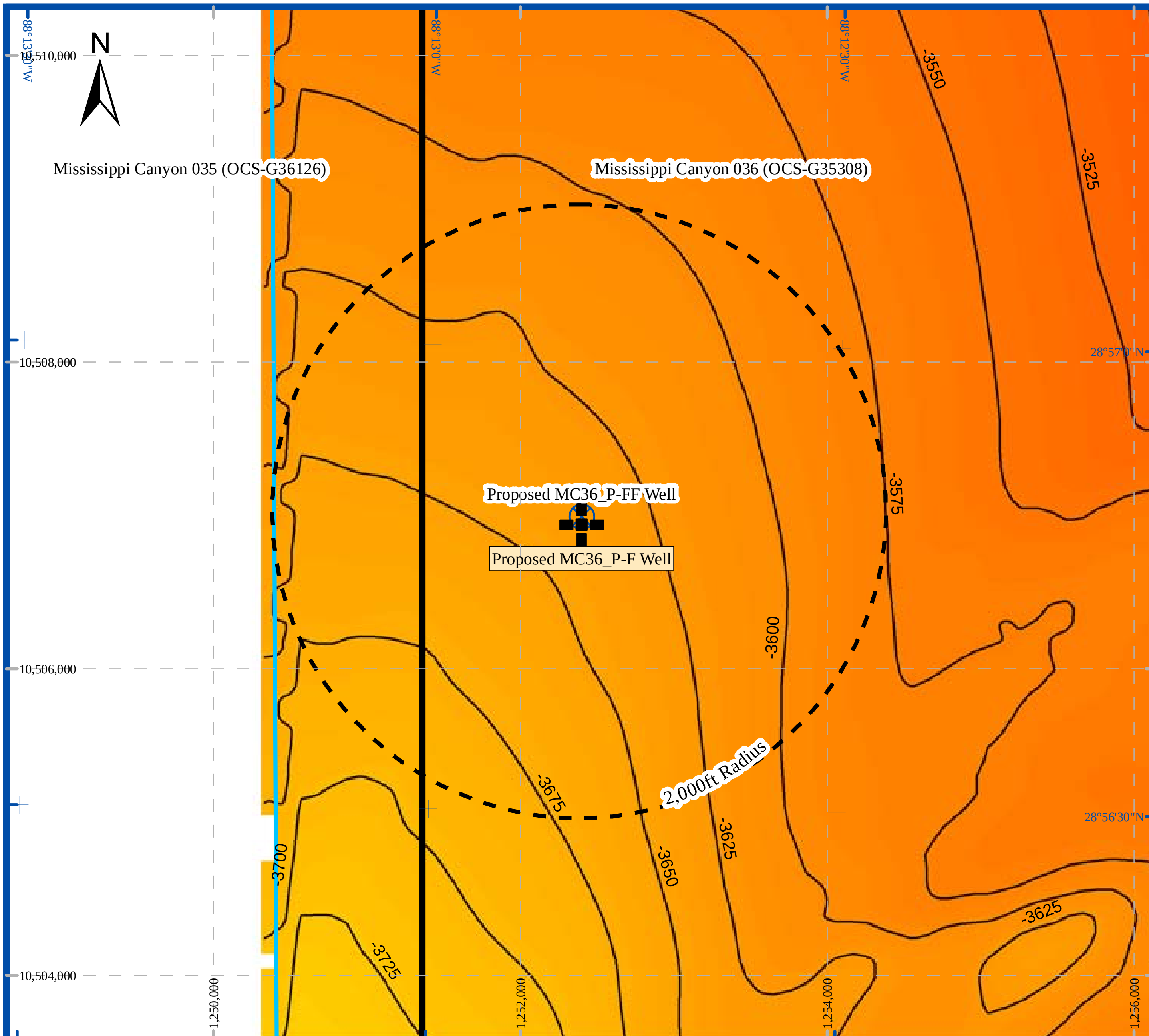
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC36_P-F Well Location
(1,252,400ft E / 10,506,941ft N)

Proposed MC36_P-FF Well Location

Block boundaries

Study area boundary

-3639 Depth in feet below sea surface to seabed, contoured at 25ft intervals

-5400 -5000 -4600 -4200 -3800 -3400

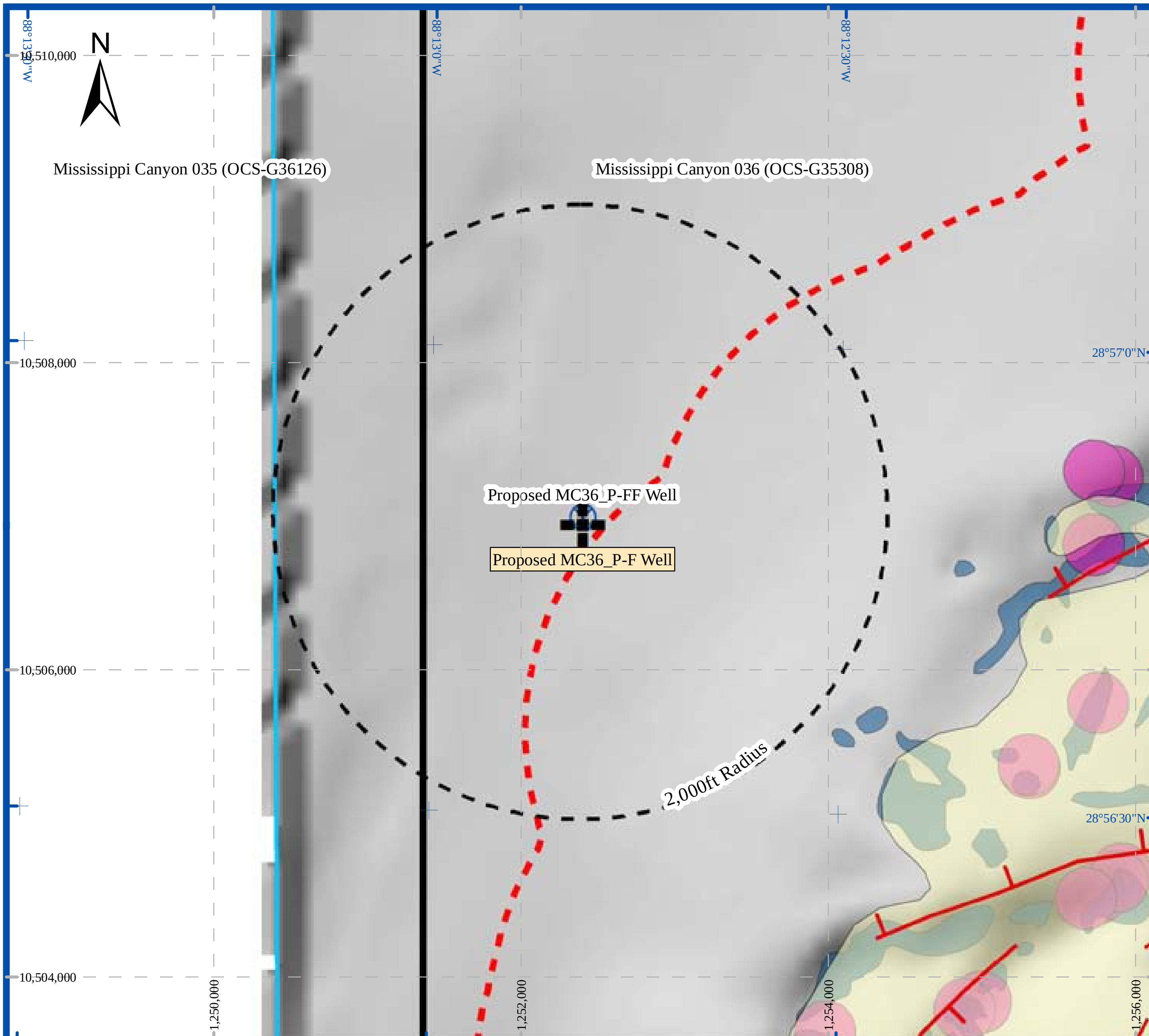
Seabed Depth (Feet)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 1
(MC36_P-F)



Seabed Morphology Extract

Proposed MC36_P-F Well Location (1,252,400ft E / 10,506,941ft N)

Proposed MC36_P-FF Well Location

Block boundaries

Study area boundary

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

BOEM database — EM302 plumes (400ft Diam)

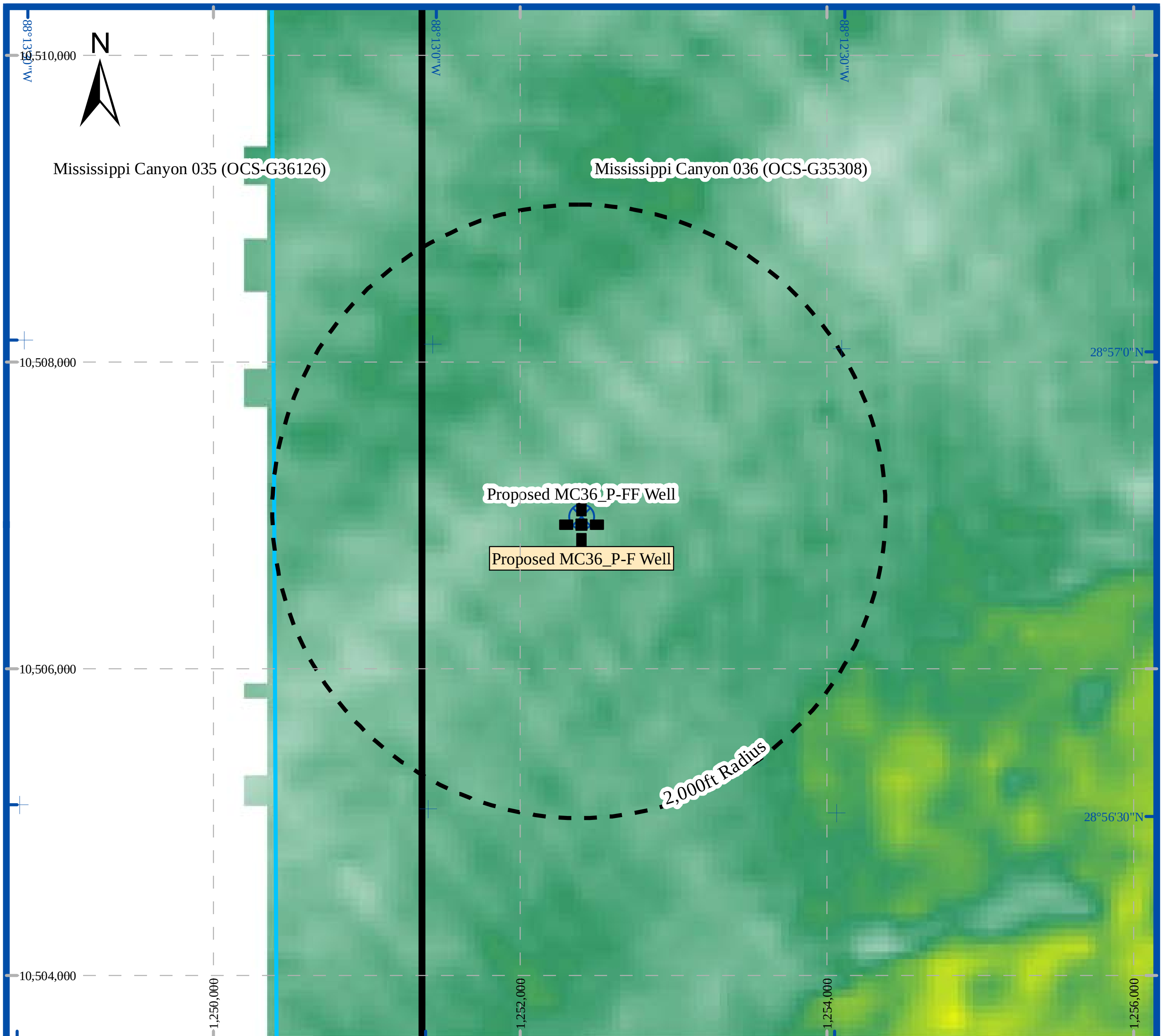
BOEM database — Seep anomaly positives (Cofirmed Organisms)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC36_P-F)



Seabed Amplitude Extract

Proposed MC36_P-F Well Location
(1,252,400ft E / 10,506,941ft N)

Proposed MC36_P-FF Well Location

Block boundaries

Study area boundary

Relative Seabed Amplitude

Chart Scale 1" = 1,000'

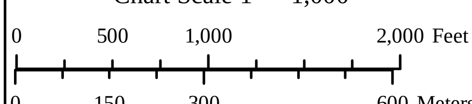
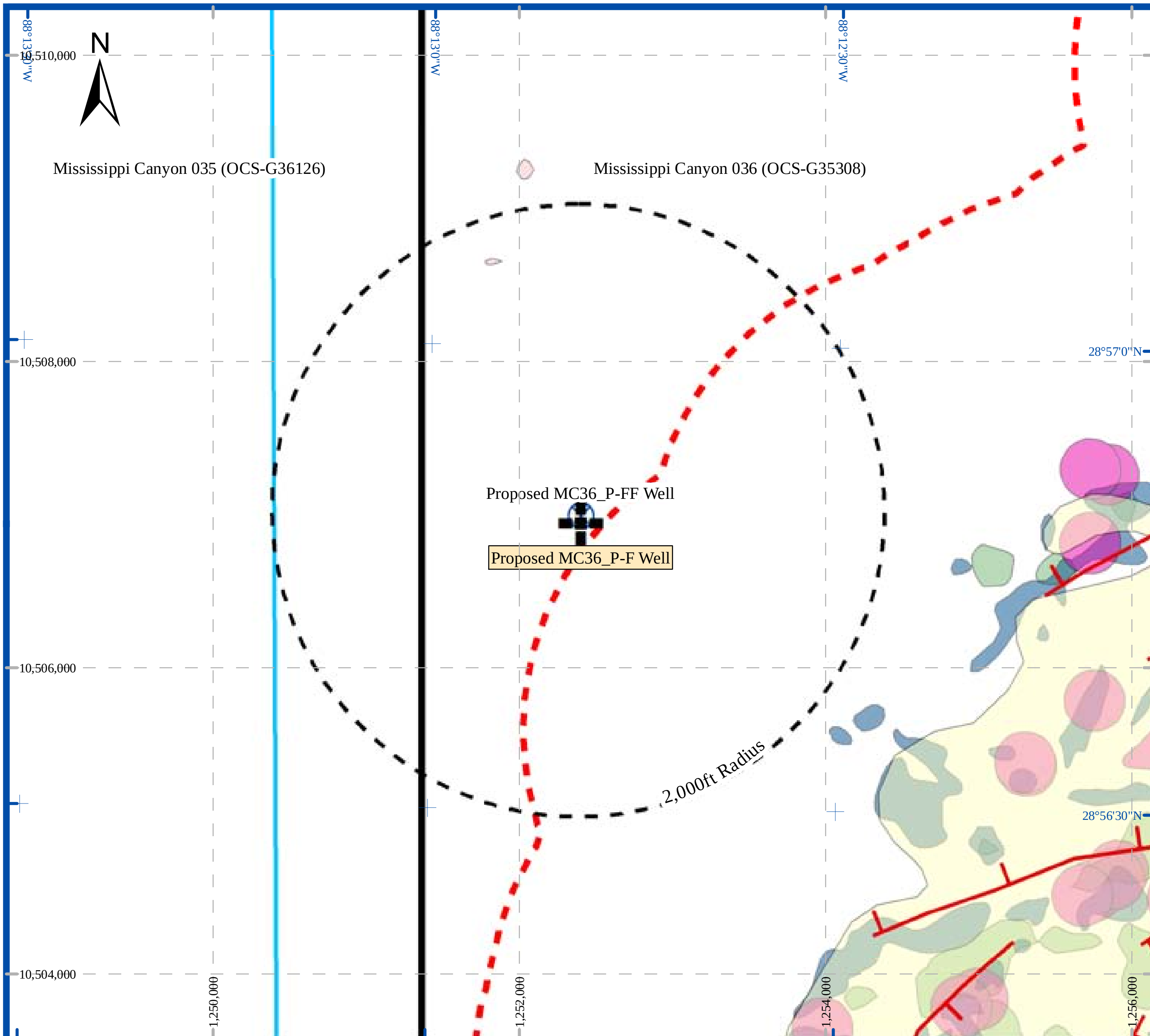


Figure 3
(MC36_P-F)



Geohazard Summary Extract

Proposed MC36_P-F Well Location (1,252,400ft E / 10,506,941ft N)

Proposed MC36_P-FF Well Location

Block boundaries

Study area boundary

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

BOEM database — EM302 plumes (400ft Diam)

BOEM database — Seep anomaly positives (Cofirmed Organisms)

Slight and Moderate Risk of Gas within Unit A

Slight, Moderate, and High Risk of Gas within Unit B

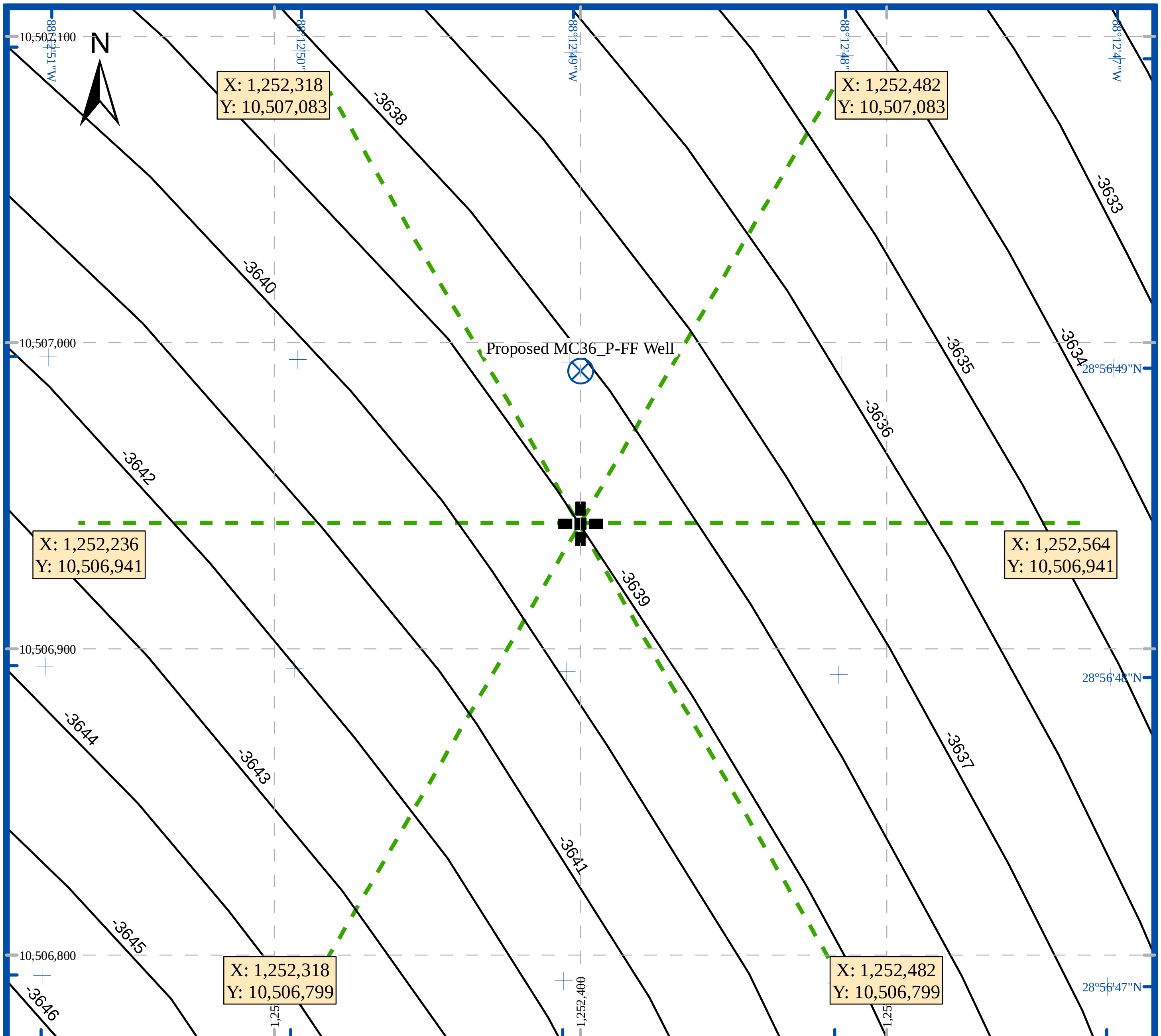
Slight and Moderate Risk of Gas within Unit G

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC36_P-F)



ROV Plat (MC36_P-F)

Proposed MC36_P-F Well Location
(1,252,400ft E / 10,506,941ft N)

Proposed MC36_P-FF Well Location

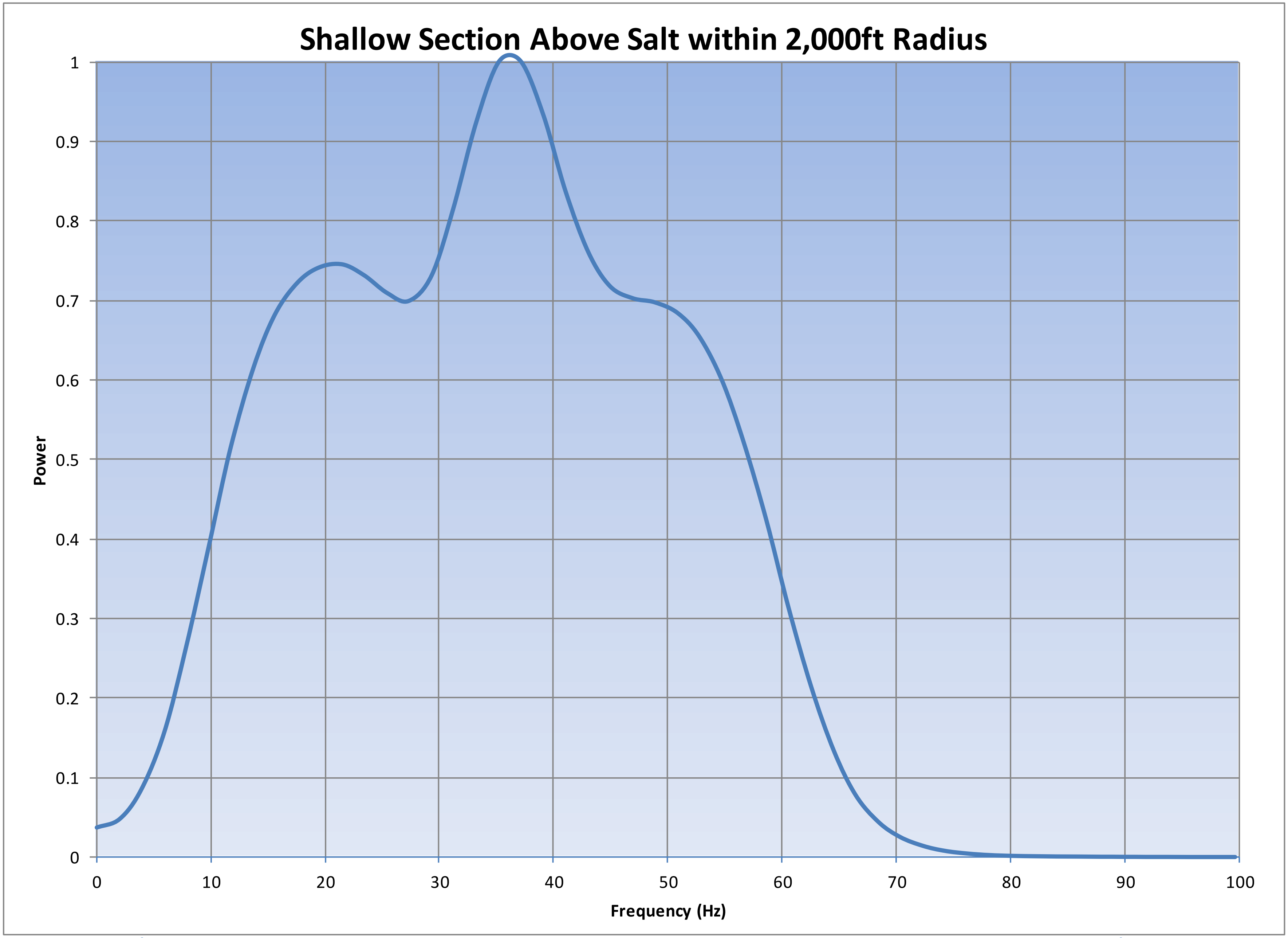
-3639 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC36_P-F)



MC36_P-F	Power Spectrum	Figure 10

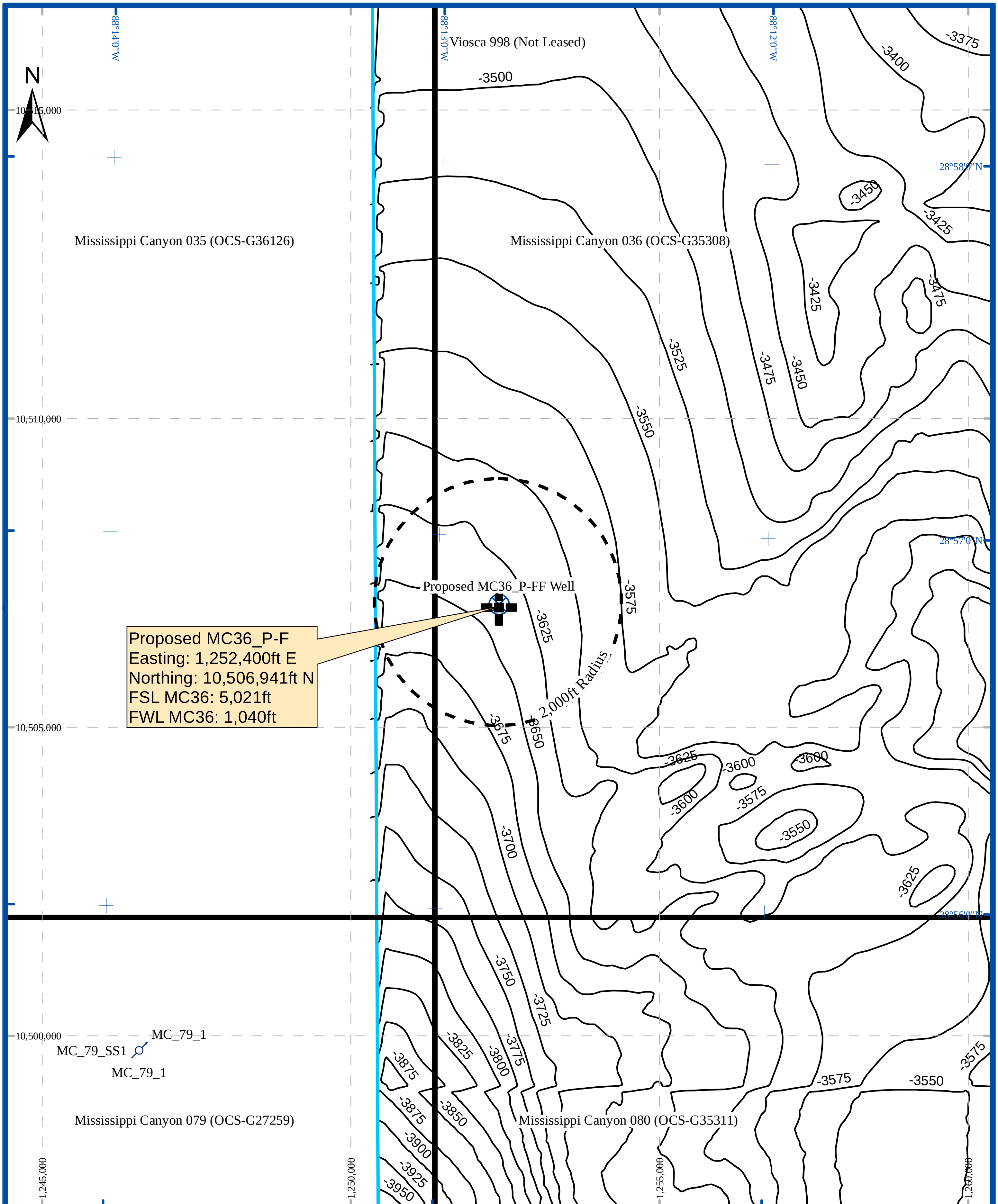


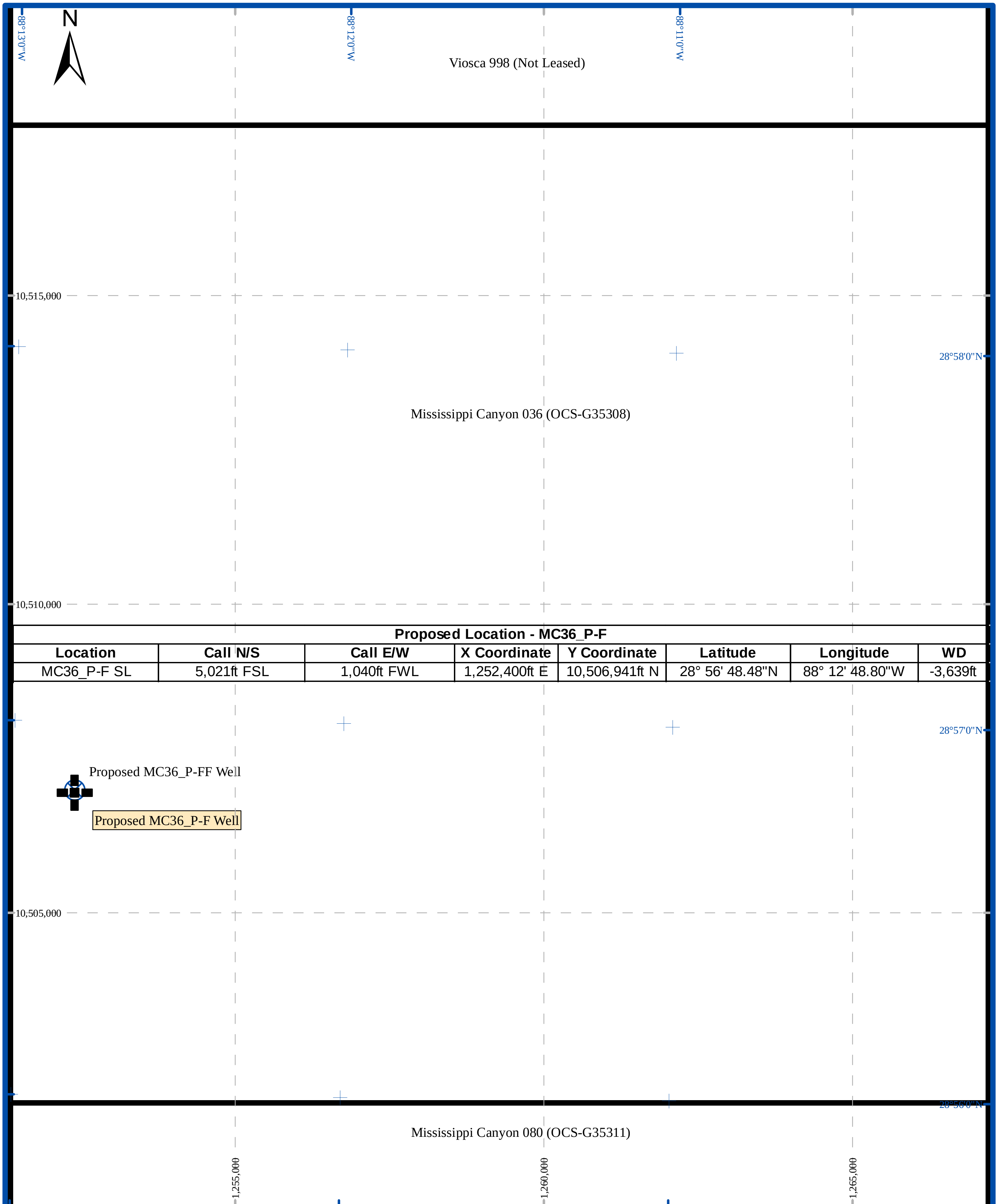
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC36_P-F

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC36_P-F SL	5,021ft FSL	1,040ft FWL	1,252,400ft E	10,506,941ft N	28° 56' 48.48"N	88° 12' 48.80"W	-3,639ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

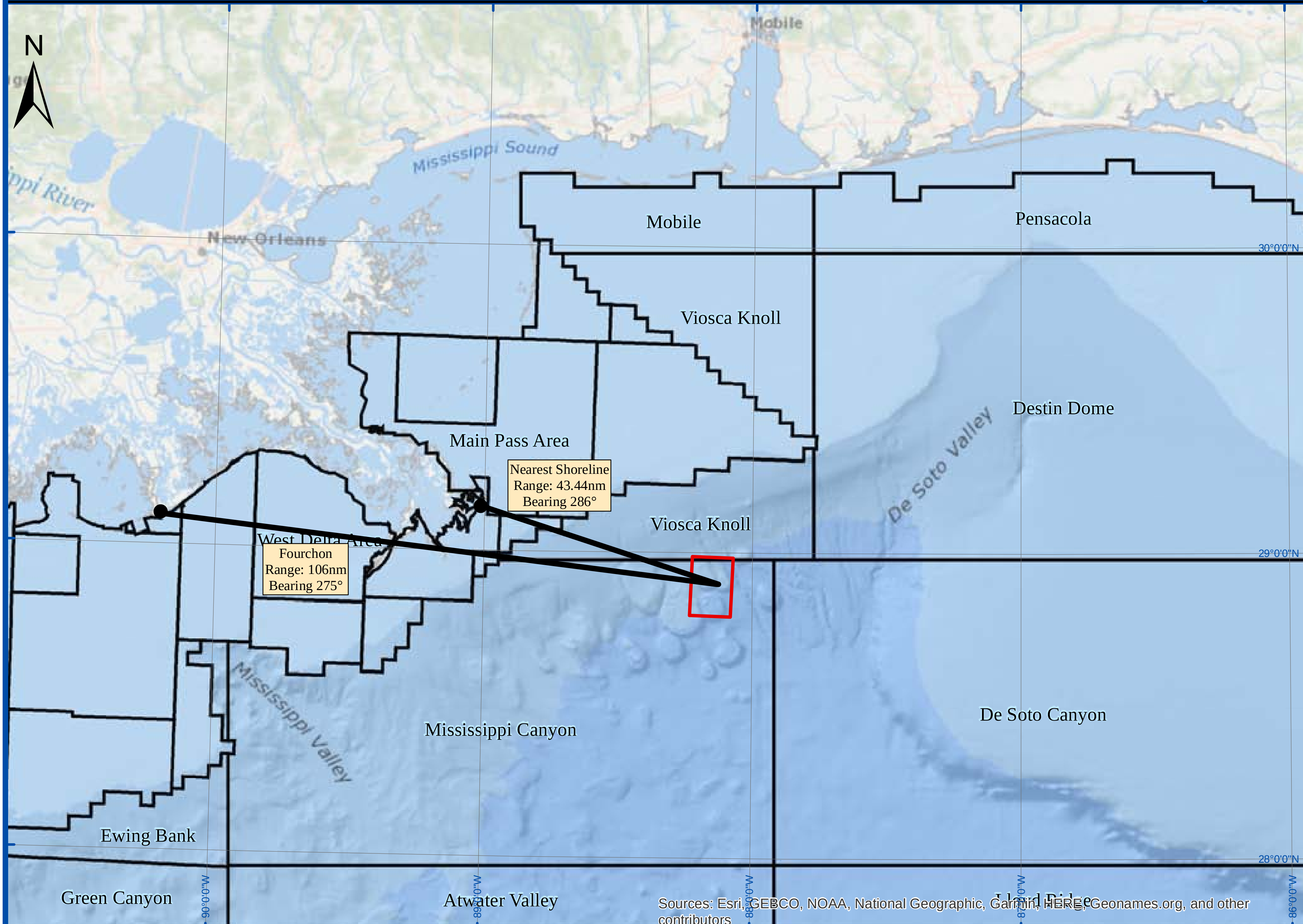
0 150 300 600 Meters

Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 36

Figure 13



Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 36

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC36_P-F Well Location

August 31, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 36
(OCS-G OCS-G-35308)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-F well location with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.5 seconds two-way time (TWT), -10,293ft below sea surface (6,654ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 1.7° to the WSW No seabed faults occur within 2,000ft of the proposed well.

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

No seabed infrastructure occurs within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas is assigned at the propsoed well and within 2,000ft of the propsoed well.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect a fault within Unit E.

Proposed MC36_P-F Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	48.478"	North	Easting	1,252,400	US ft. E
Longitude	88°	12'	48.799"	West	Northing	10,506,941	US ft. N
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FWL Mississippi Canyon 036	1,040ft		US ft.		Inline	12673	
FSL Mississippi Canyon 036	5,071ft		US ft.		Crossline	18289	
Water Depth: -3,638ft	Slope: 1.7° WSW						
Nearest Shoreline	43.44 Nautical Miles @ 286°						
Port of Operation	Fourchon				106 Nautical Miles @ 275°		
Nearest Manned Platform	A Ram-Powell in VK956				10.55 Miles @ 43.818°		

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

No risk of gas is assigned at the propsoed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect a fault within Unit E.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC36_P-F Well Location

Anadarko Petroleum Corporation

August 31, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC36_P-F Well Location (OCS-G-35308)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-F with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 2,105ft to the ESE.

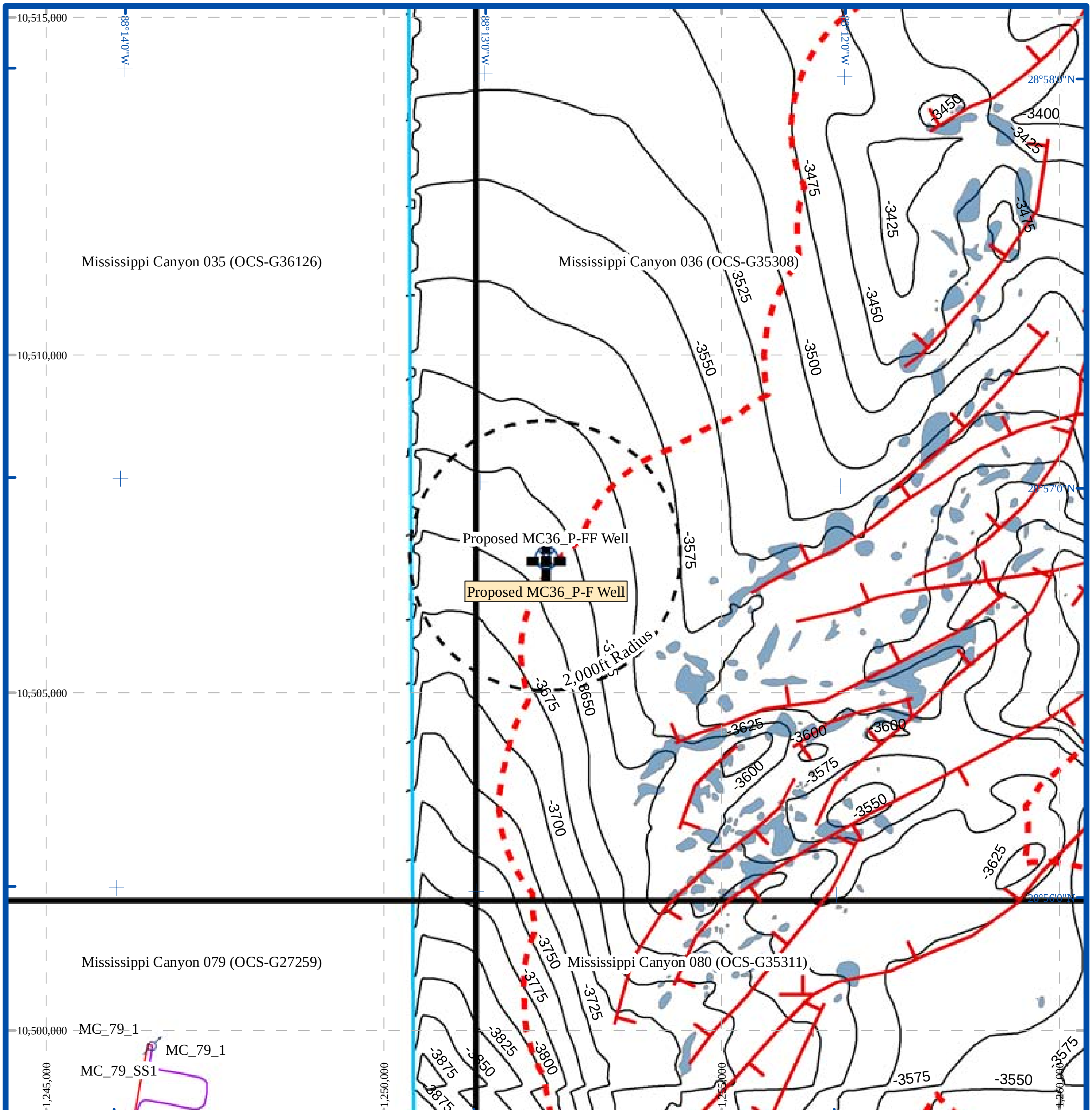
Proposed MC36_P-F Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	48.478"	North	Easting	1,252,400	US ft. E
Longitude	88°	12'	48.799"	West	Northing	10,506,941	US ft. N
Latitude Decimal			28.9467996				
Longitude Decimal			-88.2135552				
FWL Mississippi Canyon 036			1,040ft	US ft.	Inline	12672	
FSL Mississippi Canyon 036			5,021ft	US ft.	Crossline	18285	
Water Depth: -3,639ft			Slope: 1.7° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		10.57 Miles @ 43.817°		

Proposed MC36_P-FF Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	48.974"	North	Easting	1,252,400	US ft. E
Longitude	88°	12'	48.804"	West	Northing	10,506,991	US ft. N
Latitude Decimal			28.9469371				
Longitude Decimal			-88.2135568				
FWL Mississippi Canyon 036			1,040ft	US ft.	Inline	12673	
FSL Mississippi Canyon 036			5,071ft	US ft.	Crossline	18289	
Water Depth: -3,638ft			Slope: 1.7° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			A Ram-Powell in VK956		10.55 Miles @ 43.818°		

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

Conclusions and Recommendations: The proposed MC36_P-F and proposed MC36_P-FF well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC36_P-F Well Location (1,252,400ft E / 10,506,941ft N)

Proposed MC36_P-FF Well Location

Existing Wells

Gas Pipelines

Umbilical Pipelines

Block boundaries

Study area boundary

-3639 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Peach Prospect
Mississippi Canyon, Block MC36,
Offshore Gulf of Mexico

Description:
Proposed MC36_P-G Well Location

Project Number:
2020-310

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	A.R.H .... A Haigh
	Quality Assurance	D Haigh .... D Haigh

Revision	**Date**	**Title**
0	July 31, 2020	Draft
1	August 31, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

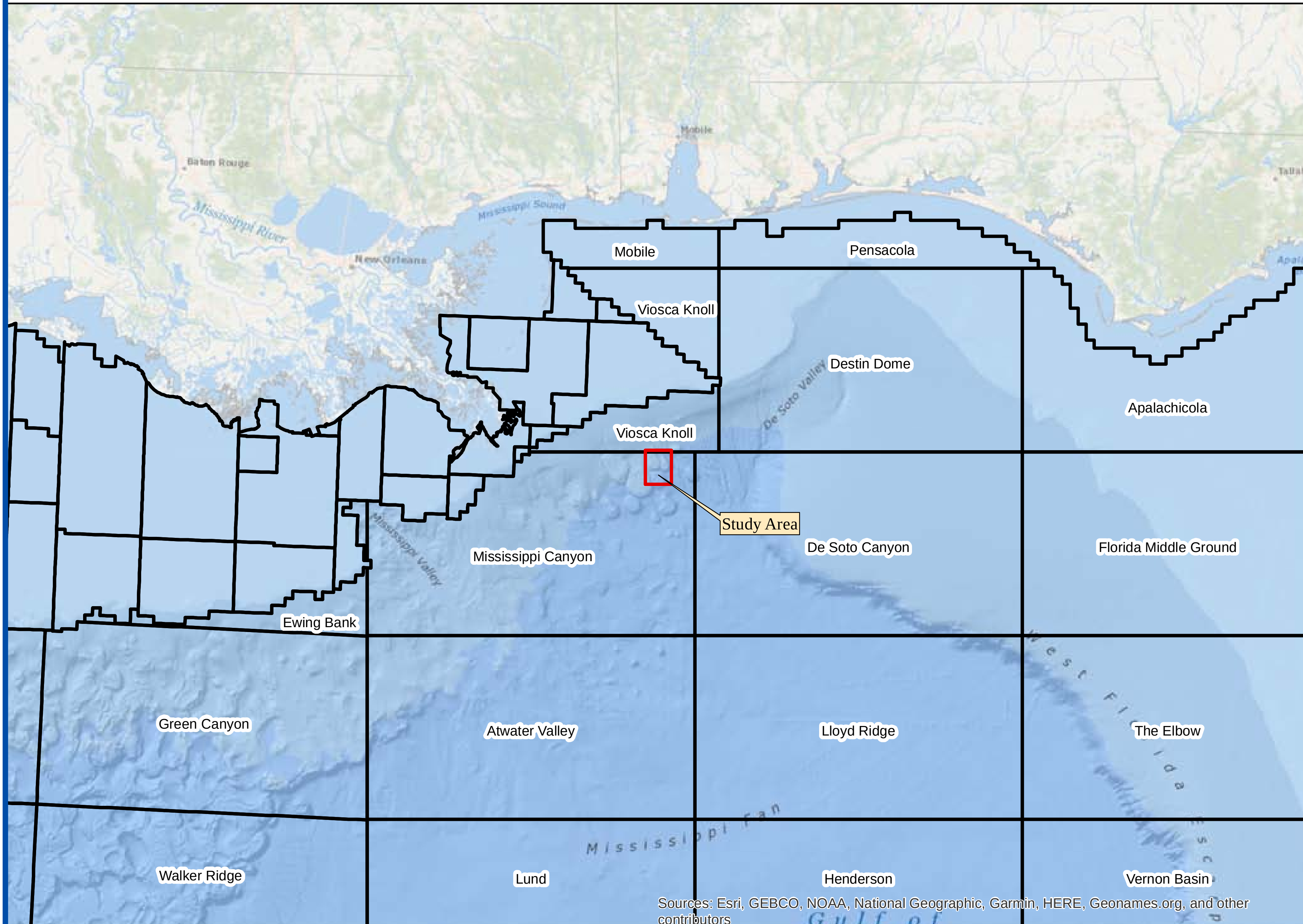
This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

Please be aware that further distribution of this report, in whole or part, or the use of the data for a purpose not expressly stated within the contractual work scope is at the client's sole risk, and Ocean Geo Solutions, Inc recommends that this disclaimer is included in any such distribution.

OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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WELL CLEARANCE LETTER – PROPOSED MC36_P-G WELL LOCATION

August 31, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC36_P-G Well Location
Mississippi Canyon Block MC36
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC36_P-G Well Location, Mississippi Canyon Area (OCS-G-35308). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,267ft below sea surface (6,574ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC36_P-G well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC36_P-G Well Location lies in the southwest part of Block MC36 (OCS-G-35308).

Proposed MC36_P-G Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56’	28.612”	North	Easting	1,251,600	US ft. E
Longitude	88°	12’	57.573”	West	Northing	10,504,943	US ft. N
Latitude Decimal			28.9412812				
Longitude Decimal			-88.2159926				
FWL Mississippi Canyon 036			240ft	US ft.	Inline	12672	
FSL Mississippi Canyon 036			3,023ft	US ft.	Crossline	18245	
Water Depth: -3,693ft			Slope: 1.7° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.97 Miles @ 118.7°		

Proposed MC36_P-GG Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56’	29.108”	North	Easting	1,251,600	US ft. E
Longitude	88°	12’	57.579”	West	Northing	10,504,993	US ft. N
Latitude Decimal			28.9414188				
Longitude Decimal			-88.2159942				
FWL Mississippi Canyon 036			240ft	US ft.	Inline	12653	
FSL Mississippi Canyon 036			3,073ft	US ft.	Crossline	18249	
Water Depth: -3,692ft			Slope: 1.8° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.97 Miles @ 118.7°		

Location MC36_P-GG is 50ft from MC36_P-G on a bearing of 000°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC36_P-G well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)-(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

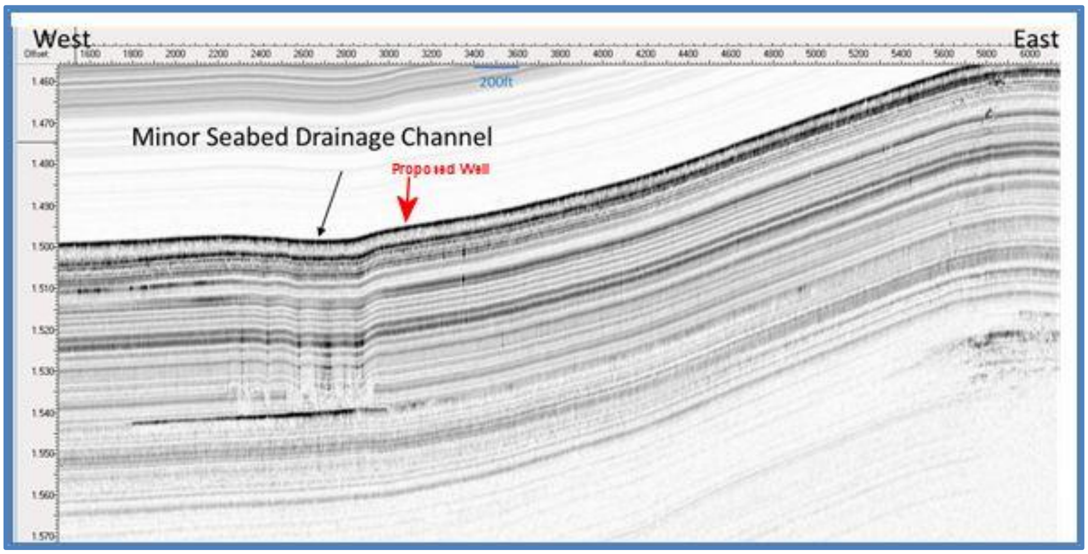
3.1 Seabed Depth

Water depth at the proposed MC36_P-G well location is -3,693ft below sea surface (Figure 1). The seafloor slopes to the WSW at 1.7°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC36_P-G well location is in the southwest part of block MC36 in an area of relatively smooth seabed located within a minibasin to the northwest of Horn Dome.

The edge of a northeast to southwest thin seabed drainage pathway is located approximately 313ft to the west. This channel appears to have been active for several thousand years and is well defined on the sub-bottom profiler data. The drainage pathway measures ~500m in width and is 5ft deep. The seabed drainage pathway will not directly affect the proposed well.



Sub-Bottom Profiler Data,-Line 311.1. Illustrating Minor Drainage Channel.

No seabed fault intersections occur within 2,000ft of the proposed location.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,924ft below sea surface (231ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,924ft below sea surface (231ft below seabed).

4.3 Unit B

The upper part of Unit B, from -3,924ft to -4,027ft below sea surface (231ft to 334ft below seabed), displays generally low-amplitude reflectors, and is interpreted as well-layered clays and silts with occasional sands.

From -4,027ft to -4,296ft below sea surface (334ft to 603ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -4,296ft below sea surface (603ft below seabed) to -4,778ft below sea surface (1,085ft below seabed) presents acoustically as well-layered, low-amplitude reflectors with clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft radius from the proposed well.

Horizon H10 marks the base of Unit B, occurring at -4,778ft below sea surface (1,085ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,778ft to –5,564ft below sea surface (1,085ft to 1,871ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit C at the proposed well or within 2,000ft radius of the proposed well.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -5,564ft below sea surface (1,871ft below seabed).

4.5 Unit D

The upper part of Unit D from -5,564ft below sea surface (1,871ft below seabed) to -5,837ft below sea surface (2,144ft below seabed) is interpreted to consist of well-layered, low-amplitude reflectors with clays, silts, and occasional sands.

Unit D from -5,837ft to -6,653ft below sea surface (2,144ft to 2,960ft below seabed) is characterized by slightly-chaotic, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sands. This interval appears to have been deposited at a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can, on occasions, induce minor over-pressure and as such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit D from -6,653ft below sea surface (2,960ft below seabed) to -7,038ft below sea surface (3,345ft below seabed) is interpreted to consist of clays, silts, and occasional sands.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -7,038ft below sea surface (3,345ft below seabed).

4.6 Unit E

Unit E from -7,038ft to -7,970ft below sea surface (3,345ft to 4,277ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~300ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight**

Shallow Water Flow Risk is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit E at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit E at the propsoed well.

Horizon H40 marks the base of Unit E at -7,970ft below sea surface (4,277ft below seabed).

4.7 Unit F

Unit F from -7,970ft to -9,667ft below sea surface (4,277ft to 5,974ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions form some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~300ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is predicted within Unit F at the proposed well or within 2,000ft radius of the proposed well.

The well-path will traverse a fault at -8,145ft below sea surface (4,452ft below seabed). This fault is downthrown around 20ft to the north. Minor wellbore and drilling fluid circulation problmes may occur at the level of the fault.

Horizon H50 marks the base of Unit F at -9,667ft below sea surface (5,974ft below seabed).

4.8 Unit G

Unit G from -9,667ft to -10,267ft below sea surface (5,974ft to 6,574ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit G.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,267ft below sea surface (6,574ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,027ft to -4,296ft below sea surface (334ft to 603ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,837ft to -6,653ft below sea surface (2,144ft to 2,960ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -7,038ft to -7,970ft below sea surface (3,345ft to 4,277ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,970ft to -9,667ft below sea surface (4,277ft to 5,974ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None predicted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,027ft to -4,296ft below sea surface (334ft to 603ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  None Predicted.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,837ft to -6,653ft below sea surface (2,144ft to 2,960ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -7,038ft to -7,970ft below sea surface (3,345ft to 4,277ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,970ft to -9,667ft below sea surface (4,277ft to 5,974ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  The well-path will traverse a fault at -8,145ft below sea surface (4,452ft below seabed). Minor wellbore and drilling fluid circulation problmes may occur at the level of the fault. Casing seats should be planned to avoid fault intersections as formation intergrity could be compromised.

- Unit G

  No drilling hazards or problems interpreted.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC36_P-G Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

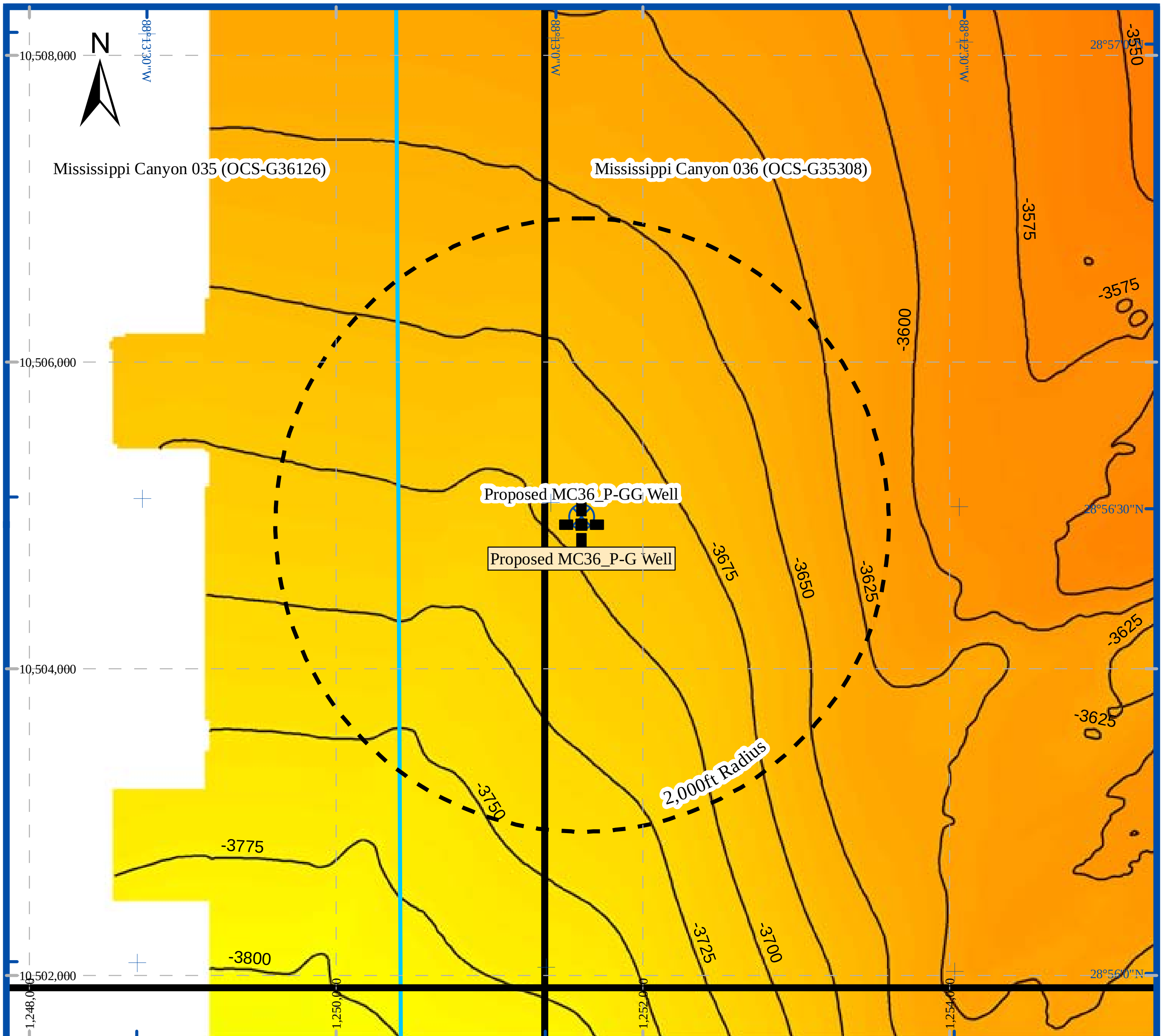
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC36_P-G Well Location (1,251,600ft E / 10,504,943ft N)

Proposed MC36_P-GG Well Location

Block boundaries

Study area boundary

-3693 Depth in feet below sea surface to seabed, contoured at 25ft intervals

Seabed Depth (Feet)

Chart Scale 1" = 1,000'

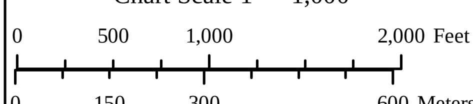
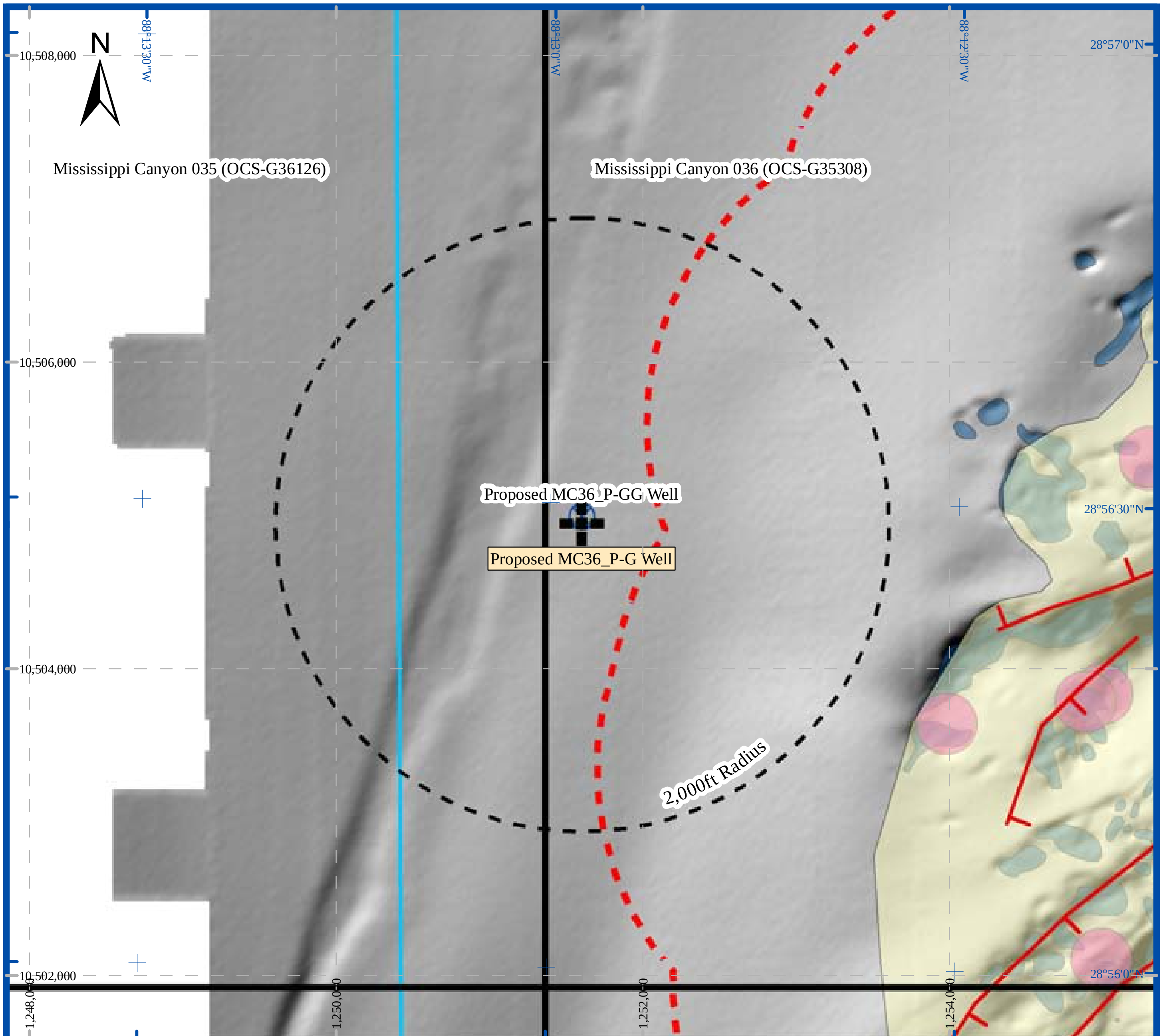


Figure 1
(MC36_P-G)



Seabed Morphology Extract

Proposed MC36_P-G Well Location (1,251,600ft E / 10,504,943ft N)

Proposed MC36_P-GG Well Location

Block boundaries

Study area boundary

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

BOEM database — EM302 plumes (400ft Diam)

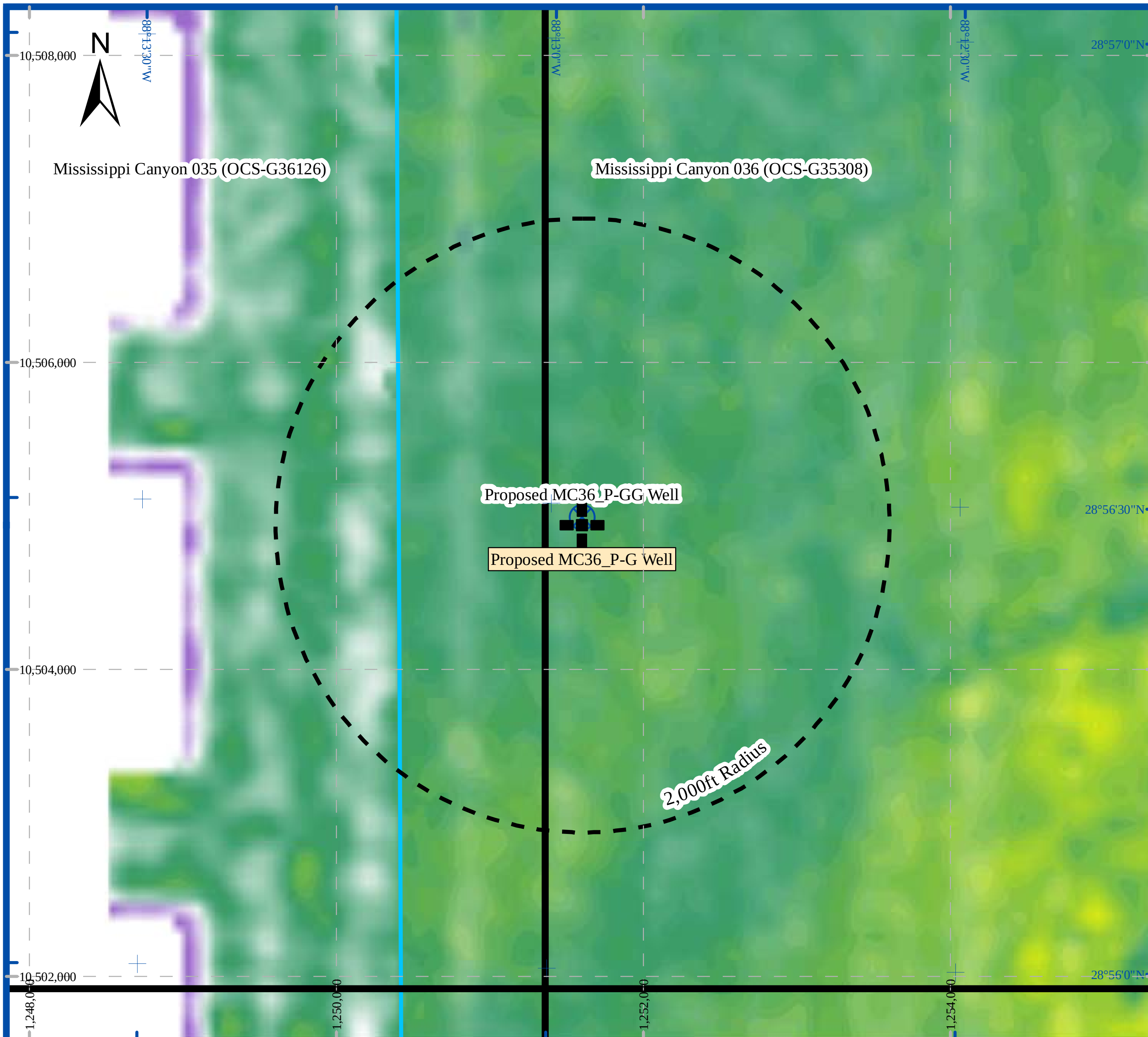
BOEM database — Seep anomaly positives (Cofirmed Organisms)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2 (MC36_P-G)



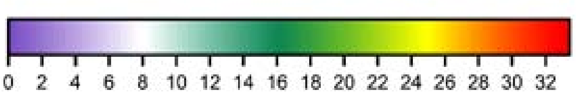
Seabed Amplitude Extract

Proposed MC36_P-G Well Location (1,251,600ft E / 10,504,943ft N)

Proposed MC36_P-GG Well Location

Block boundaries

Study area boundary



Relative Seabed Amplitude

Chart Scale 1" = 1,000'

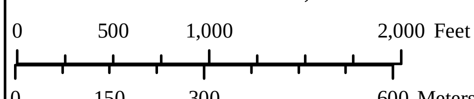
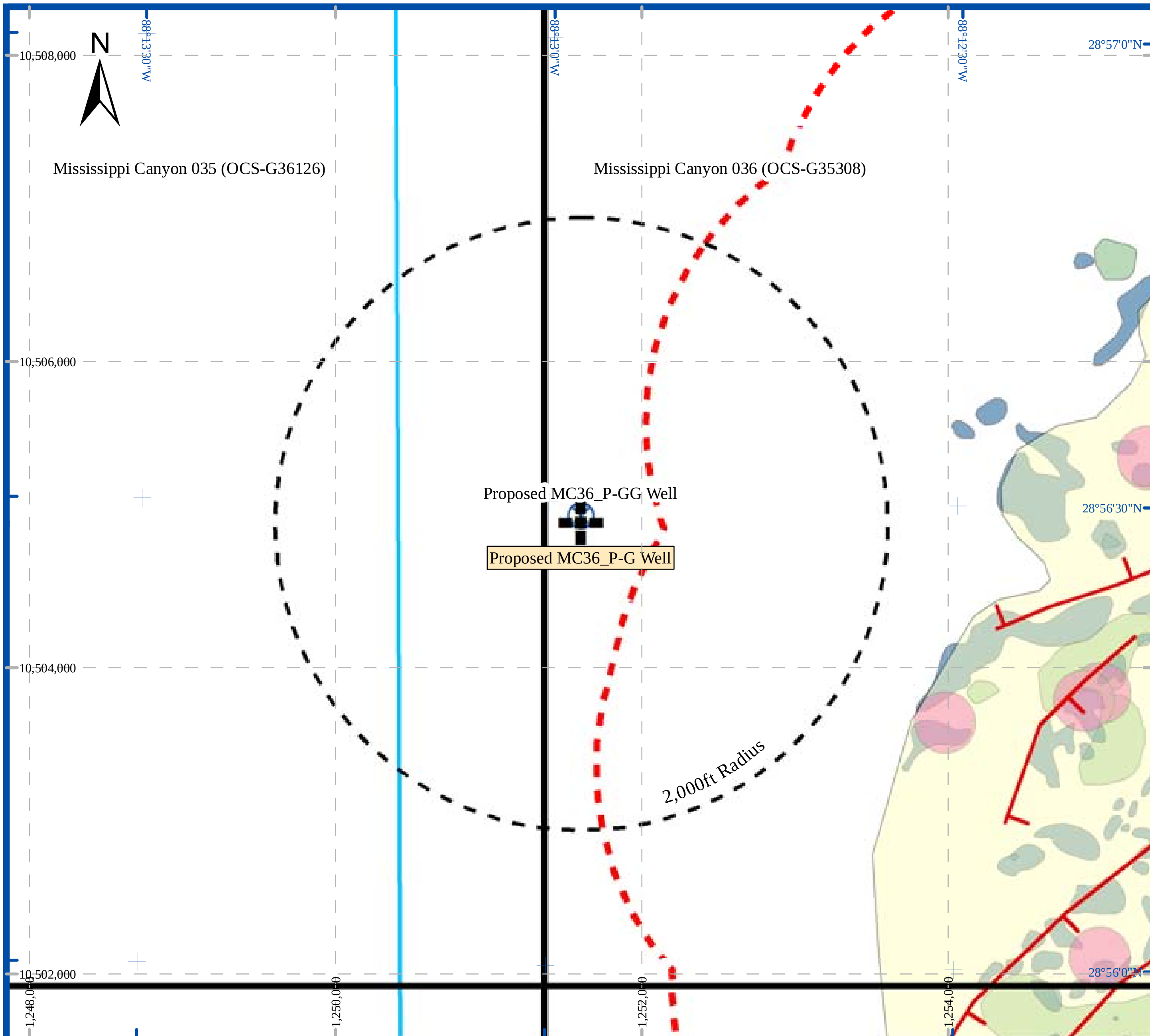


Figure 3
(MC36_P-G)



Geohazard Summary Extract

Proposed MC36_P-G Well Location (1,251,600ft E / 10,504,943ft N)

Proposed MC36_P-GG Well Location

Block boundaries

Study area boundary

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

BOEM database — EM302 plumes (400ft Diam)

BOEM database — Seep anomaly positives (Cofirmed Organisms)

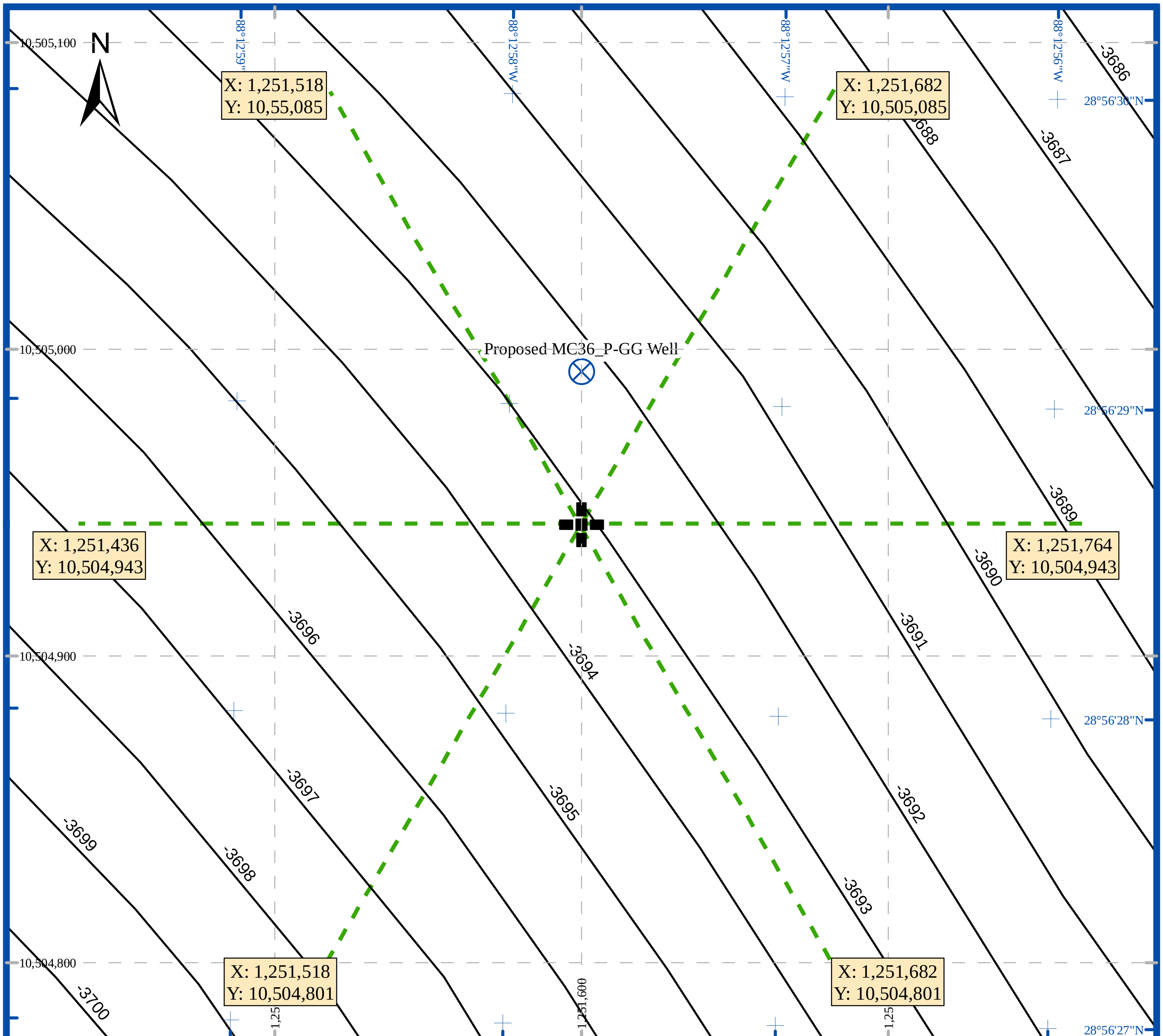
Slight and Moderate Risk of Gas within Unit A

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC36_P-G)



ROV Plat (MC36_P-G)

Proposed MC36_P-G Well Location (1,251,600ft E / 10,504,943ft N)

Proposed MC36_P-GG Well Location

-3693 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

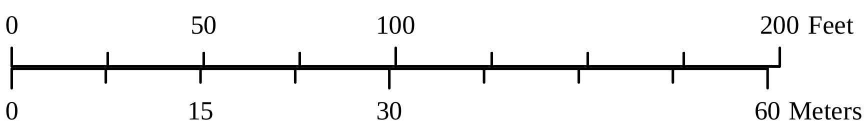
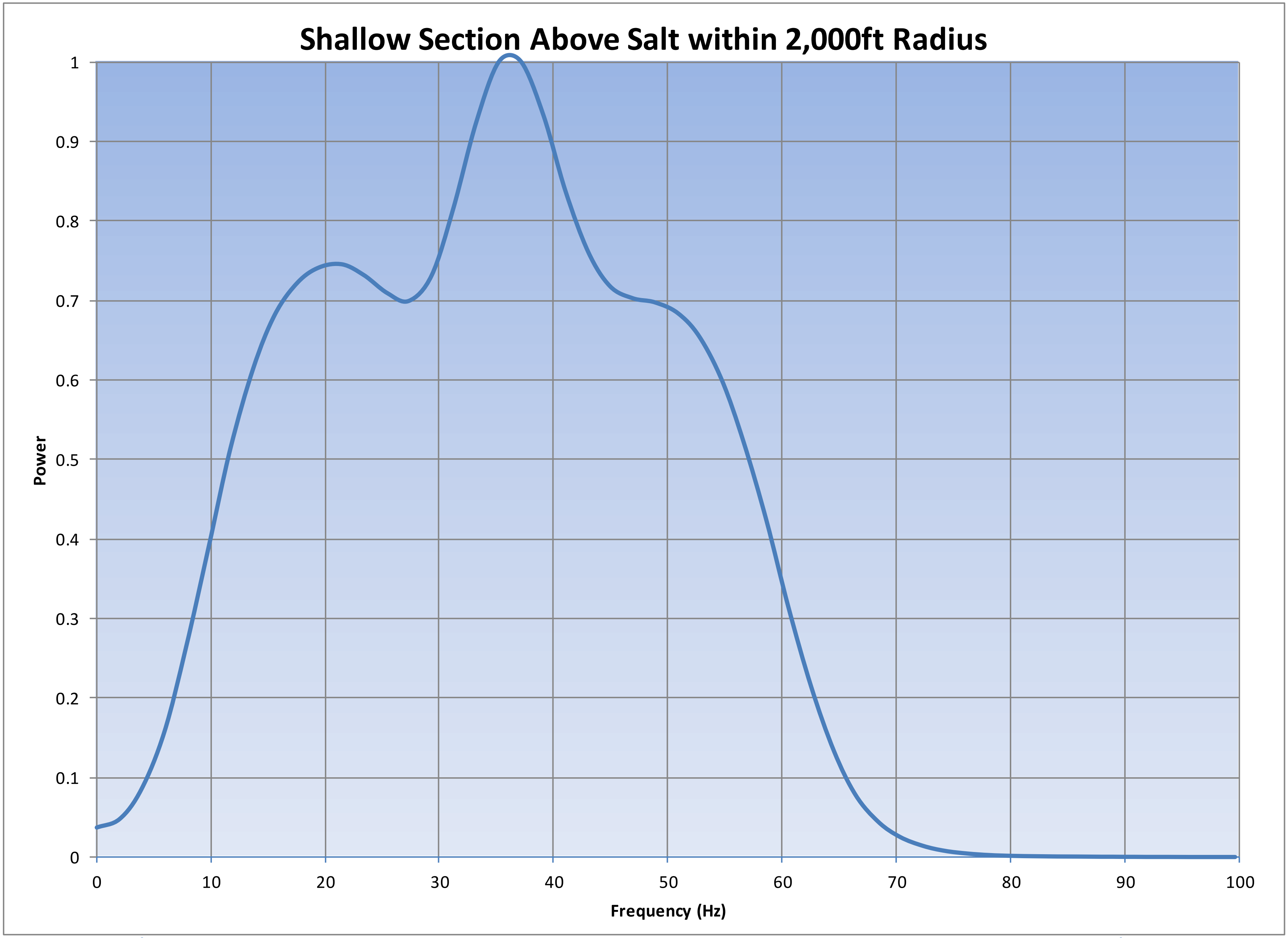
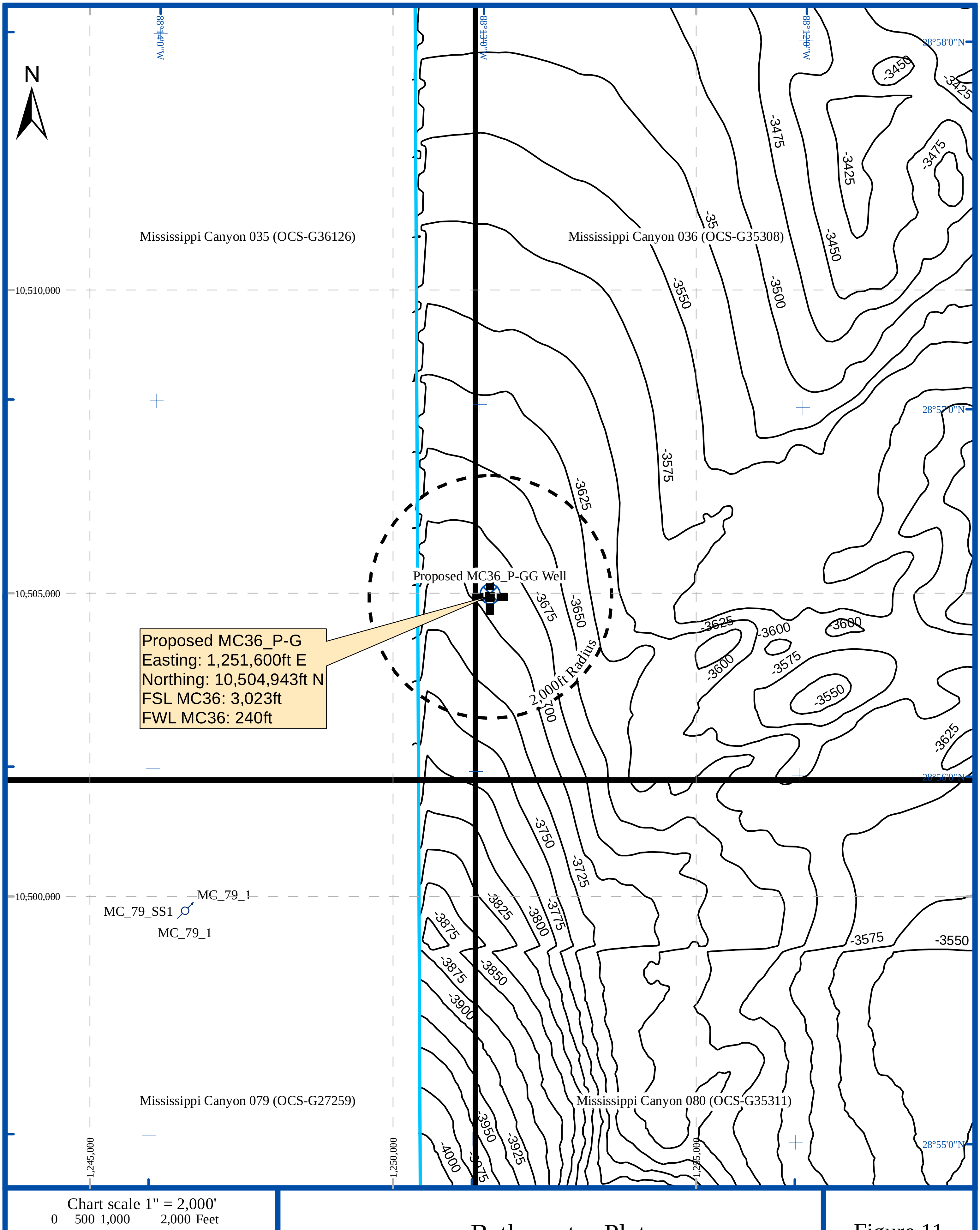


Figure 9
(MC36_P-G)

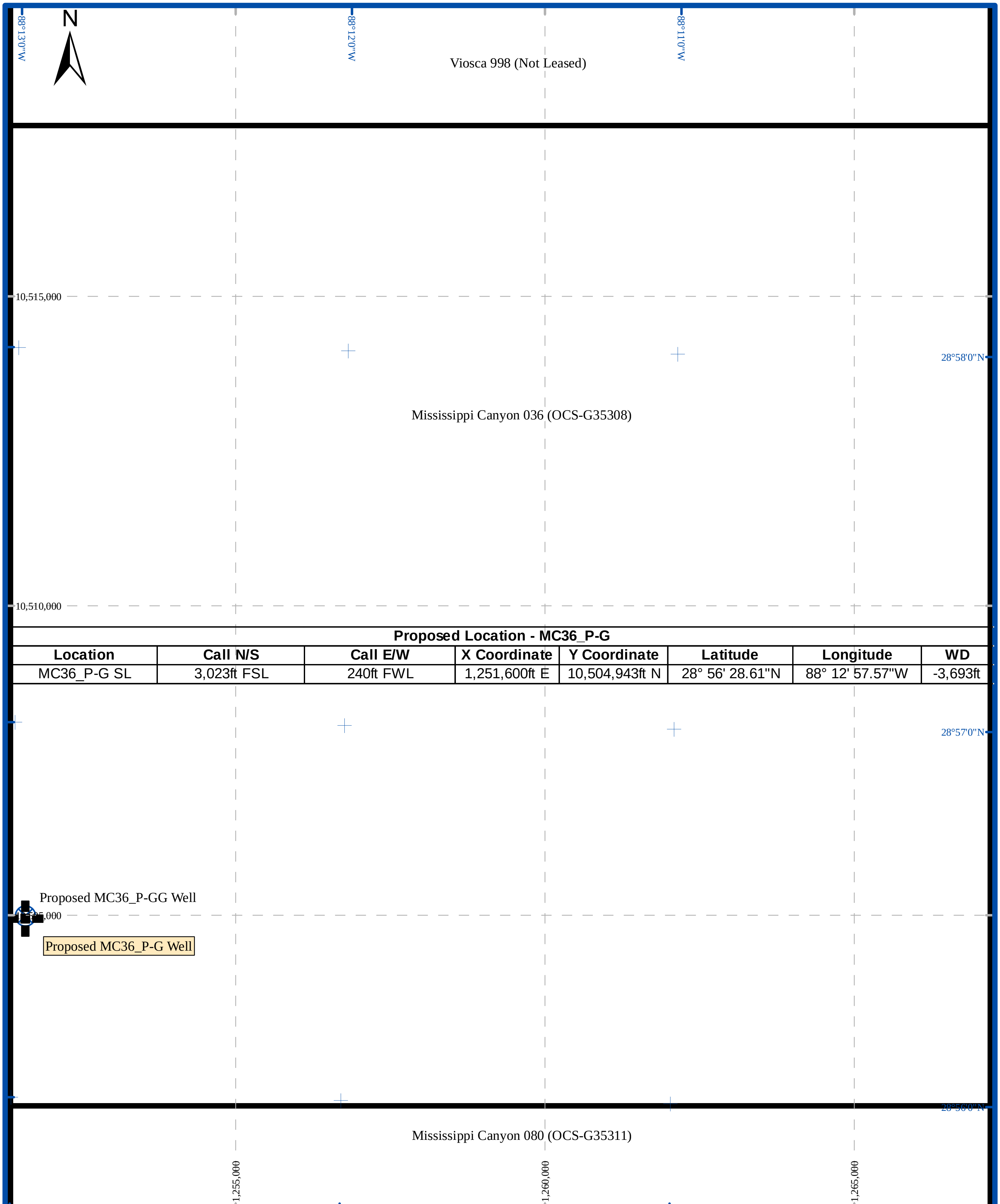


MC36_P-G	Power Spectrum	Figure 10



Bathymetry Plat

Figure 11



Proposed Location - MC36_P-G

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC36_P-G SL	3,023ft FSL	240ft FWL	1,251,600ft E	10,504,943ft N	28° 56' 28.61"N	88° 12' 57.57"W	-3,693ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

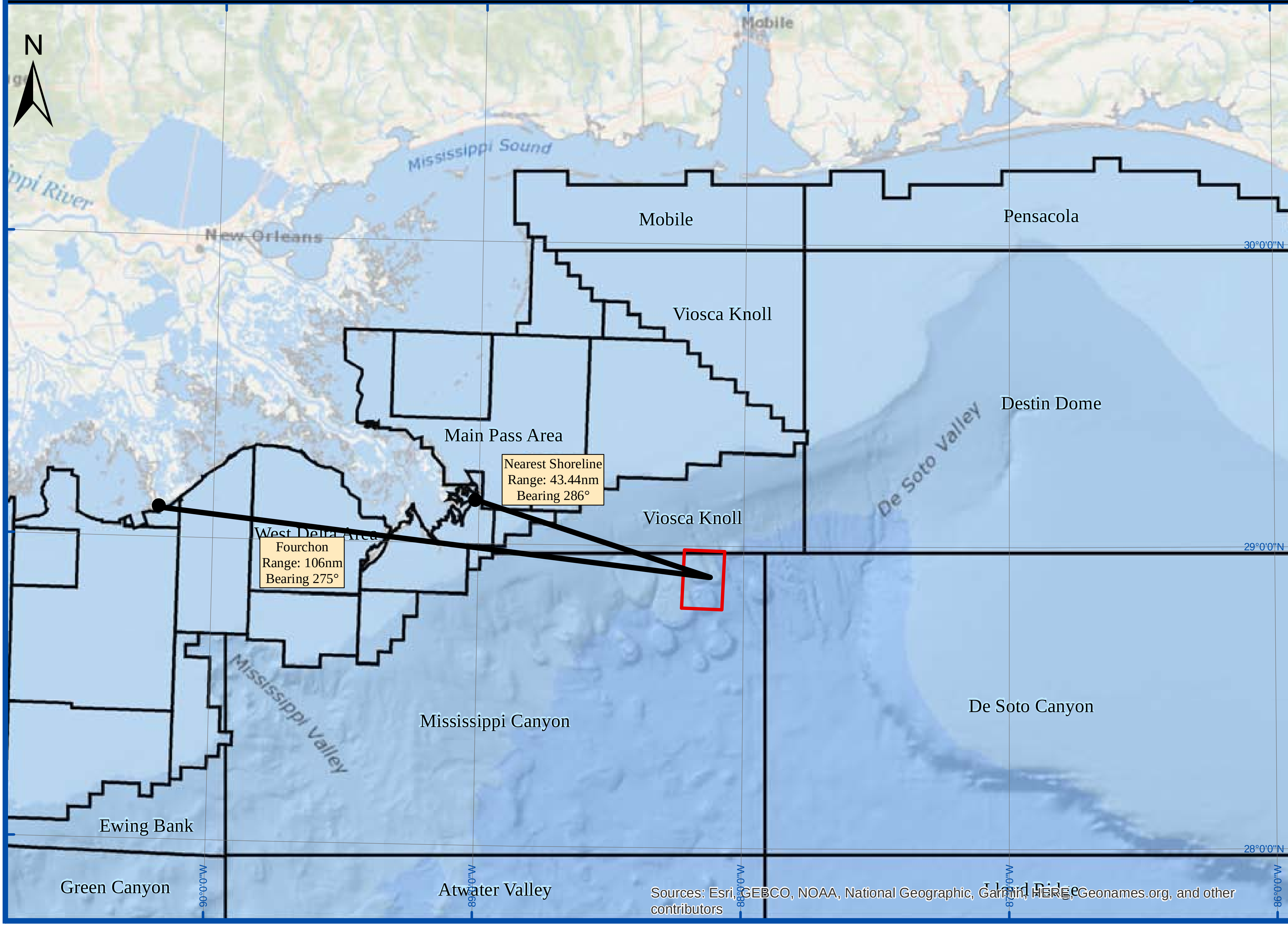
0 150 300 600 Meters

Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 36

Figure 13



Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 36

0 5 10 Miles

1 inch = 2.5 miles

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC36_P-G Well Location

August 31, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 36
(OCS-G OCS-G-35308)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-G well location with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.5 seconds two-way time (TWT), -10,267ft below sea surface (6,574ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 1.7° to the WSW No seabed faults occur within 2,000ft of the proposed well.

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

No seabed infrastructure occurs within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas is assigned at the propsoed well and within 2,000ft of the propsoed well.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect a fault within Unit F.

Proposed MC36_P-G Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	28.612"	North	Easting	1,251,600	US ft. E
Longitude	88°	12'	57.573"	West	Northing	10,504,943	US ft. N
Latitude Decimal			28.9412812				
Longitude Decimal			-88.2159926				
FWL Mississippi Canyon 036			240ft		US ft.	Inline	12672
FSL Mississippi Canyon 036			3,023ft		US ft.	Crossline	18245
Water Depth: -3,693ft			Slope: 1.7° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon			106 Nautical Miles @ 275°	
Nearest Manned Platform			Horn Mountain in MC127			10.97 Miles @ 118.7°	

Proposed MC36_P-GG Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	29.108"	North	Easting	1,251,600	US ft. E
Longitude	88°	12'	57.579"	West	Northing	10,504,993	US ft. N
Latitude Decimal			28.9414188				
Longitude Decimal			-88.2159942				
FWL Mississippi Canyon 036			240ft		US ft.	Inline	12653
FSL Mississippi Canyon 036			3,073ft		US ft.	Crossline	18249
Water Depth: -3,692ft			Slope: 1.8° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon			106 Nautical Miles @ 275°	
Nearest Manned Platform			Horn Mountain in MC127			10.97 Miles @ 118.7°	

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

No risk of gas is assigned at the propsoed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect a fault within Unit F.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC36_P-G Well Location

Anadarko Petroleum Corporation

August 31, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC36_P-G Well Location (OCS-G-35308)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-G with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 2,528ft to the ESE.

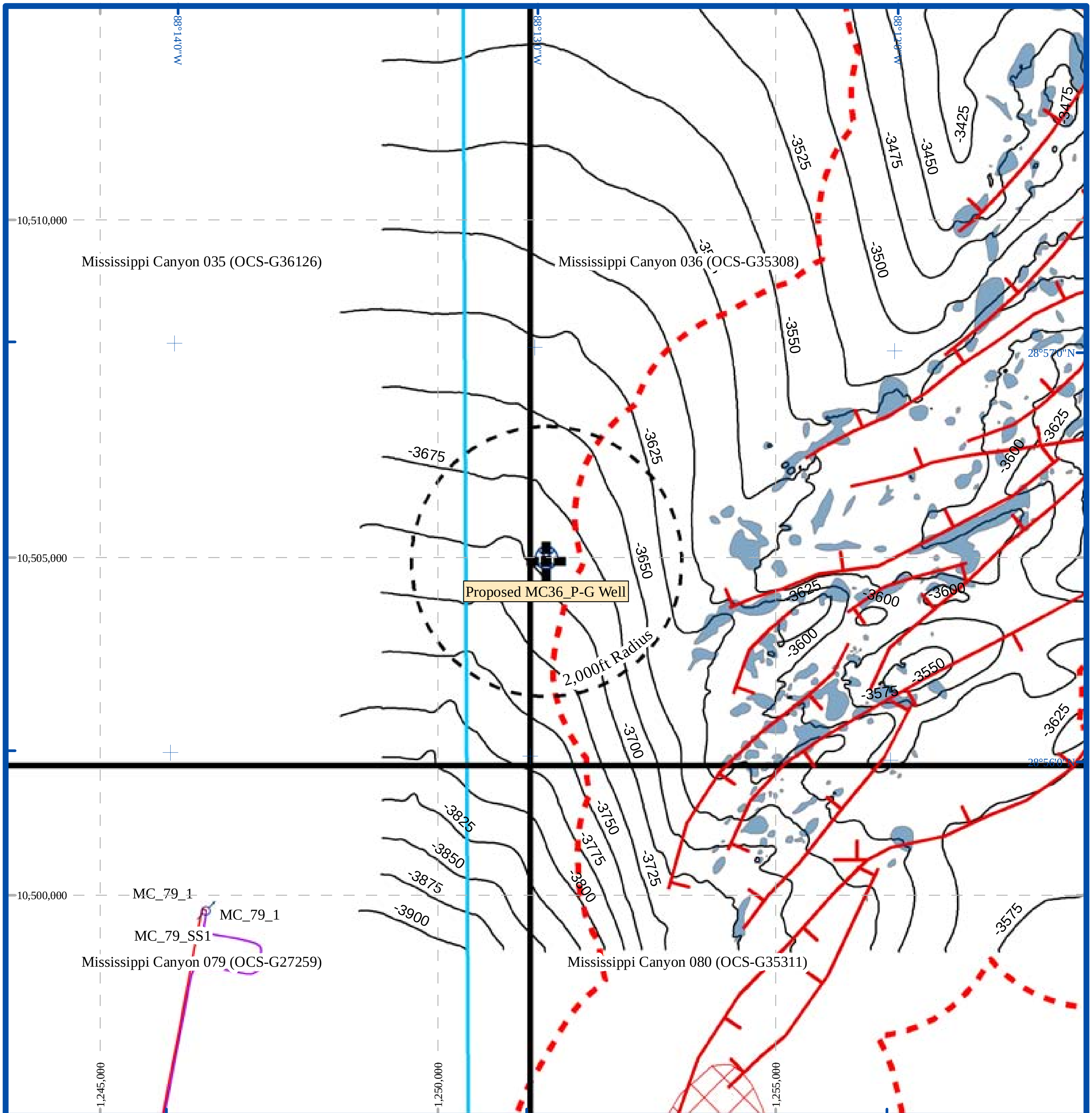
Proposed MC36_P-G Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56’	28.612”	North	Easting	1,251,600	US ft. E
Longitude	88°	12’	57.573”	West	Northing	10,504,943	US ft. N
Latitude Decimal	28.9412812						
Longitude Decimal	-88.2159926						
FWL Mississippi Canyon 036	240ft			US ft.	Inline	12672	
FSL Mississippi Canyon 036	3,023ft			US ft.	Crossline	18245	
Water Depth: -3,693ft	Slope: 1.7° WSW						
Nearest Shoreline	43.44 Nautical Miles @ 286°						
Port of Operation	Fourchon				106 Nautical Miles @ 275°		
Nearest Manned Platform	Horn Mountain in MC127				10.97 Miles @ 118.7°		

Proposed MC36_P-GG Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56’	29.108”	North	Easting	1,251,600	US ft. E
Longitude	88°	12’	57.579”	West	Northing	10,504,993	US ft. N
Latitude Decimal	28.9414188						
Longitude Decimal	-88.2159942						
FWL Mississippi Canyon 036	240ft			US ft.	Inline	12653	
FSL Mississippi Canyon 036	3,073ft			US ft.	Crossline	18249	
Water Depth: -3,692ft	Slope: 1.8° WSW						
Nearest Shoreline	43.44 Nautical Miles @ 286°						
Port of Operation	Fourchon				106 Nautical Miles @ 275°		
Nearest Manned Platform	Horn Mountain in MC127				10.97 Miles @ 118.7°		

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

Conclusions and Recommendations: The proposed MC36_P-G and proposed MC36_P-GG well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC36_P-G Well Location (1,251,600ft E / 10,504,943ft N)

Proposed MC36_P-GG Well Location

Existing Wells

Gas Pipelines

Umbilical Pipelines

Block boundaries

Study area boundary

-3693 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Peach Prospect
Mississippi Canyon, Block MC36,
Offshore Gulf of Mexico

Description:
Proposed MC36_P-H Well Location

Project Number:
2020-311

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	………………… A Haigh
	Quality Assurance	………………… D Haigh

Revision	**Date**	**Title**
0	August 6, 2020	Draft
1	August 31, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

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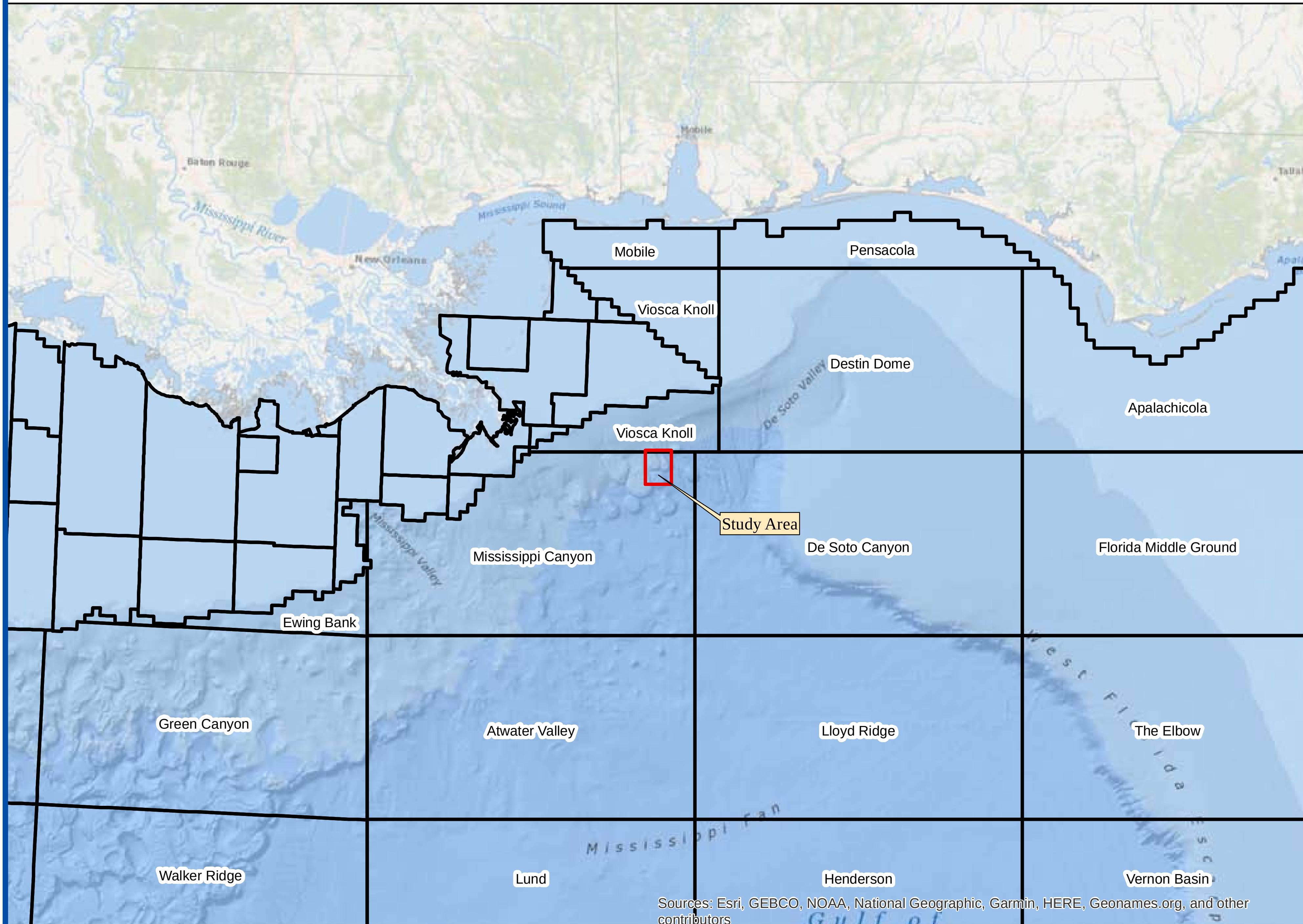
OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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LIST OF FIGURES

WELL CLEARANCE LETTER – PROPOSED MC36_P-H WELL LOCATION

August 31, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC36_P-H Well Location
Mississippi Canyon Block MC36
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC36_P-H Well Location, Mississippi Canyon Area (OCS-G-35308). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,232ft below sea surface (6,494ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC36_P-H well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC36_P-H Well Location lies in the southwest part of Block MC36 (OCS-G-35308).

Proposed MC36_P-H Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	08.778"	North	Easting	1,251,500	US ft. E
Longitude	88°	12'	58.467"	West	Northing	10,502,941	US ft. N
Latitude Decimal			28.9357716				
Longitude Decimal			-88.216241				
FWL Mississippi Canyon 36			140ft		US ft.	Inline	12637
FSL Mississippi Canyon 36			1,021ft		US ft.	Crossline	18181
Water Depth: -3,738ft			Slope: 1.8° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon			106 Nautical Miles @ 275°	
Nearest Manned Platform			Horn Mountain in MC127			10.774 Miles @ 116.993°	

Proposed MC36_P-HH Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	09.273"	North	Easting	1,251,500	US ft. E
Longitude	88°	12'	58.473"	West	Northing	10,502,991	US ft. N
Latitude Decimal			28.9359092				
Longitude Decimal			-88.2162426				
FWL Mississippi Canyon 36			140ft		US ft.	Inline	12637
FSL Mississippi Canyon 36			1,071ft		US ft.	Crossline	18181
Water Depth: -3,737ft			Slope: 1.8° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon			106 Nautical Miles @ 275°	
Nearest Manned Platform			Horn Mountain in MC127			10.974 Miles @ 118.722°	

Location MC36_P-HH is 50ft from MC36_P-H on a bearing of 000°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC36_P-H well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

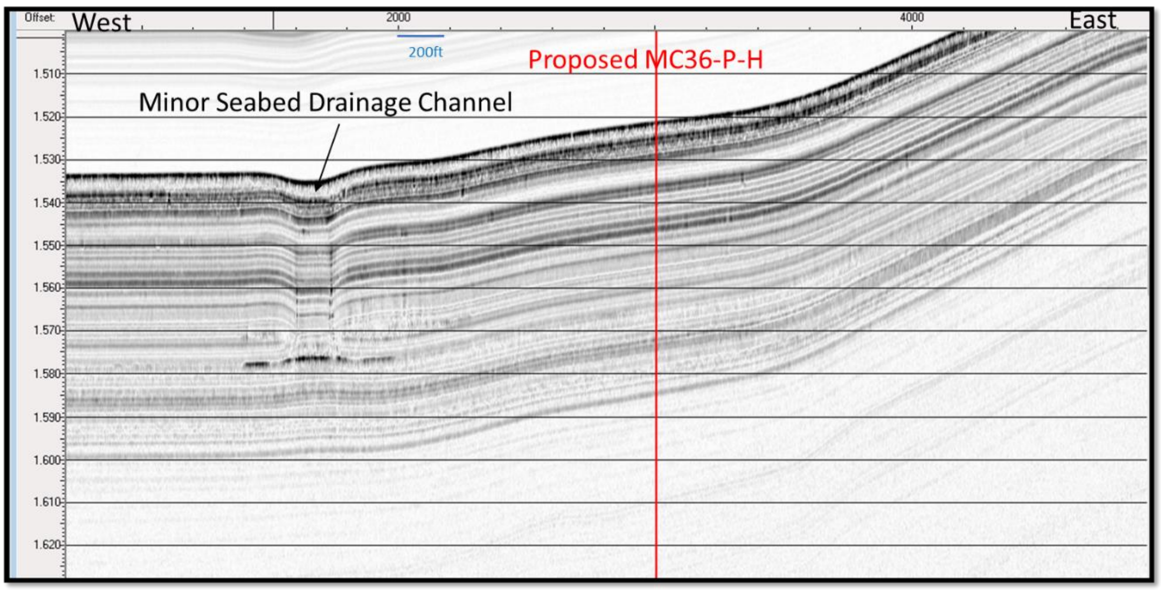
3.1 Seabed Depth

Water depth at the proposed MC36_P-H well location is -3,738ft below sea surface (Figure 1). The seafloor slopes to the WSW at 1.8°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC36_P-H well location is in the southwest part of block MC36 in an area of relatively smooth seabed located within a minibasin to the northwest of Horn Dome.

The edge of a northeast to southwest narrow seabed drainage pathway is located 1,030ft to the west. This channel appears to have been active for several thousand years and is well defined on the sub-bottom profiler data. The drainage pathway measures ~500m in width and is 5ft deep. The seabed drainage pathway will not directly affect the proposed well.



Sub-Bottom Profiler Data,-Line 312.1. Illustrating Minor Drainage Channel.

No seabed fault intersections occur within 2,000ft of the proposed location.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,954ft below sea surface (216ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,954ft below sea surface (216ft below seabed).

4.3 Unit B

The upper part of Unit B, from -3,954ft to -4,058ft below sea surface (216ft to 320ft below seabed), displays generally low-amplitude reflectors, and is interpreted as well-layered clays and silts with occasional sands.

From -4,058ft to -4,325ft below sea surface (320ft to 587ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -4,325ft below sea surface (587ft below seabed) to -4,812ft below sea surface (1,074ft below seabed) presents acoustically as well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft.

Horizon H10 marks the base of Unit B, occurring at -4,812ft below sea surface (1,074ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,812ft to -5,558ft below sea surface (1,074ft to 1,820ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit C at the proposed well or within 2,000ft.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -5,558ft below sea surface (1,820ft below seabed).

4.5 Unit D

The upper part of Unit D from -5,558ft below sea surface (1,820ft below seabed) to -5,789ft below sea surface (2,051ft below seabed) is interpreted to consist of well-layered, low-amplitude reflectors with clays, silts, and occasional sands.

Unit D from -5,789ft to -6,737ft below sea surface (2,051ft to 2,999ft below seabed) is characterized by slightly-chaotic, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sands. This interval appears to have been deposited at a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can, on occasions, induce minor over-pressure and as such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit D from -6,737ft below sea surface (2,999ft below seabed) to -6,936ft below sea surface (3,198ft below seabed) is interpreted to consist of clays, silts, and occasional sands.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft of the proposed well.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -6,936ft below sea surface (3,198ft below seabed).

4.6 Unit E

Unit E from -6,936ft to -7,923ft below sea surface (3,198ft to 4,185ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~300ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is interpreted within Unit E at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit E at the propsoed well.

Horizon H40 marks the base of Unit E at -7,923ft below sea surface (4,185ft below seabed).

4.7 Unit F

Unit F from -7,923ft to -9,786ft below sea surface (4,185ft to 6,048ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions form some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~300ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is interpreted within Unit F at the proposed well or within 2,000ft.

The well-path will not traverse any faults at the proposed well.

Horizon H50 marks the base of Unit F at -9,786ft below sea surface (6,048ft below seabed).

4.8 Unit G

Unit G from -9,786ft to -10,232ft below sea surface (6,048ft to 6,494ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit G.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,232ft below sea surface (6,494ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,058ft to -4,325ft below sea surface (320ft to 587ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,789ft to -6,737ft below sea surface (2,051ft to 2,999ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,936ft to -7,923ft below sea surface (3,198ft to 4,185ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,923ft to -9,786ft below sea surface (4,185ft to 6,048ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None predicted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,058ft to -4,325ft below sea surface (320ft to 587ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  No drilling hazards or problems interpreted.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,789ft to -6,737ft below sea surface (2,051ft to 2,999ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

  Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,936ft to -7,923ft below sea surface (3,198ft to 4,185ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,923ft to -9,786ft below sea surface (4,185ft to 6,048ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit G

No drilling hazards or problems interpreted.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

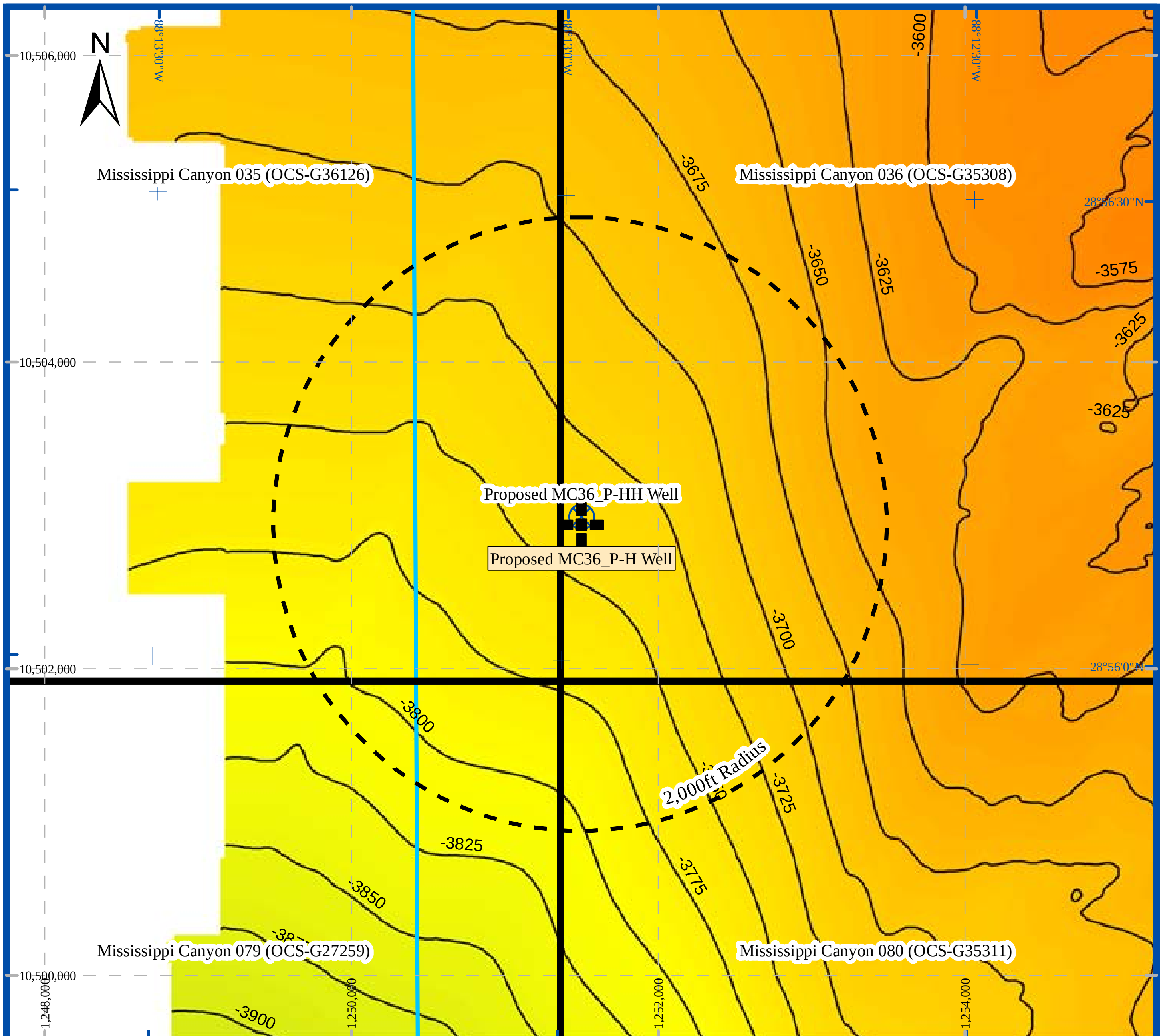
Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC36_P-H Well Location

Seabed Depth Extract
Seabed Morphology Extract
Seabed Amplitude Extract
Geohazard Summary Extract
Sand Lithology Summary Extract
Inline Data Example
Crossline Data Example
Top Hole Prognosis
ROV Plat
Power Spectrum
Bathymetry Plat
Public Information Plat
Vicinity Plat
10-Mile Radius Plat



Seabed Depth Extract

Proposed MC36_P-H Well Location (1,251,500ft E / 10,502,941ft N)

Proposed MC36_P-HH Well Location

Block boundaries

Study area boundary

-3,738 Depth in feet below sea surface to seabed, contoured at 25ft intervals

-5400 -5000 -4600 -4200 -3800 -3400

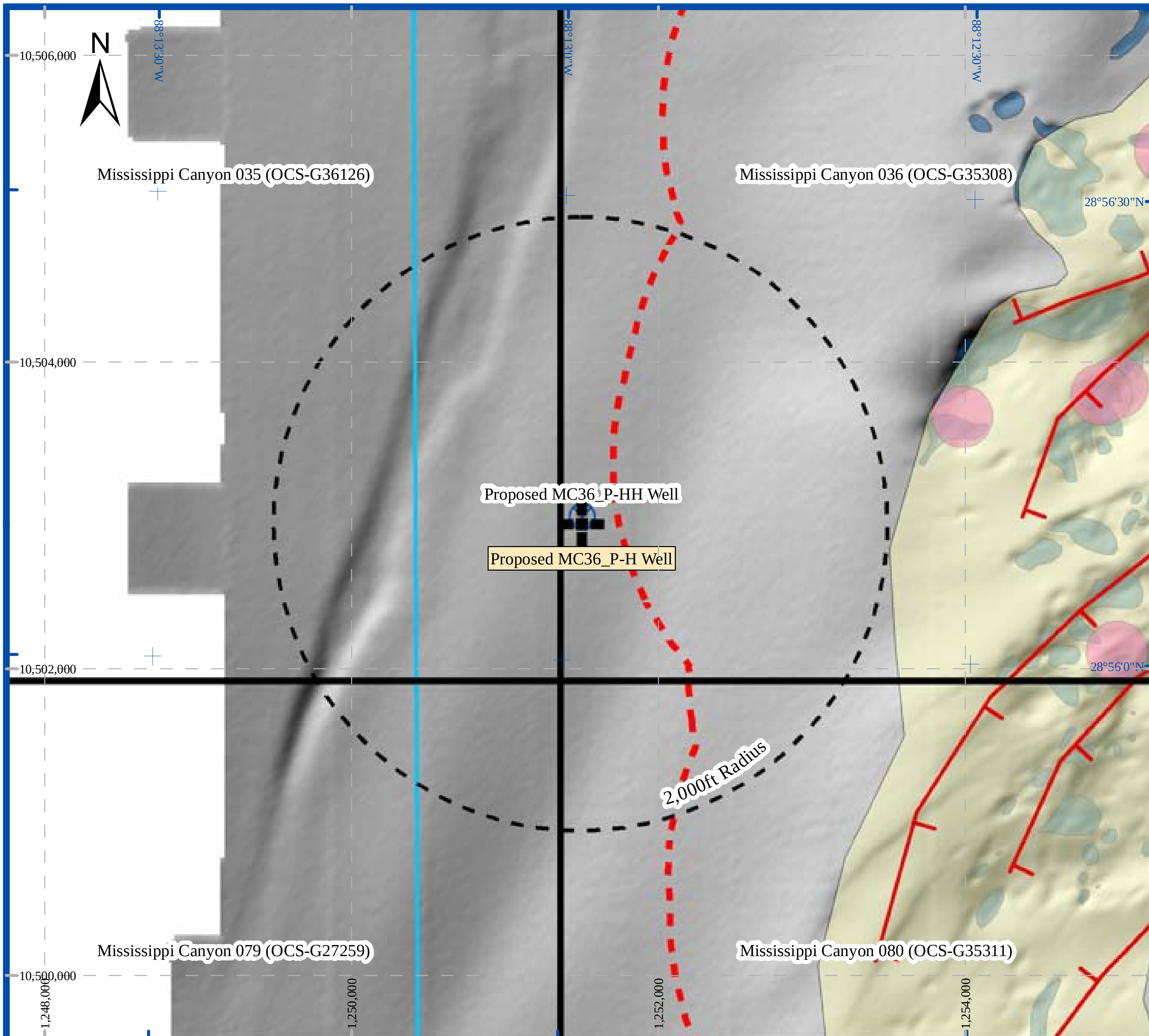
Seabed Depth (Feet)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 1 (MC36_P-H)



Seabed Morphology Extract

Proposed MC36_P-H Well Location (1,251,500ft E / 10,502,941ft N)

Proposed MC36_P-HH Well Location

Block boundaries

Study area boundary

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

BOEM database — EM302 plumes (400ft Diam)

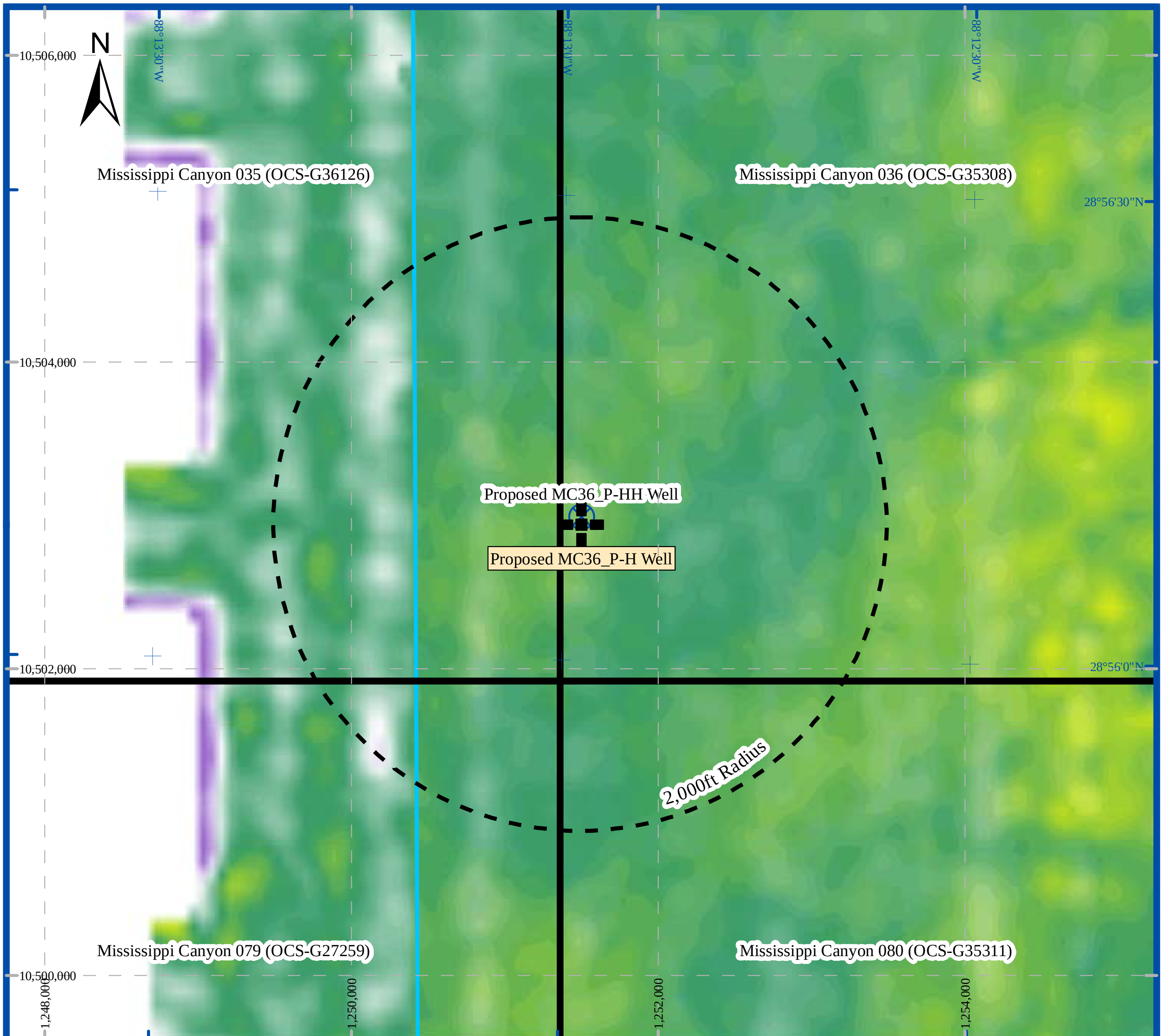
BOEM database — Seep anomaly positives (Cofirmed Organisms)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

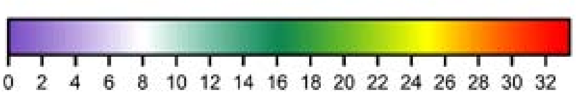
0 150 300 600 Meters

Figure 2
(MC36_P-H)



Seabed Amplitude Extract

- Proposed MC36_P-H Well Location (1,251,500ft E / 10,502,941ft N)
- Proposed MC36_P-HH Well Location
- Block boundaries
- Study area boundary



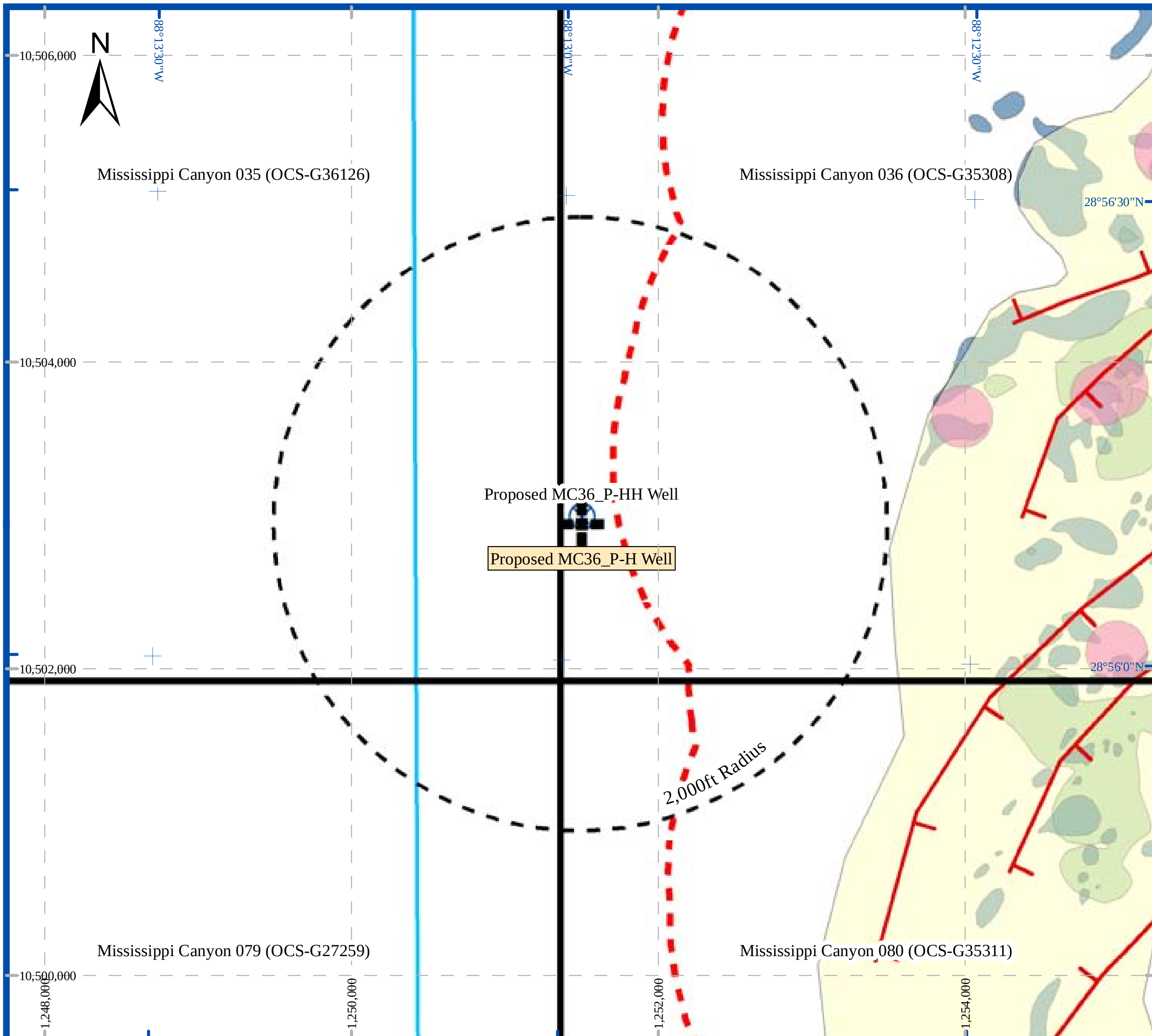
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC36_P-H)



Geohazard Summary Extract

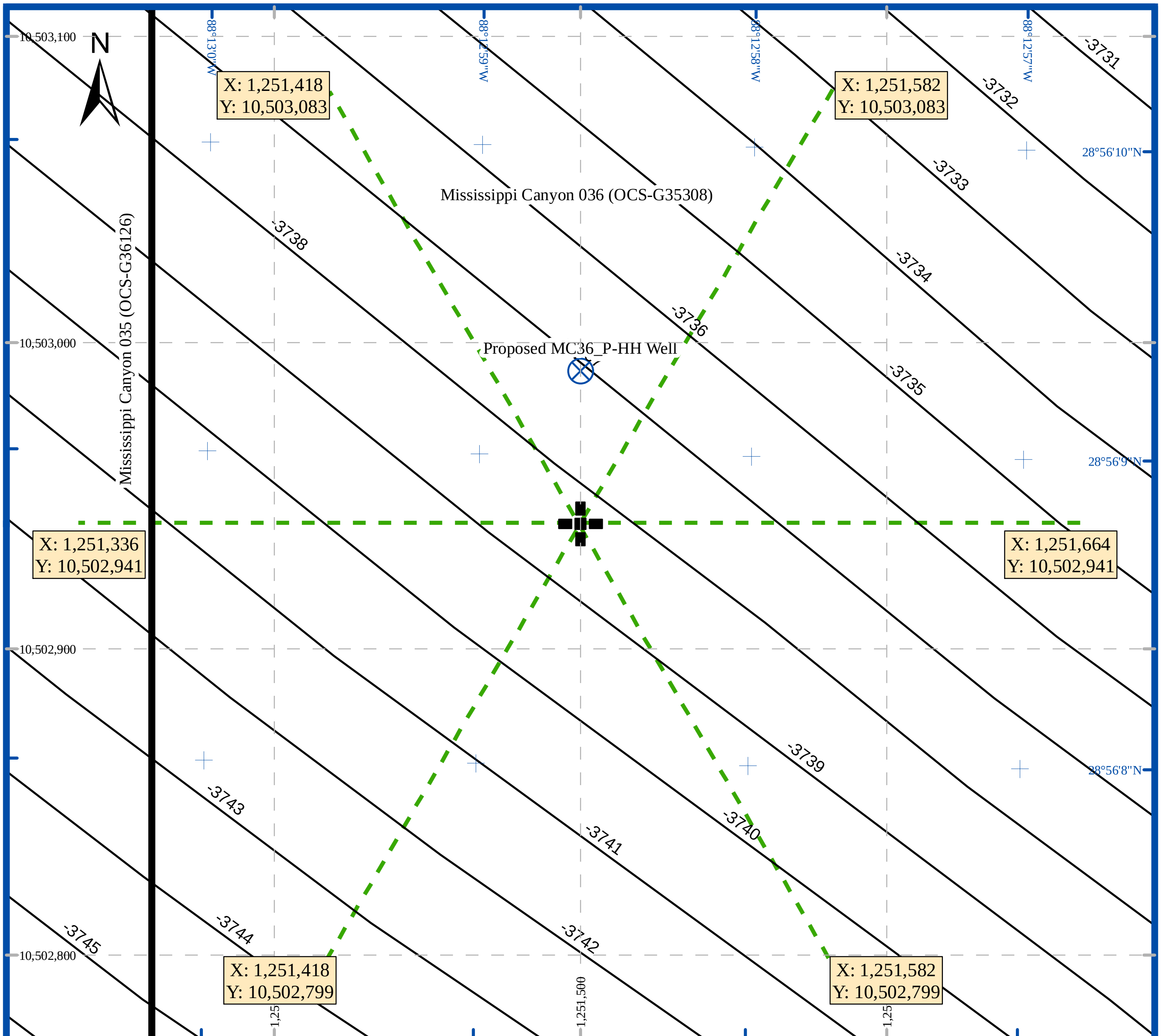
- Proposed MC36_P-H Well Location (1,251,500ft E / 10,502,941ft N)
- Proposed MC36_P-HH Well Location
- Block boundaries
- Study area boundary
- Seafloor fault intersection. Tick denotes downthrown block
- 2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar
- Hardgrounds exposures at seabed mapped from side scan sonar data
- BOEM database — EM302 plumes (400ft Diam)
- BOEM database — Seep anomaly positives (Cofirmed Organisms)
- Slight and Moderate Risk of Gas within Unit A

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC36_P-H)



ROV Plat (MC36_P-H)

Proposed MC36_P-H Well Location (1,251,500ft E / 10,502,941ft N)

Proposed MC36_P-HH Well Location

Block boundaries

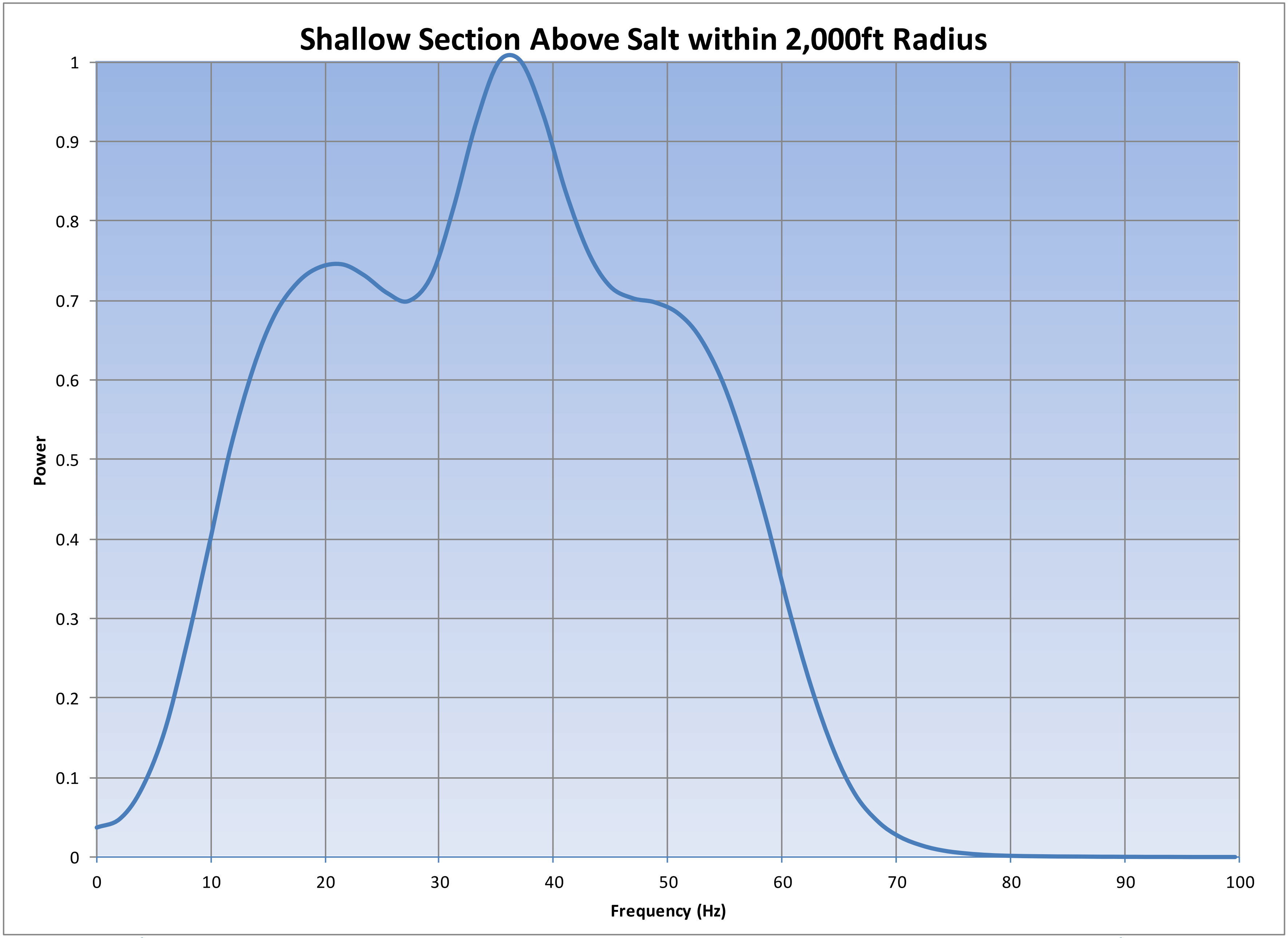
-3738 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC36_P-H)



MC36_P-H	Power Spectrum	Figure 10

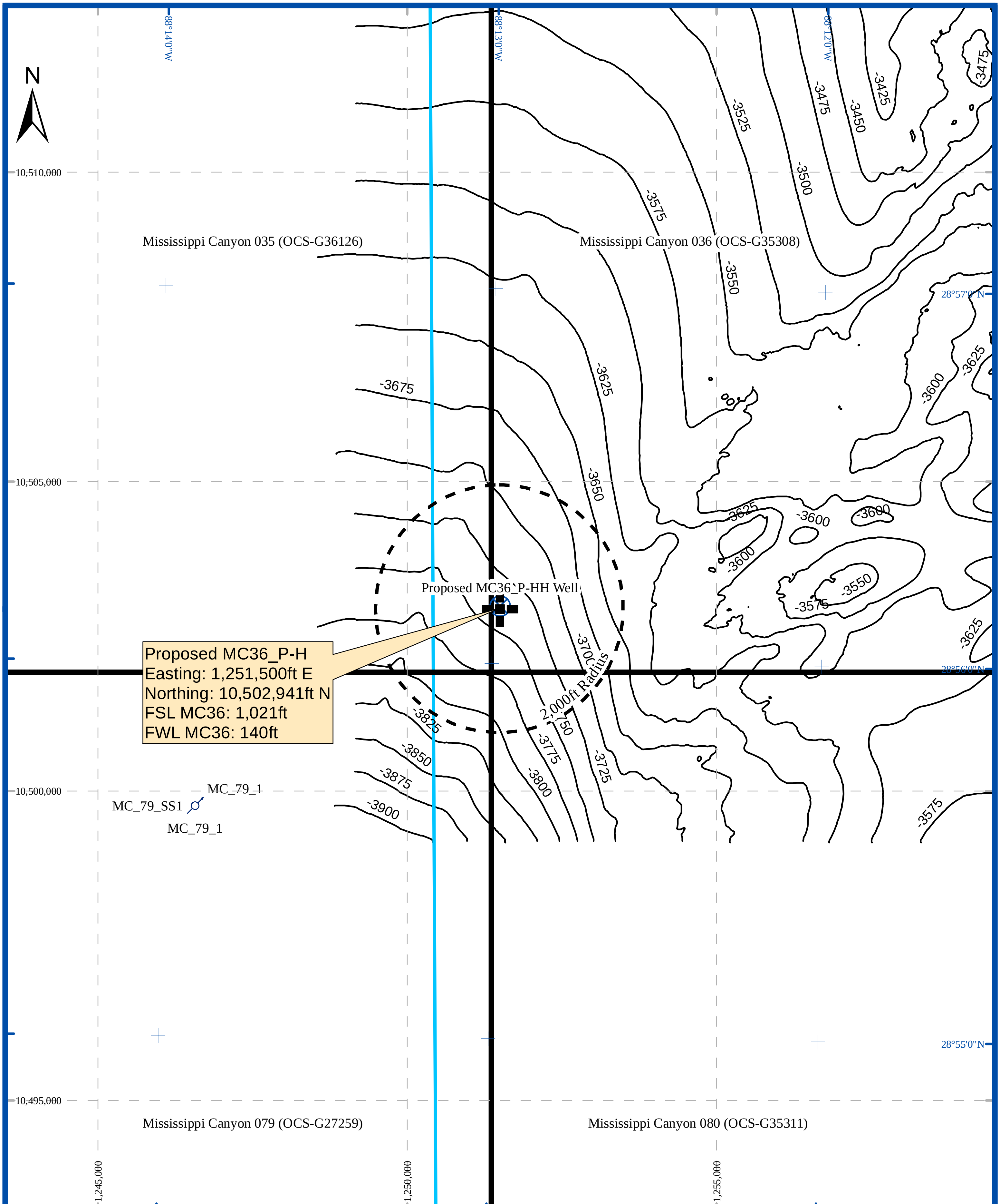


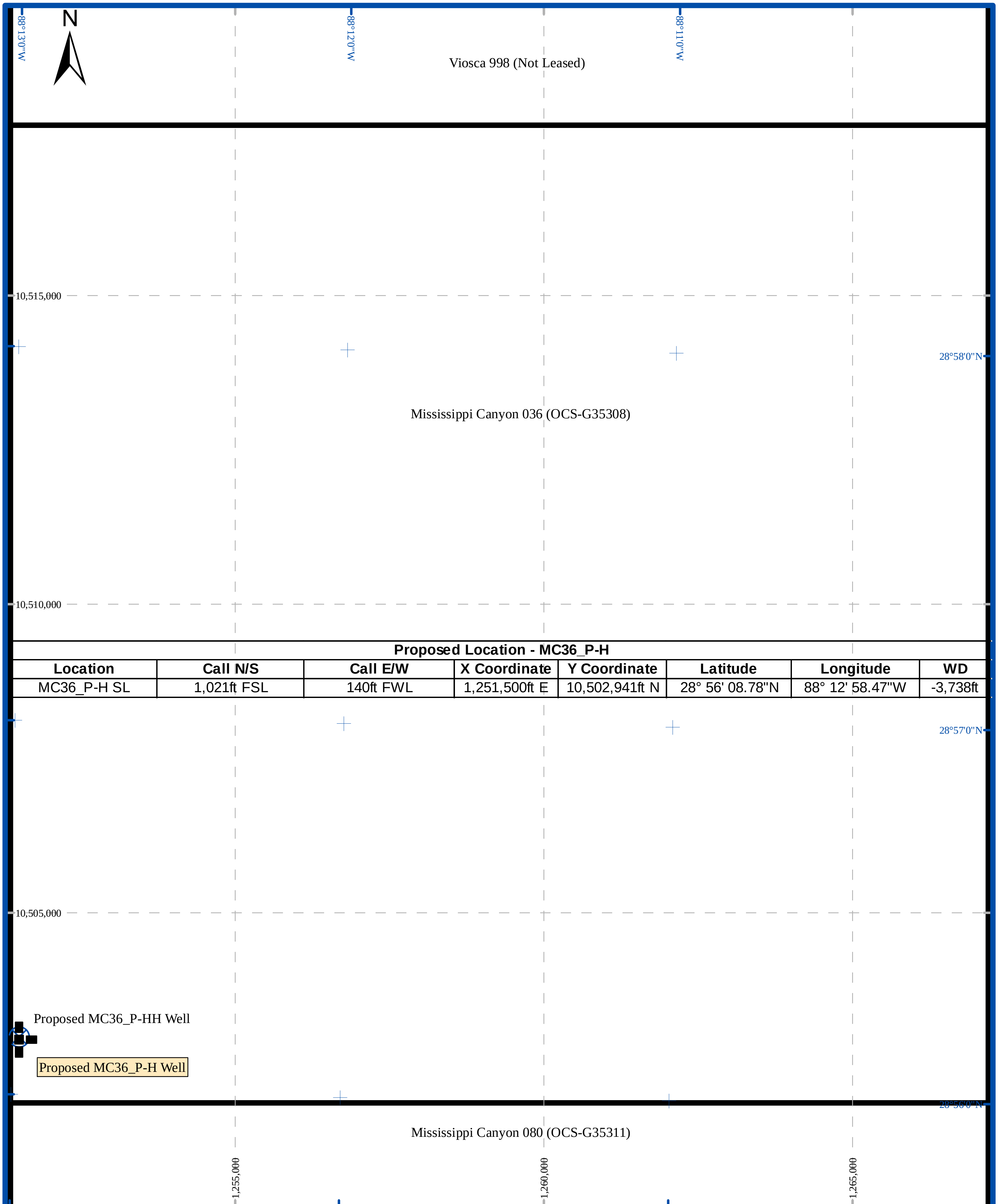
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC36_P-H

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC36_P-H SL	1,021ft FSL	140ft FWL	1,251,500ft E	10,502,941ft N	28° 56' 08.78"N	88° 12' 58.47"W	-3,738ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

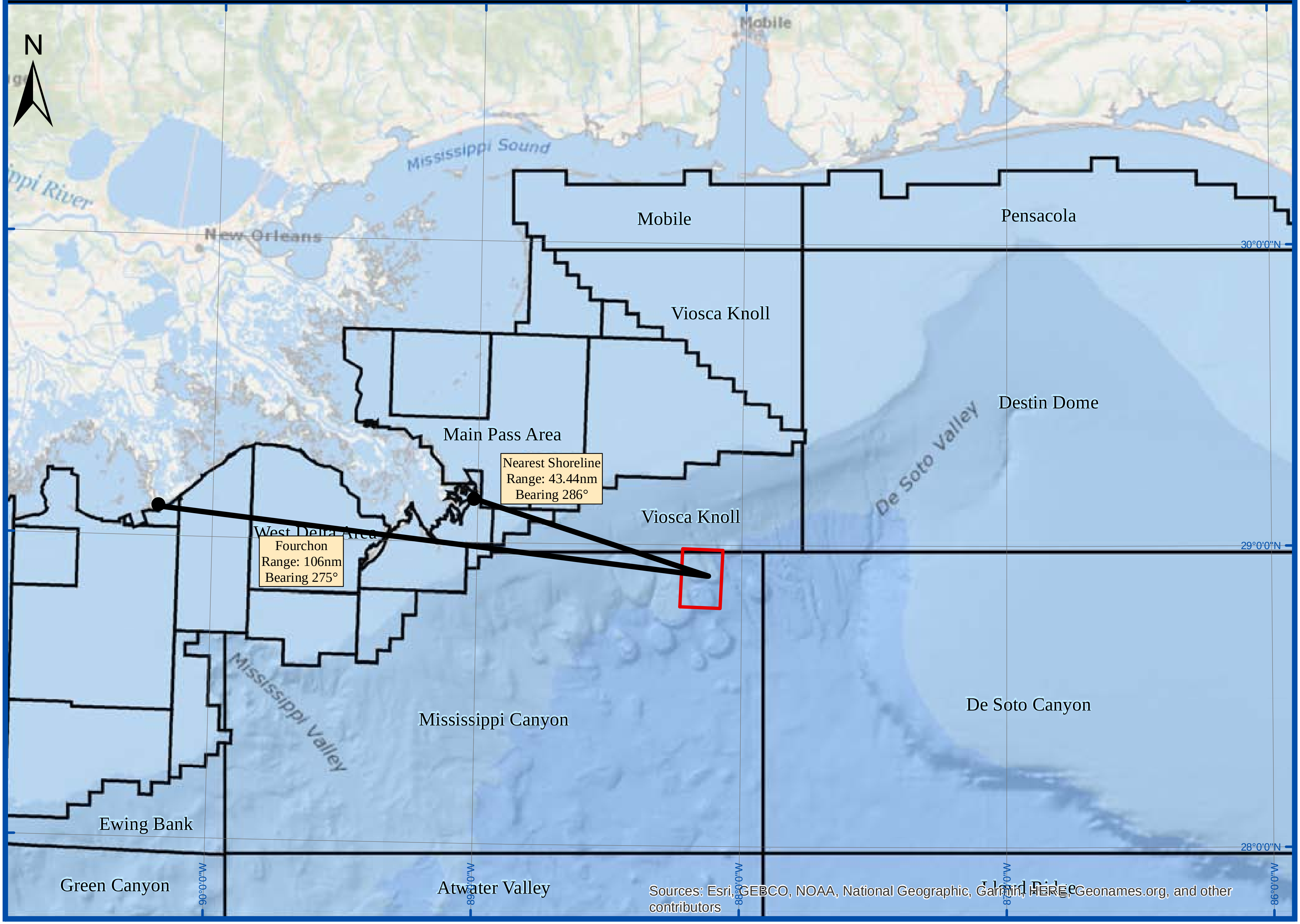
0 150 300 600 Meters

Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 36

Figure 13



Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 36

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC36_P-H Well Location

August 31, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 36
(OCS-G OCS-G-35308)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-H well location with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.5 seconds two-way time (TWT), -10,232ft below sea surface (6,494ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 1.8° to the WSW No seabed faults occur within 2,000ft of the proposed well.

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

No seabed infrastructure occurs within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas is assigned at the proposed well or within 2,000ft.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will not intersect any faults.

Proposed MC36_P-H Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	08.778"	North	Easting	1,251,500	US ft. E
Longitude	88°	12'	58.467"	West	Northing	10,502,941	US ft. N
Latitude Decimal	28.9357716						
Longitude Decimal	-88.216241						
FWL Mississippi Canyon 36	140ft			US ft.	Inline	12637	
FSL Mississippi Canyon 36	1,021ft			US ft.	Crossline	18181	
Water Depth: -3,738ft	Slope: 1.8° WSW						
Nearest Shoreline	43.44 Nautical Miles @ 286°						
Port of Operation	Fourchon				106 Nautical Miles @ 275°		
Nearest Manned Platform	Horn Mountain in MC127				10.774 Miles @ 116.993°		

Proposed MC36_P-HH Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	09.273"	North	Easting	1,251,500	US ft. E
Longitude	88°	12'	58.473"	West	Northing	10,502,991	US ft. N
Latitude Decimal	28.9359092						
Longitude Decimal	-88.2162426						
FWL Mississippi Canyon 36	140ft			US ft.	Inline	12637	
FSL Mississippi Canyon 36	1,071ft			US ft.	Crossline	18181	
Water Depth: -3,737ft	Slope: 1.8° WSW						
Nearest Shoreline	43.44 Nautical Miles @ 286°						
Port of Operation	Fourchon				106 Nautical Miles @ 275°		
Nearest Manned Platform	Horn Mountain in MC127				10.974 Miles @ 118.722°		

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

No risk of gas is assigned at the propsoed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will not intersect any faults.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC36_P-H Well Location

Anadarko Petroleum Corporation

August 31, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC36_P-H Well Location (OCS-G-35308)

Ladies/Gentlemen:

Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC36_P-H with surface location in Block 36, Mississippi Canyon Area (OCS-G-35308). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities

Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 2,236ft to the ESE.

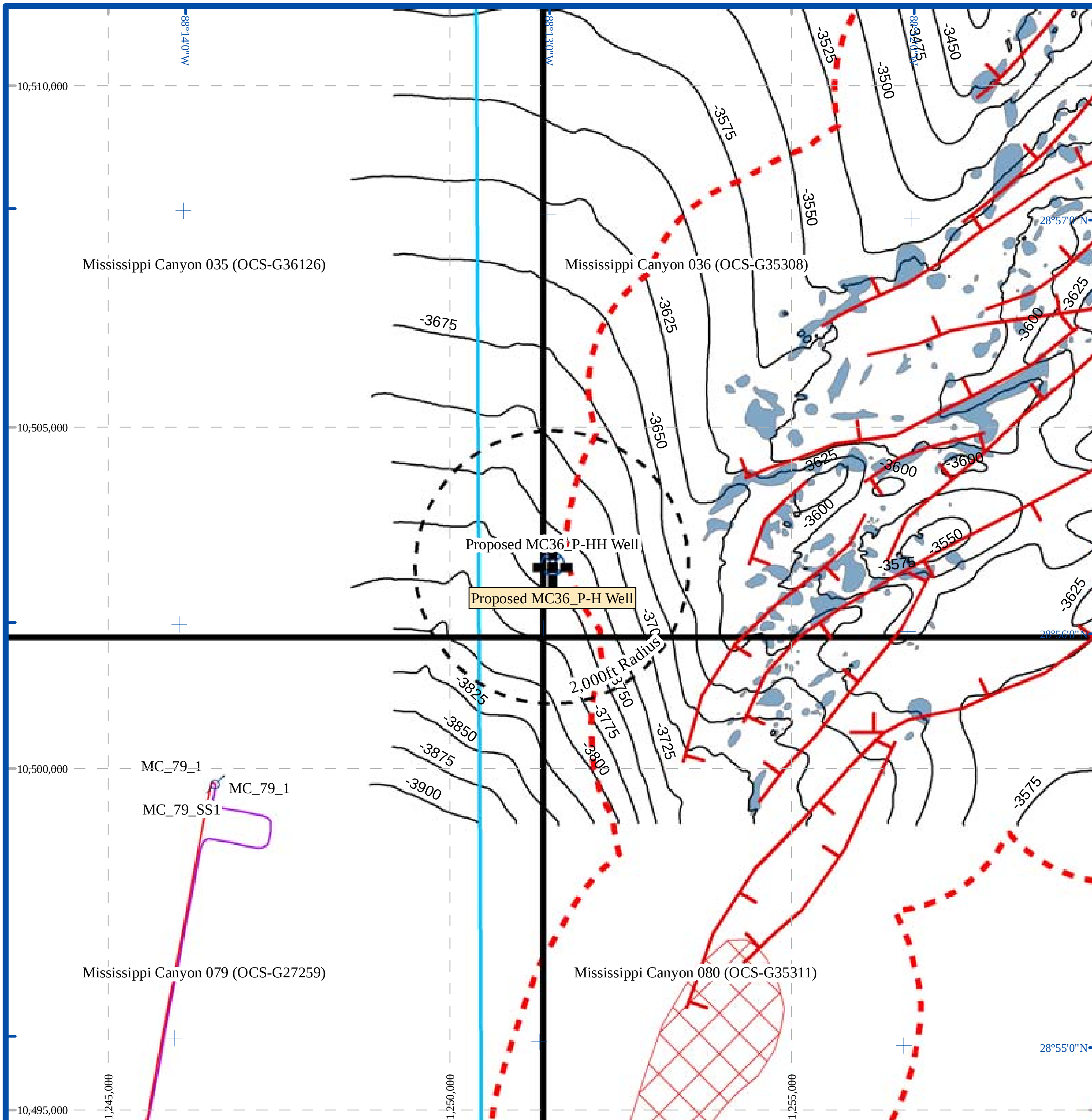
Proposed MC36_P-H Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	08.778"	North	Easting	1,251,500	US ft. E
Longitude	88°	12'	58.467"	West	Northing	10,502,941	US ft. N
Latitude Decimal			28.9357716				
Longitude Decimal			-88.216241				
FWL Mississippi Canyon 36			140ft	US ft.	Inline	12637	
FSL Mississippi Canyon 36			1,021ft	US ft.	Crossline	18181	
Water Depth: -3,738ft			Slope: 1.8° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.774 Miles @ 116.993°		

Proposed MC36_P-HH Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	56'	09.273"	North	Easting	1,251,500	US ft. E
Longitude	88°	12'	58.473"	West	Northing	10,502,991	US ft. N
Latitude Decimal			28.9359092				
Longitude Decimal			-88.2162426				
FWL Mississippi Canyon 36			140ft	US ft.	Inline	12637	
FSL Mississippi Canyon 36			1,071ft	US ft.	Crossline	18181	
Water Depth: -3,737ft			Slope: 1.8° WSW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.974 Miles @ 118.722°		

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

Conclusions and Recommendations: The proposed MC36_P-H and proposed MC36_P-HH well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC36_P-H Well Location (1,251,500ft E / 10,502,941ft N)

Proposed MC36_P-HH Well Location

Existing Wells

Gas Pipelines

Umbilical Pipelines

Block boundaries

Study area boundary

-3,738 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Regions considered favorable for sensitive sessile benthic communities based on 3D seismic data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Peach Prospect
Mississippi Canyon, Block MC80,
Offshore Gulf of Mexico

Description:
Proposed MC80_P-I Well Location

Project Number:
2020-312

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	.... A Haigh
	Quality Assurance	.... D Haigh

Revision	**Date**	**Title**
0	August 11, 2020	Draft
1	August 31, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

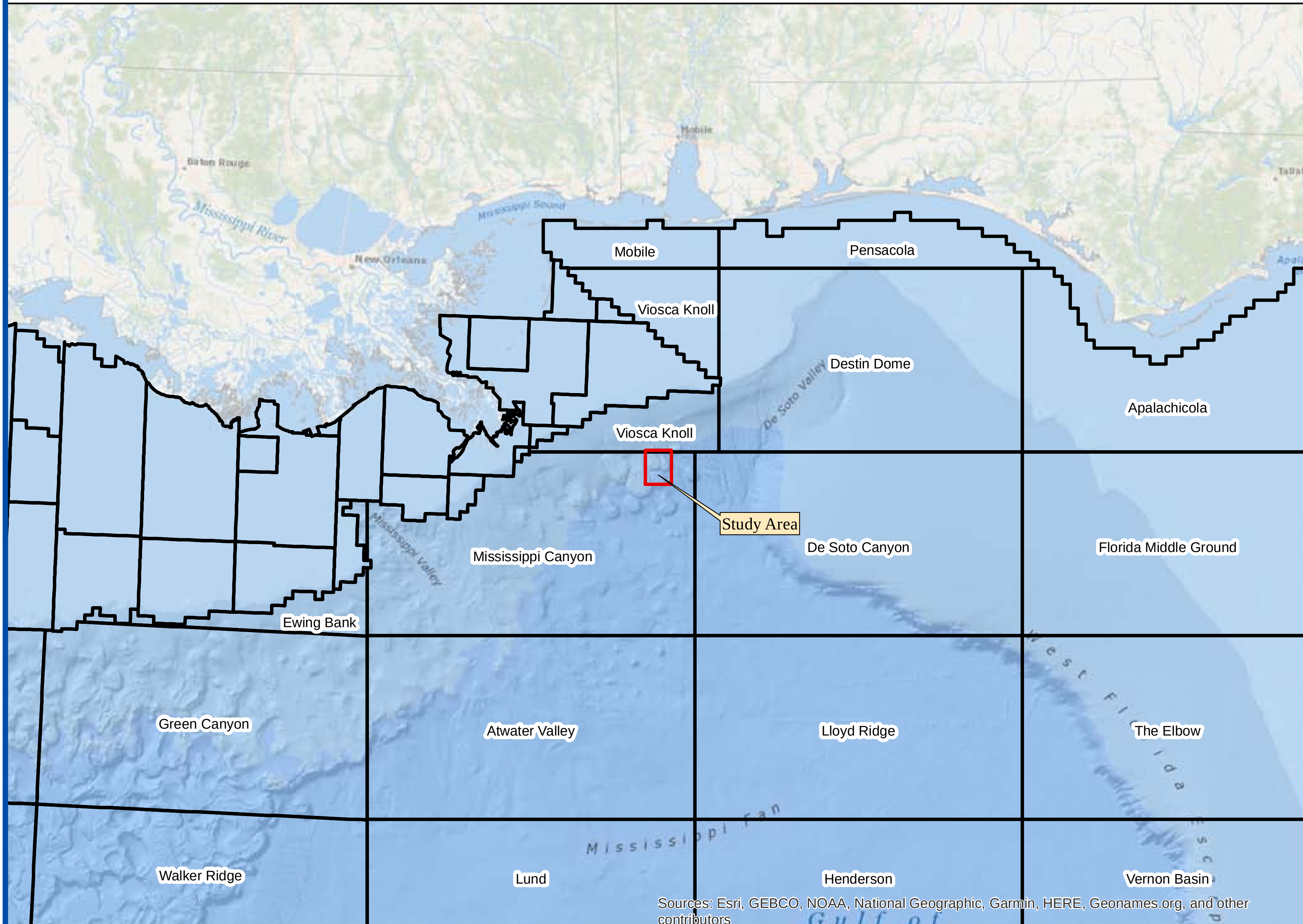
This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

Please be aware that further distribution of this report, in whole or part, or the use of the data for a purpose not expressly stated within the contractual work scope is at the client's sole risk, and Ocean Geo Solutions, Inc recommends that this disclaimer is included in any such distribution.

OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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LIST OF FIGURES

WELL CLEARANCE LETTER – PROPOSED MC80_P-I WELL LOCATION

August 31, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC80_P-I Well Location
Mississippi Canyon Block MC80
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC80_P-I Well Location, Mississippi Canyon Area (OCS-G-35311). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,208ft below sea surface (6,438ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC80_P-I well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the northern part of block MC80 including the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC80_P-I Well Location lies in the northeast part of Block MC80 (OCS-G-35311).

Proposed MC80_P-I Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	55'	49.064"	North	Easting	1,252,000	US ft. E
Longitude	88°	12'	52.609"	West	Northing	10,500,945	US ft. N
Latitude Decimal			28.9302955				
Longitude Decimal			-88.2146136				
FWL Mississippi Canyon 080			640ft	US ft.	Inline	12626	
FNL Mississippi Canyon 080			975ft	US ft.	Crossline	18093	
Water Depth: -3,770ft			Slope: 3.4° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.560 Miles @ 115.281°		

Proposed MC80_P-II Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	55'	49.559"	North	Easting	1,252,000	US ft. E
Longitude	88°	12'	52.615"	West	Northing	10,500,995	US ft. N
Latitude Decimal			28.930433				
Longitude Decimal			-88.2146152				
FWL Mississippi Canyon 080			640ft	US ft.	Inline	12627	
FNL Mississippi Canyon 080			925ft	US ft.	Crossline	18097	
Water Depth: -3,768ft			Slope: 3.6° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.562 Miles @ 115.453°°		

Location MC80_P-II is 50ft from MC80_P-I on a bearing of 000°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC80_P-I well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC80_P-I well location is -3,770ft below sea surface (Figure 1). The seafloor slopes to the southwest at 3.4°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC80_P-I well location is in the southwest part of block MC80 in an area of relatively smooth seabed located within a minibasin to the west of Horn Dome.

Several seabed fault intersections occur within 2,000ft of the proposed location with the nearest fault occuriing at 1,340ft to the east.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,965ft below sea surface (195ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,965ft below sea surface (195ft below seabed).

4.3 Unit B

The upper part of Unit B, from -3,965ft to -4,059ft below sea surface (195ft to 289ft below seabed), displays generally low-amplitude reflectors, and is interpreted as well-layered clays and silts with occasional sands.

From -4,059ft to -4,319ft below sea surface (289ft to 549ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -4,319ft below sea surface (549ft below seabed) to -4,773ft below sea surface (1,003ft below seabed) presents acoustically as well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft.

Horizon H10 marks the base of Unit B, occurring at -4,773ft below sea surface (1,003ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,773ft to -5,383ft below sea surface (1,003ft to 1,613ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit C at the proposed well or within 2,000ft.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -5,383ft below sea surface (1,613ft below seabed).

4.5 Unit D

The upper part of Unit D from -5,383ft below sea surface (1,613ft below seabed) to -5,671ft below sea surface (1,901ft below seabed) is interpreted to consist of well-layered, low-amplitude reflectors with clays, silts, and occasional sands.

Unit D from -5,671ft to -6,236ft below sea surface (1,901ft to 2,466ft below seabed) is characterized by slightly-chaotic, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sands. This interval appears to have been deposited at a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can, on occasions, induce minor over-pressure and as such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

From -6,236ft to -6,566ft below sea surface (2,466ft to 2,796ft below seabed) is interpreted to consist of slightly-chatic, low-amplitude reflectors with clays, silts, and occasional sands.

The lower part of Unit D from -6,566ft below sea surface (2,796ft below seabed) to -6,842ft below sea surface (3,072ft below seabed) is interpreted to consist of clays, silts, and several sands. The sands within this interval have the potential to contain small amounts of fluid and a **Slight Shallow Water Flow Risk** is assigned.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -6,842ft below sea surface (3,072ft below seabed).

4.6 Unit E

Unit E from -6,842ft to -7,849ft below sea surface (3,072ft to 4,079ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~500ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is interpreted within Unit E at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit E at the propsoed well.

Horizon H40 marks the base of Unit E at -7,849ft below sea surface (4,079ft below seabed).

4.7 Unit F

The upper part of Unit F from -7,849ft to -8,582ft below sea surface (4,079ft to 4,812ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~300ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit F from -8,582ft to -9,662ft below sea surface (4,812ft to 5,892ft below seabed) is characterized by well-layered, low and occasional moderate-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is interpreted within Unit F at the proposed well or within 2,000ft.

The well-path will not traverse any faults at the proposed well.

Horizon H50 marks the base of Unit F at -9,662ft below sea surface (5,892ft below seabed).

4.8 Unit G

Unit G from -9,662ft to -10,208ft below sea surface (5,892ft to 6,438ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit G.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,208ft below sea surface (6,438ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,059ft to -4,319ft below sea surface (289ft to 549ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,671ft to -6,236ft below sea surface (1,901ft to 2,466ft below seabed) and from -6,566ft below sea surface (2,796ft below seabed) to -6,842ft below sea surface (3,072ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,842ft to -7,849ft below sea surface (3,072ft to 4,079ft below seabed).

Within Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,849ft to -8,582ft below sea surface (4,079ft to 4,812ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

None predicted.

- Unit A

No drilling hazards or problems interpreted.

- Unit B

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,059ft to -4,319ft below sea surface (289ft to 549ft below seabed) Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

No drilling hazards or problems interpreted.

- Unit D

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,671ft to -6,236ft below sea surface (1,901ft to 2,466ft below seabed) and from -6,566ft below sea surface (2,796ft below seabed) to -6,842ft below sea surface (3,072ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit E

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,842ft to -7,849ft below sea surface (3,072ft to 4,079ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit F

Within Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,849ft to -8,582ft below sea surface (4,079ft to 4,812ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit G

  No drilling hazards or problems interpreted.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh
Geophysical Manager

Denise Haigh
Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC80_P-I Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

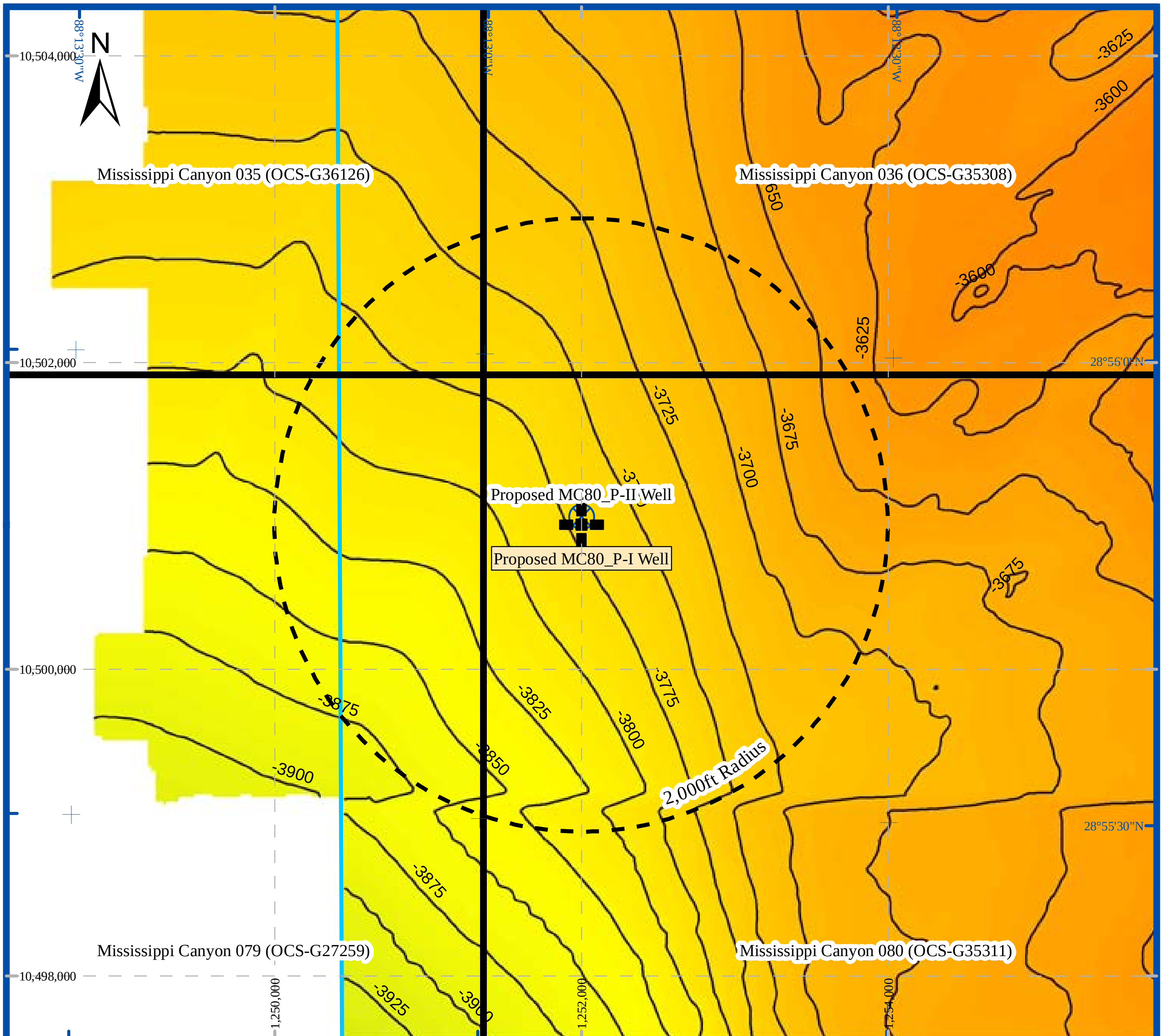
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC80_P-I Well Location
(1,252,000ft E / 10,500,945ft N)

Proposed MC80_P-II Well Location

Block boundaries

Study area boundary

-3770 Depth in feet below sea surface to seabed, contoured at 25ft intervals

Seabed Depth (Feet)

Chart Scale 1" = 1,000'

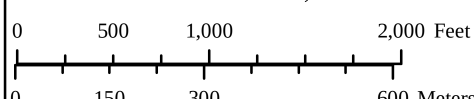
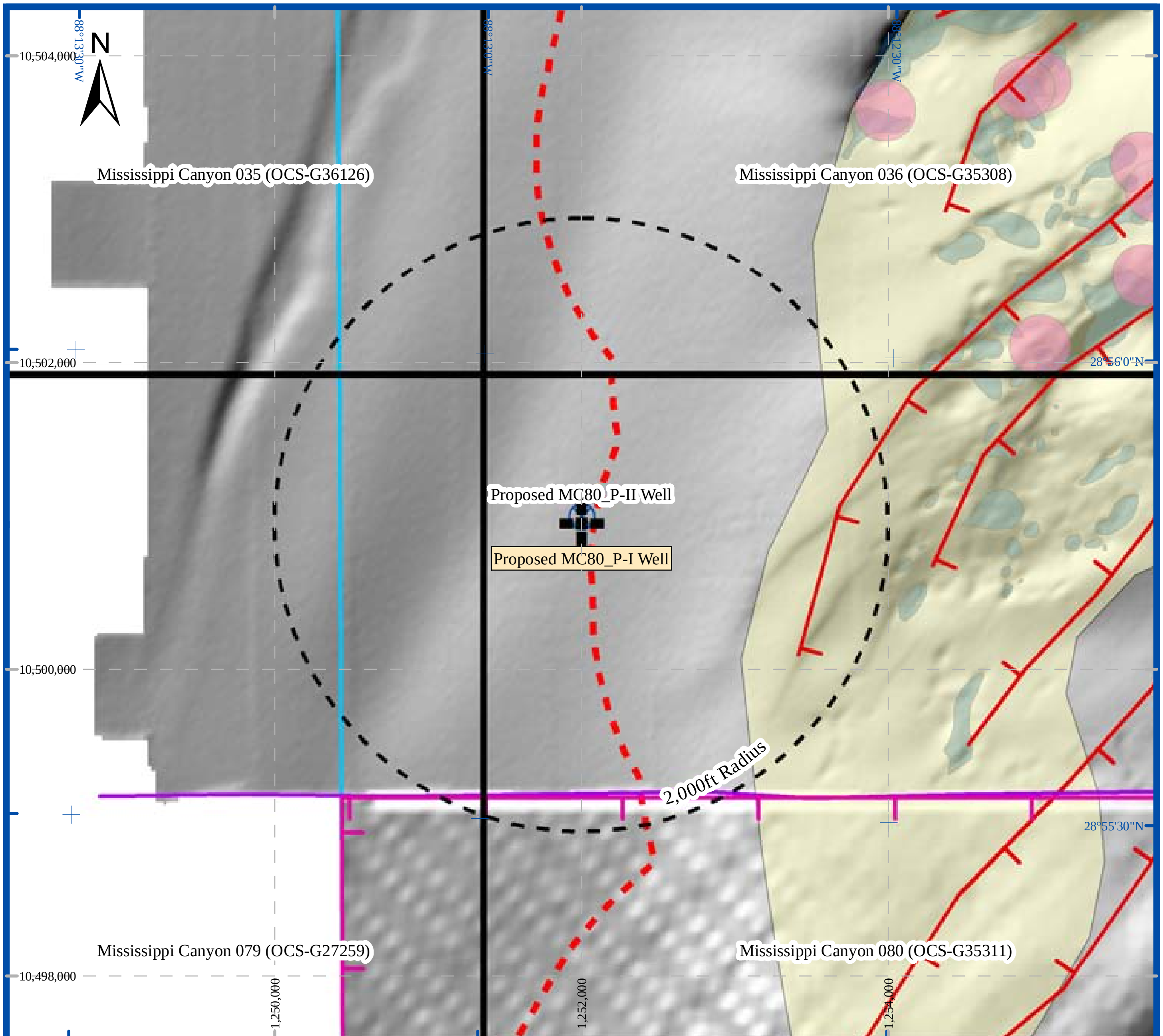


Figure 1
(MC80_P-I)



Seabed Morphology Extract

Proposed MC80_P-I Well Location (1,252,000ft E / 10,500,945ft N)

Proposed MC80_P-II Well Location

No AUV/archaeological coverage

Boundary of Side Scan Sonar Data Coverage

Block boundaries

Study area boundary

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

BOEM database — EM302 plumes (400ft Diam)

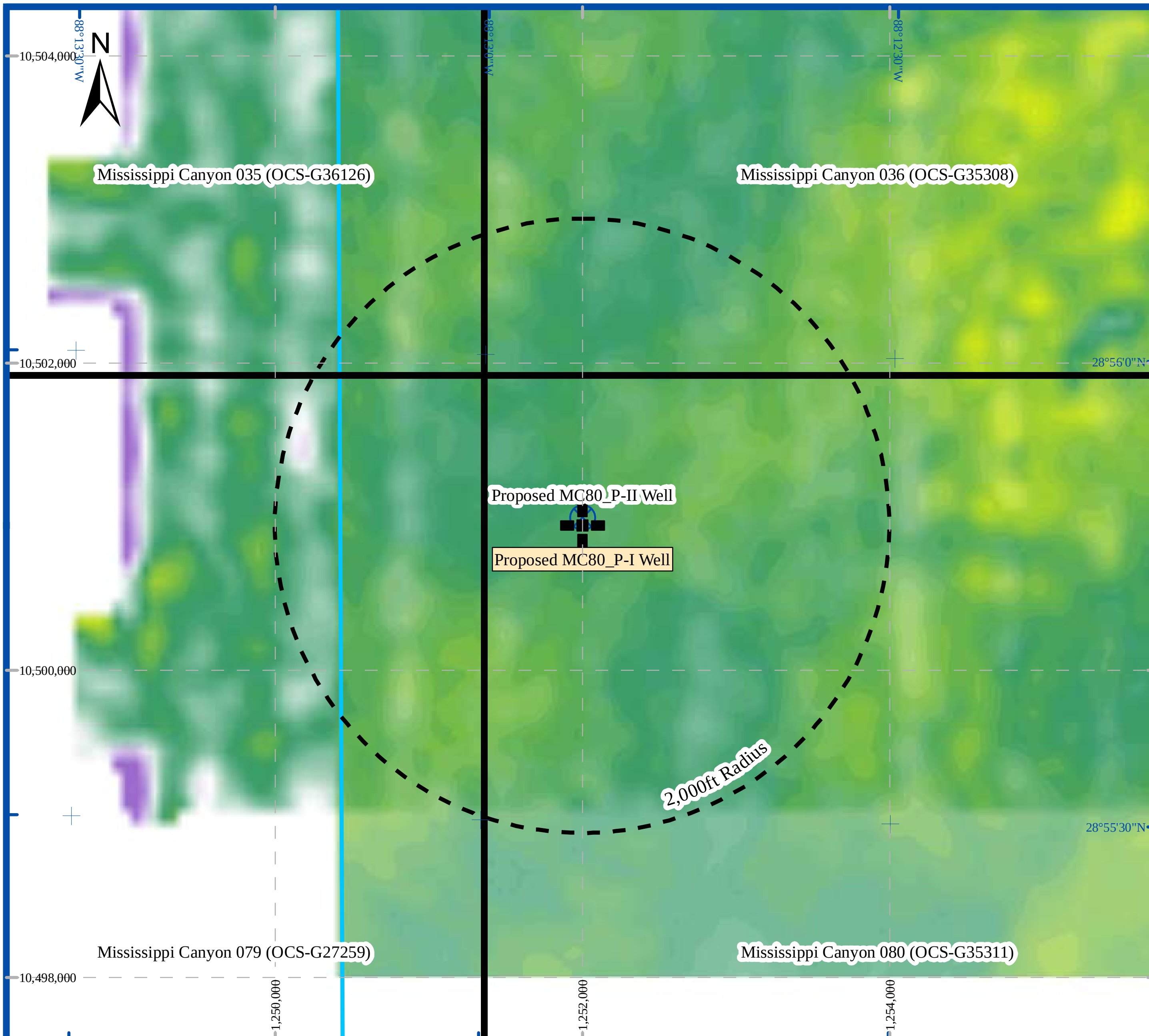
BOEM database — Seep anomaly positives (Confirmed Organisms)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2 (MC80_P-I)



Seabed Amplitude Extract

- Proposed MC80_P-I Well Location (1,252,000ft E / 10,500,945ft N)
- Proposed MC80_P-II Well Location
- Block boundaries
- Study area boundary

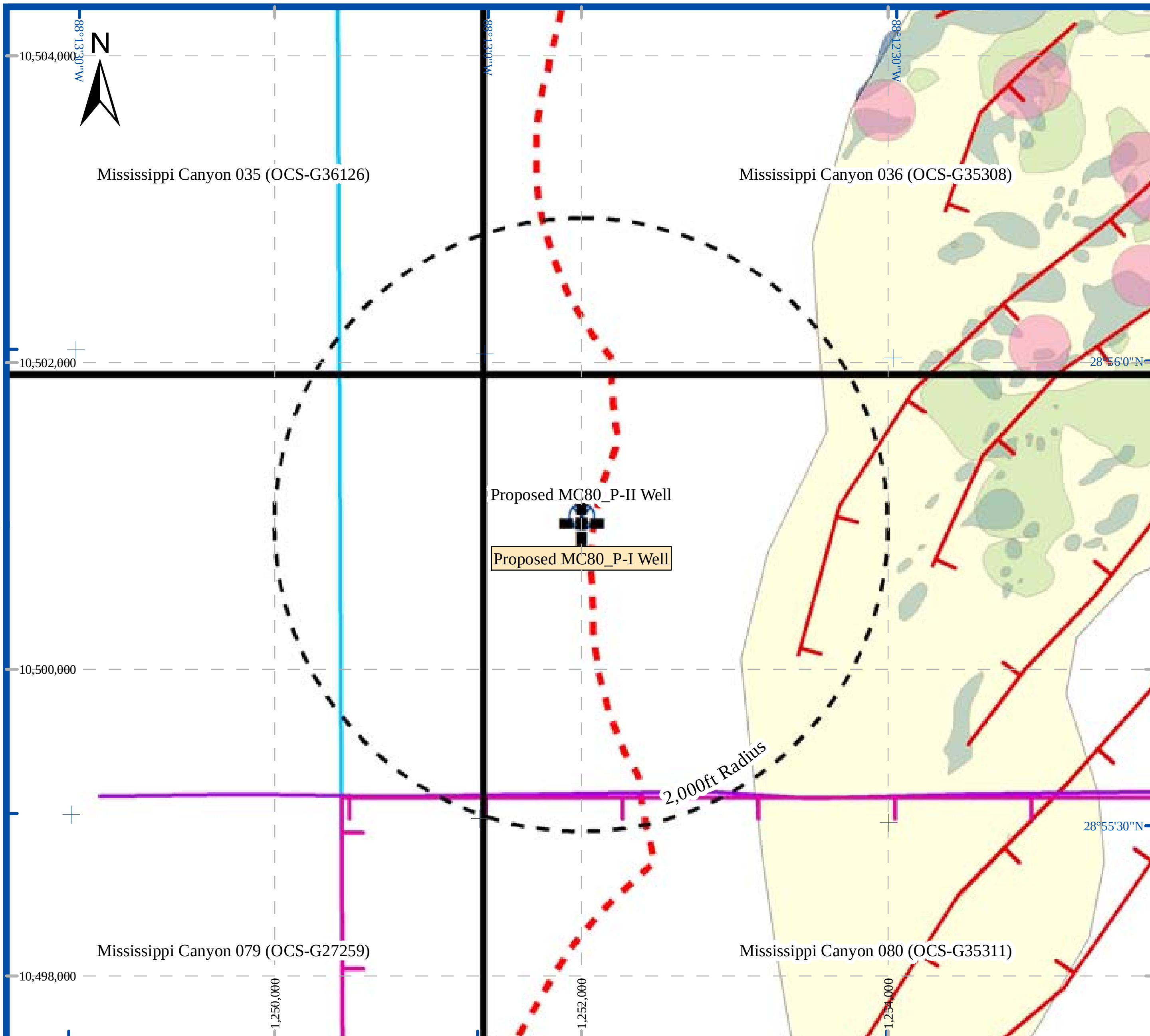
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC80_P-I)



Geohazard Summary Extract

Proposed MC80_P-I Well Location (1,252,000ft E / 10,500,945ft N)

Proposed MC80_P-II Well Location

No AUV/archaeological coverage

Boundary of Side Scan Sonar Data Coverage

Block boundaries

Study area boundary

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

BOEM database — EM302 plumes (400ft Diam)

BOEM database — Seep anomaly positives (Confirmed Organisms)

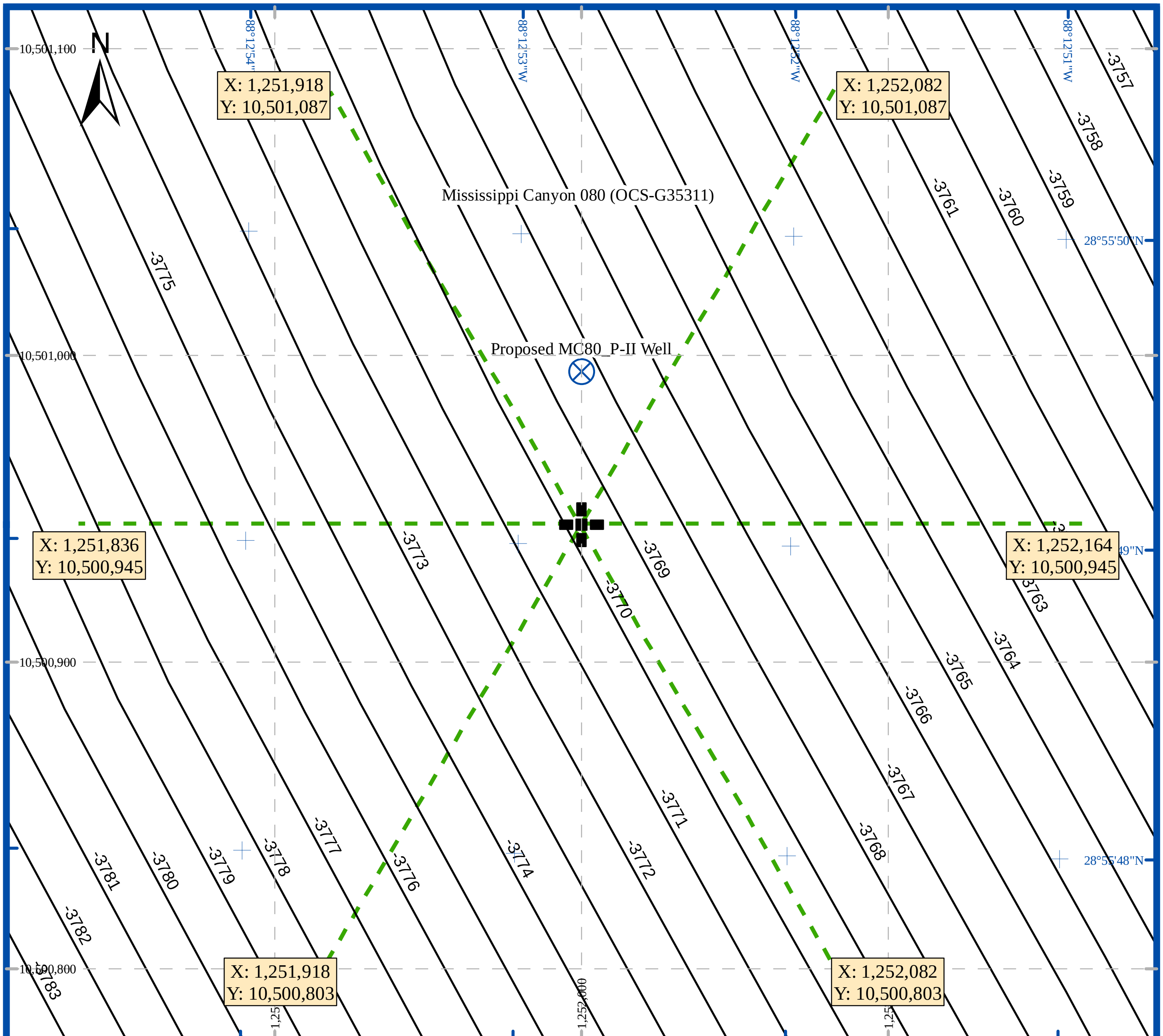
Slight and Moderate Risk of Gas within Unit A

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC80_P-I)



ROV Plat (MC80_P-I)

Proposed MC80_P-I Well Location (1,252,000ft E / 10,500,945ft N)

Proposed MC80_P-II Well Location

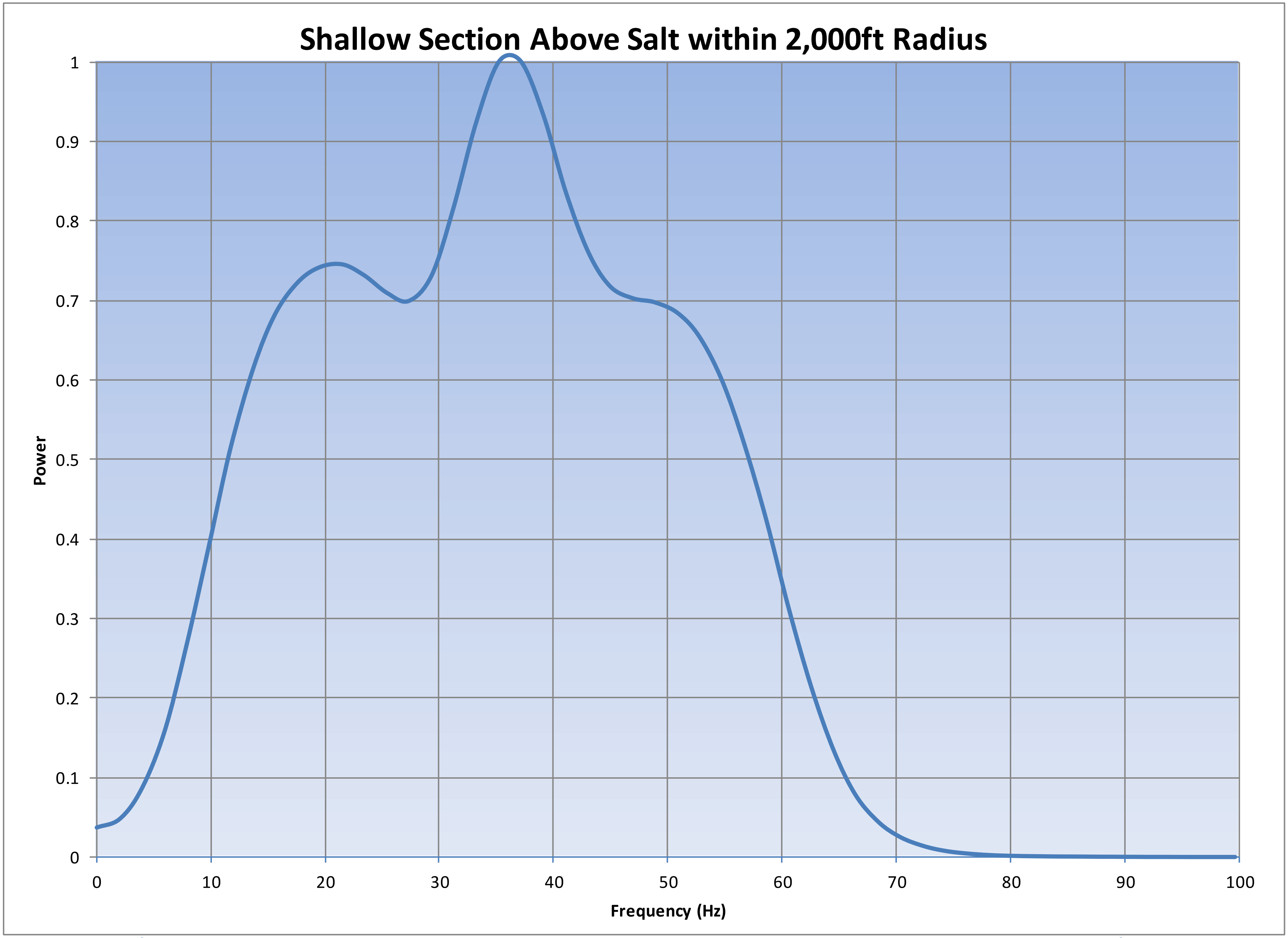
-3770 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC80_P-I)



MC80_P-I	Power Spectrum	Figure 10

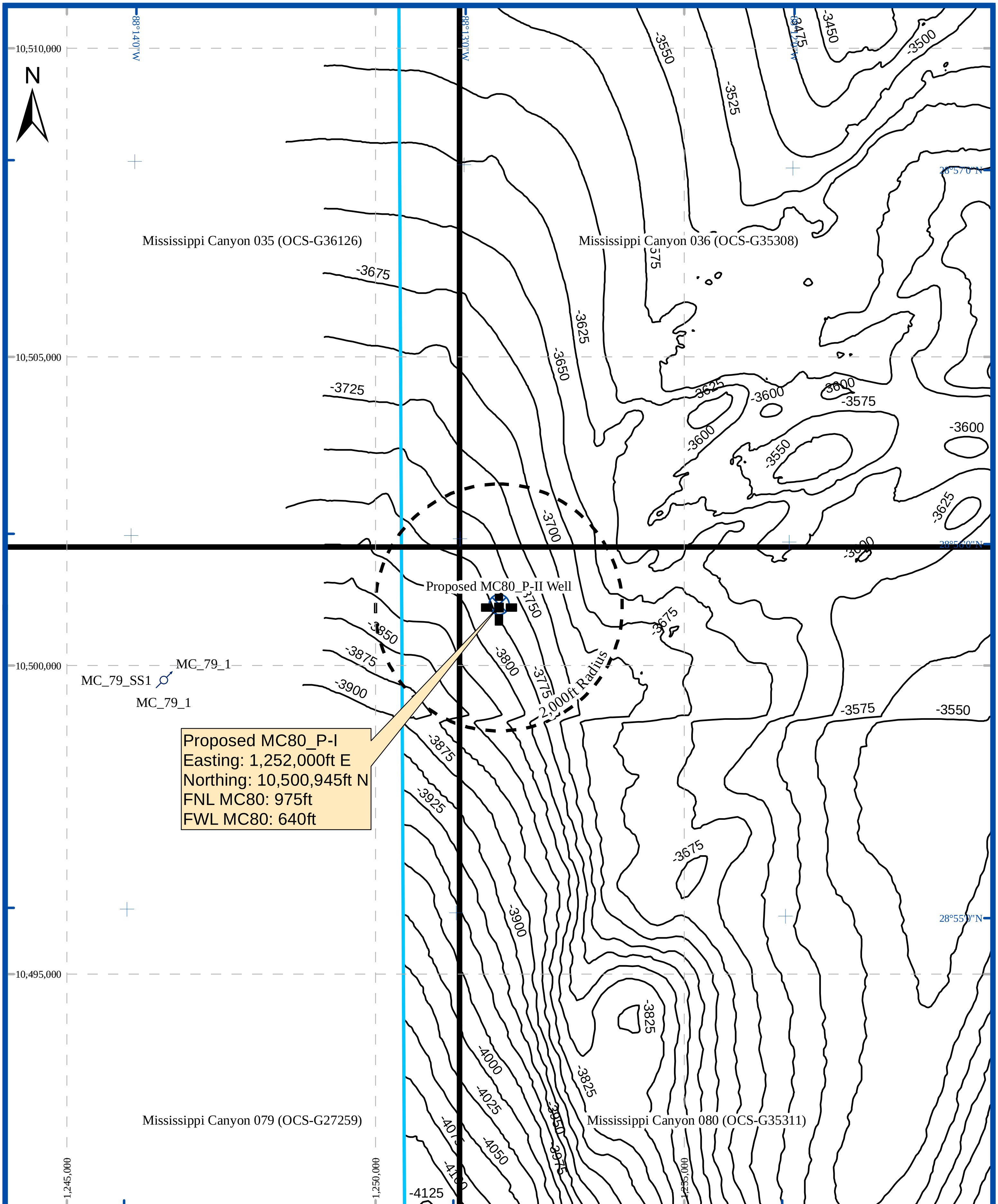


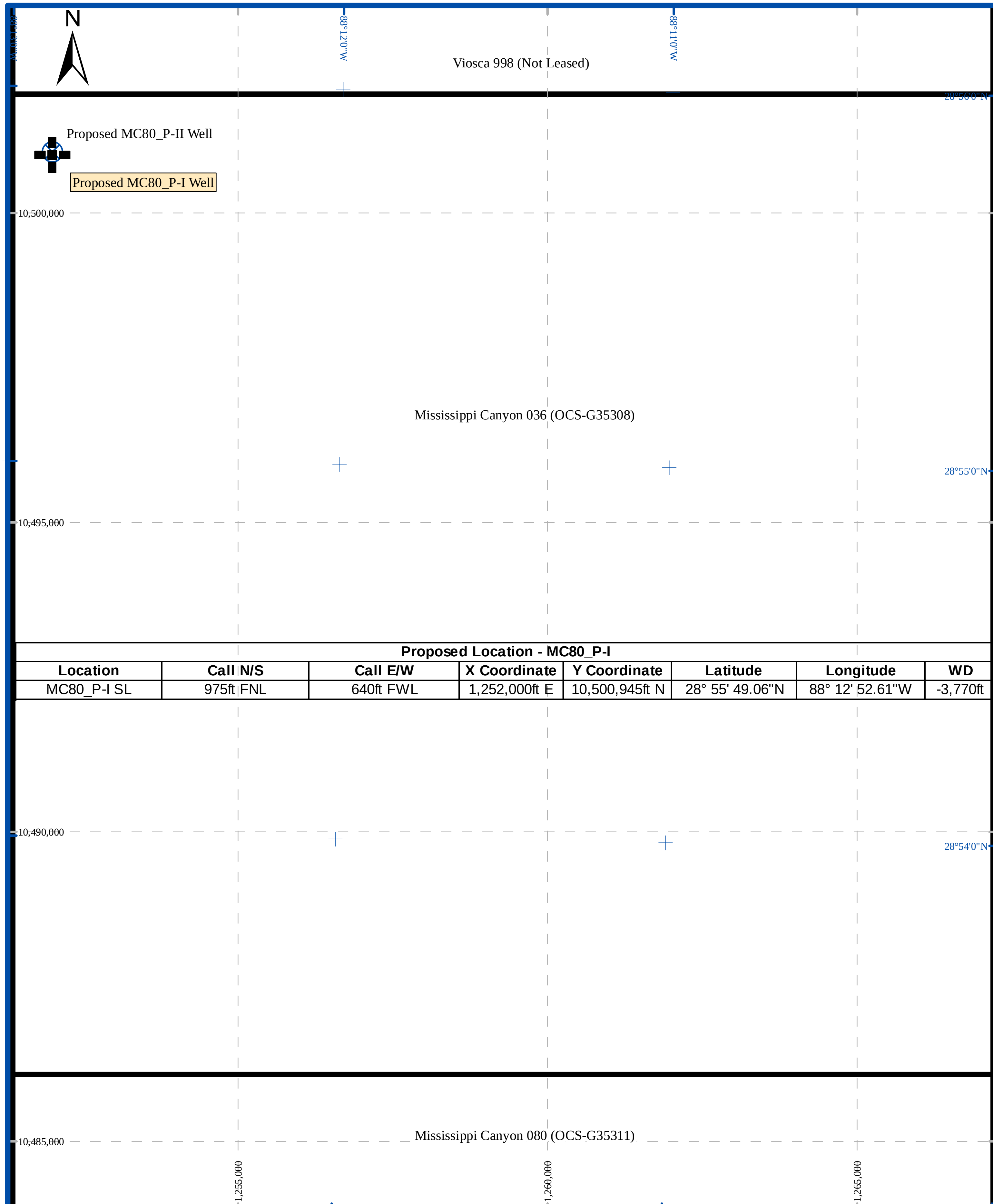
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC80_P-I							
Location	**Call N/S**	**Call E/W**	**X Coordinate**	**Y Coordinate**	**Latitude**	**Longitude**	**WD**
MC80_P-I SL	975ft FNL	640ft FWL	1,252,000ft E	10,500,945ft N	28° 55' 49.06"N	88° 12' 52.61"W	-3,770ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

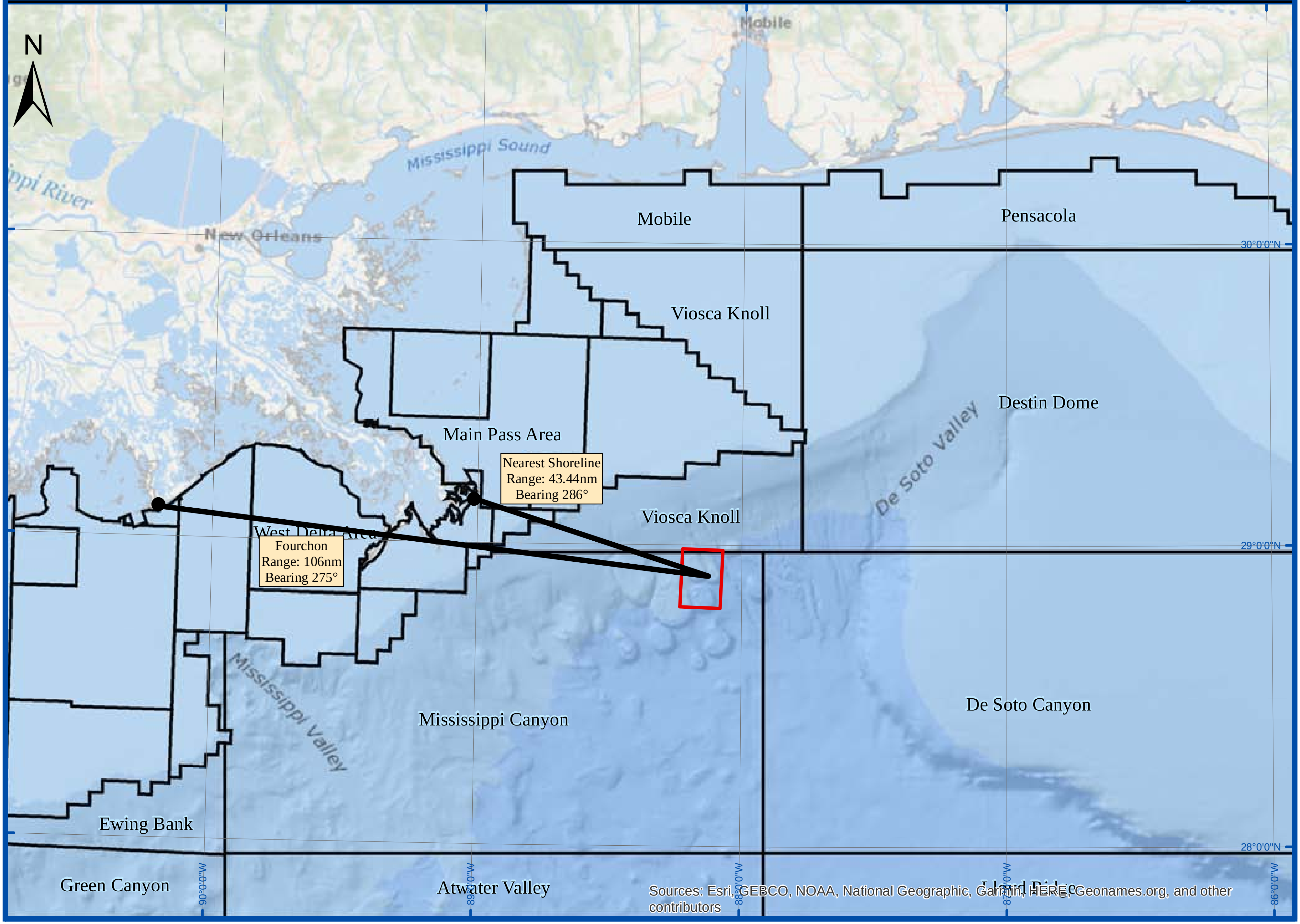
0 150 300 600 Meters

Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 80

Figure 13



Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 80

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC80_P-I Well Location

August 31, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 80
(OCS-G OCS-G-35311)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC80_P-I well location with surface location in Block 80, Mississippi Canyon Area (OCS-G-35311). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.5 seconds two-way time (TWT), -10,208ft below sea surface (6,438ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 3.4° to the SW Several seabed faults occur within 2,000ft of the proposed well.

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

No seabed infrastructure occurs within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas is assigned at the proposed well or within 2,000ft.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, and Unit F and throughout Unit E.

The well-path will not intersect any faults.

Proposed MC80_P-I Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	55'	49.064"	North	Easting	1,252,000	US ft. E
Longitude	88°	12'	52.609"	West	Northing	10,500,945	US ft. N
Latitude Decimal			28.9302955				
Longitude Decimal			-88.2146136				
FWL Mississippi Canyon 080			640ft	US ft.	Inline	12626	
FNL Mississippi Canyon 080			975ft	US ft.	Crossline	18093	
Water Depth: -3,770ft			Slope: 3.4° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.560 Miles @ 115.281°		

Proposed MC80_P-II Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	55'	49.559"	North	Easting	1,252,000	US ft. E
Longitude	88°	12'	52.615"	West	Northing	10,500,995	US ft. N
Latitude Decimal			28.930433				
Longitude Decimal			-88.2146152				
FWL Mississippi Canyon 080			640ft	US ft.	Inline	12627	
FNL Mississippi Canyon 080			925ft	US ft.	Crossline	18097	
Water Depth: -3,768ft			Slope: 3.6° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.562 Miles @ 115.453°°		

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

No risk of gas is assigned at the proposed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, Unit F and throughout Unit E.

The well-path will not intersect any faults.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC80_P-I Well Location

Anadarko Petroleum Corporation

August 31, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC80_P-I Well Location (OCS-G-35311)

Ladies/Gentlemen:

Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC80_P-I with surface location in Block 80, Mississippi Canyon Area (OCS-G-35311). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities

Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 2,060ft to the east.

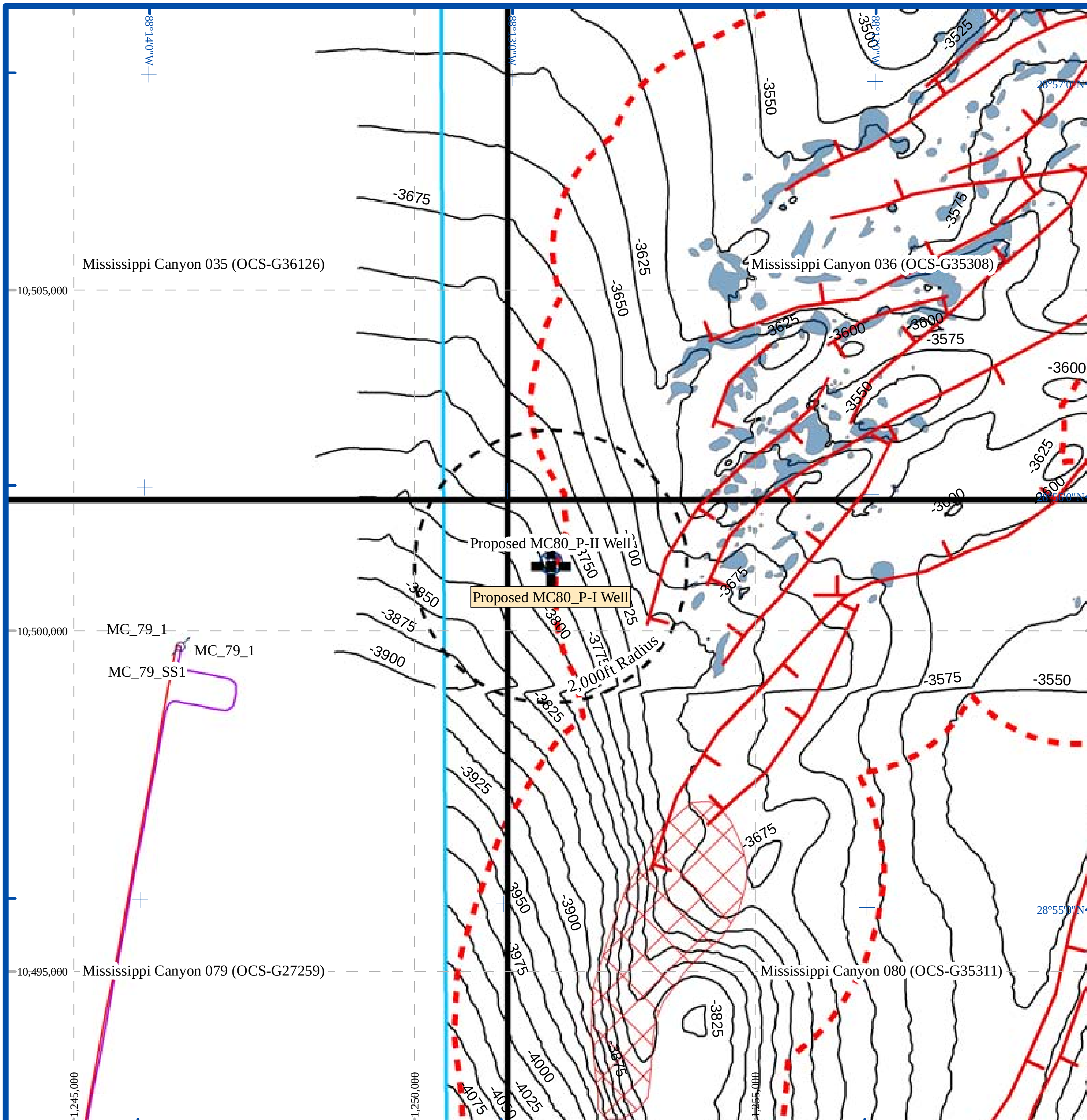
Proposed MC80_P-I Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	55'	49.064"	North	Easting	1,252,000	US ft. E
Longitude	88°	12'	52.609"	West	Northing	10,500,945	US ft. N
Latitude Decimal	28.9302955						
Longitude Decimal	-88.2146136						
FWL Mississippi Canyon 080	640ft			US ft.	Inline	12626	
FNL Mississippi Canyon 080	975ft			US ft.	Crossline	18093	
Water Depth: -3,770ft	Slope: 3.4° SW						
Nearest Shoreline	43.44 Nautical Miles @ 286°						
Port of Operation	Fourchon				106 Nautical Miles @ 275°		
Nearest Manned Platform	Horn Mountain in MC127				10.560 Miles @ 115.281°		

Proposed MC80_P-II Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	55'	49.559"	North	Easting	1,252,000	US ft. E
Longitude	88°	12'	52.615"	West	Northing	10,500,995	US ft. N
Latitude Decimal	28.930433						
Longitude Decimal	-88.2146152						
FWL Mississippi Canyon 080	640ft			US ft.	Inline	12627	
FNL Mississippi Canyon 080	925ft			US ft.	Crossline	18097	
Water Depth: -3,768ft	Slope: 3.6° SW						
Nearest Shoreline	43.44 Nautical Miles @ 286°						
Port of Operation	Fourchon				106 Nautical Miles @ 275°		
Nearest Manned Platform	Horn Mountain in MC127				10.562 Miles @ 115.453°°		

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

Conclusions and Recommendations: The proposed MC80_P-I and proposed MC80_P-II well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC80_P-I Well Location (1,252,000ft E / 10,500,945ft N)

Proposed MC80_P-II Well Location

Existing Wells

Gas Pipelines

Umbilical Pipelines

Block boundaries

Study area boundary

-3770 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Regions considered favorable for sensitive sessile benthic communities based on 3D seismic data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Peach Prospect
Mississippi Canyon, Block MC80,
Offshore Gulf of Mexico

Description:
Proposed MC80_P-J Well Location

Project Number:
2020-313

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	………………… A Haigh
	Quality Assurance	D Haigh ………………… D Haigh

Revision	**Date**	**Title**
0	August 13, 2020	Draft
1	August 31, 2020	Final

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

Please be aware that further distribution of this report, in whole or part, or the use of the data for a purpose not expressly stated within the contractual work scope is at the client's sole risk, and Ocean Geo Solutions, Inc recommends that this disclaimer is included in any such distribution.

OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
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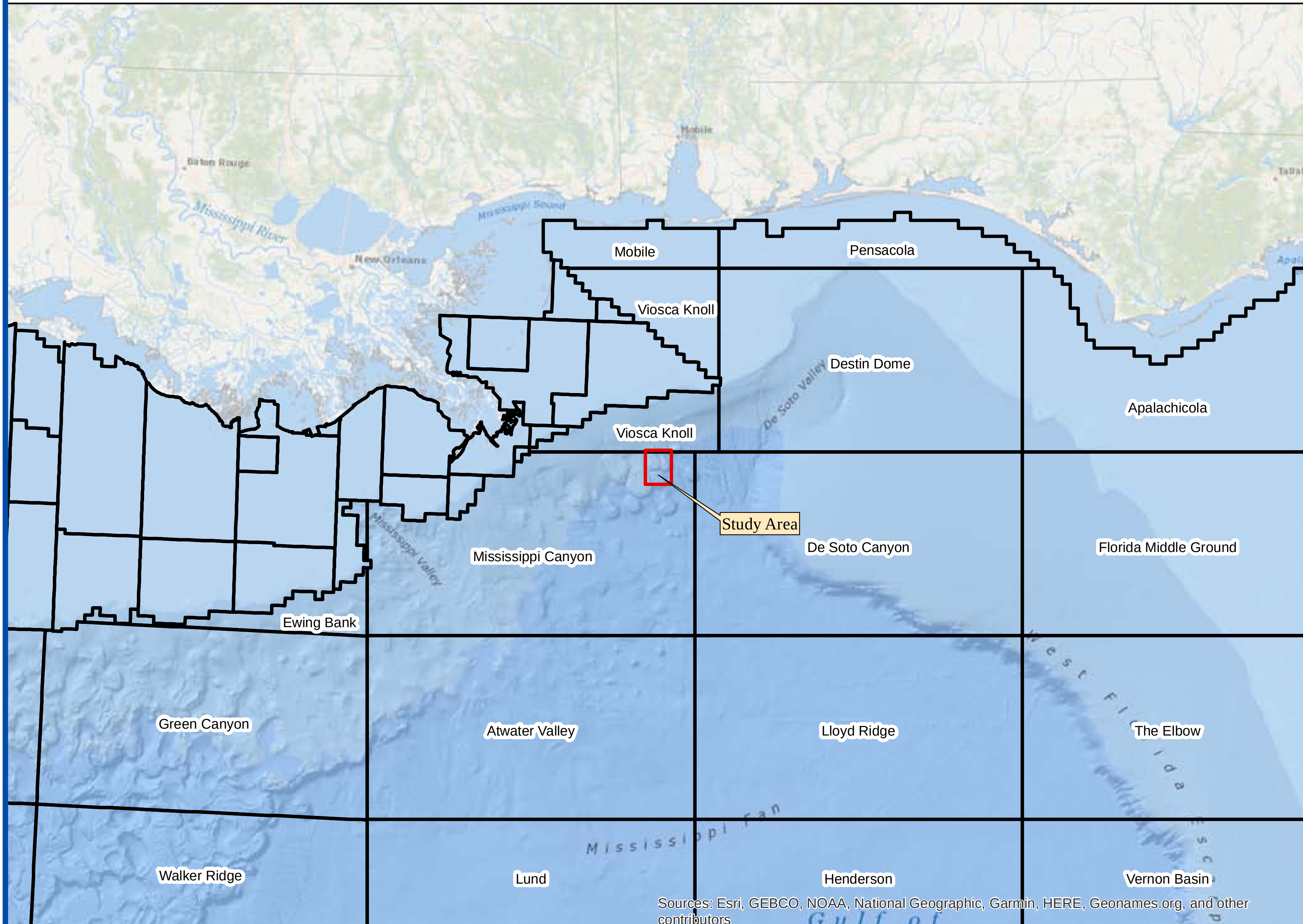
Location Map



Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors

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WELL CLEARANCE LETTER – PROPOSED MC80_P-J WELL LOCATION

August 31, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC80_P-J Well Location
Mississippi Canyon Block MC80
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC80_P-J Well Location, Mississippi Canyon Area (OCS-G-35311). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 3.5 seconds two-way time (TWT), -10,638ft below sea surface (6,832ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC80_P-J well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report covers the northern part of block MC80 including the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC80_P-J Well Location lies in the northeast part of Block MC80 (OCS-G-35311).

Proposed MC80_P-J Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	55’	39.141”	North	Easting	1,251,900	US ft. E
Longitude	88°	12’	53.619”	West	Northing	10,499,944	US ft. N
Latitude Decimal			28.9275393				
Longitude Decimal			-88.2148942				
FWL Mississippi Canyon 080			540ft	US ft.	Inline	12618	
FNL Mississippi Canyon 080			1,976ft	US ft.	Crossline	18061	
Water Depth: -3,806ft			Slope: 3.2° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.501 Miles @ 114.334°		

Proposed MC80_P-JJ Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	55’	39.637”	North	Easting	1,251,900.	US ft. E
Longitude	88°	12’	53.625”	West	Northing	10,499,994	US ft. N
Latitude Decimal			28.9276768				
Longitude Decimal			-88.2148958				
FWL Mississippi Canyon 080			540ft	US ft.	Inline	12619	
FNL Mississippi Canyon 080			1,926ft	US ft.	Crossline	18065	
Water Depth: -3,801ft			Slope: 3.4° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.575 Miles @ 115.482°°		

Location MC80_P-JJ is 50ft from MC80_P-J on a bearing of 000°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the proposed MC80_P-I well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft.) =
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft.) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC80_P-J well location is -3,806ft below sea surface (Figure 1). The seafloor slopes to the southwest at 3.2°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC80_P-J well location is in the southwest part of block MC80 in an area of relatively smooth seabed located within a minibasin to the west of Horn Dome.

Several seabed fault intersections occur within 2,000ft of the proposed location with the nearest fault occuring at 1,198ft to the east.

No other significant seabed features were observed within 2,000ft.

Clays and silts are interpreted at the seabed.

No existing wells or pipelines occur within 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into seven units, A, B, C, D, E, F, and G. These are separated by Horizons H05, H10, H20, H30, H40, and H50 (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -4,014ft below sea surface (208ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -4,014ft below sea surface (208ft below seabed).

4.3 Unit B

The upper part of Unit B, from -4,014ft to -4,113ft below sea surface (208ft to 307ft below seabed), displays generally low-amplitude reflectors, and is interpreted as well-layered clays and silts with occasional sands.

From -4,113ft to -4,377ft below sea surface (307ft to 571ft below seabed) the stratigraphy displays seismically as generally well-layered and slightly-chaotic, low and moderate-amplitude reflectors interpreted as clays, silts, and several sands representing slightly channelized deposits. The sands within this interval within this interval of Unit B may have been rapidly deposited with inadequate dewatering time and contain trapped fluid therefore a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased potential for poorly consolidated granular material in this interval minor wellbore stability and drilling fluid circulation problems may occur.

The lower interval of Unit B from -4,377ft below sea surface (571ft below seabed) to -4,840ft below sea surface (1,034ft below seabed) presents acoustically as well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional sand interbeds.

The well-path will not traverse any faults within Unit B.

No risk of gas anomalies occur at the proposed well or within 2,000ft.

Horizon H10 marks the base of Unit B, occurring at -4,840ft below sea surface (1,034ft below seabed). The proposed well will not traverse any identified risk of gas anomalies at the level of Horizon H10.

4.4 Unit C

Unit C from -4,840t to -5,387ft below sea surface (1,034ft to 1,581ft below seabed) is characterized by low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit C at the proposed well or within 2,000ft.

The well path will not traverse any faults in Unit C.

Horizon H20 marks the base of Unit C occurring at -5,387ft below sea surface (1,581ft below seabed).

4.5 Unit D

The upper part of Unit D from -5,387ft below sea surface (1,581ft below seabed) to -5,820ft below sea surface (2,014ft below seabed) is characterized by well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional sands.

Unit D from -5,820ft to -6,422ft below sea surface (2,014ft to 2,616ft below seabed) is characterized by slightly-chaotic, low and occasional moderate-amplitude reflectors interpreted as clays, silts and several sands. This interval appears to have been deposited at a slightly higher rate of deposition, perhaps with inadequate dewatering time, and the sands may contain small amounts of trapped fluid. The well-path will traverse this section adjacent the salt wall and the geology are slightly-tilted and disrupted. This geological setting can, on occasions, induce minor over-pressure and as such a **Slight Shallow Water Flow Risk** is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval, minor wellbore stability and drilling fluid circulation problems may occur.

The lower part of Unit D From -6,422ft to -6,881ft below sea surface (2,616ft to 3,075ft below seabed) presents as slightly-chatic, low-amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit D at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit D.

Horizon H30 marks the base of Unit D at -6,881ft below sea surface (3,075ft below seabed).

4.6 Unit E

Unit E from -6,881ft to -7,885ft below sea surface (3,075ft to 4,079ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~500ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight**

Shallow Water Flow Risk is interpreted. Due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is interpreted within Unit E at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit E at the propsoed well.

Horizon H40 marks the base of Unit E at -7,885ft below sea surface (4,079ft below seabed).

4.7 Unit F

Unit F from -7,885ft to -9,682ft below sea surface (4,079ft to 5,876ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and several sands. The well-path will traverse this section adjacent the salt wall and the geology are tilted and disrupted. This geological setting can on occasions for some minor over-pressure. In addition, if pore pressure connectivity exists to the deeper parts of the mini-basin (~500ft), these deeper pressures can be transmitted up-dip along tilted interbeds to the borehole. As such a **Slight Shallow Water Flow Risk** is interpreted. Additionally, due to the increased possibility of poorly consolidated sediment in this interval minor wellbore stability and drilling fluid circulation problems may occur.

No risk of gas is interpreted within Unit F at the proposed well or within 2,000ft.

The well-path will traverse a fault at the proposed well at -8,671ft below sea surface (4,877ft below seabed). This fault is downthrown around 20ft to the south. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

Horizon H50 marks the base of Unit F at -9,682ft below sea surface (5,876ft below seabed).

4.8 Unit G

Unit G from -9,682ft to -10,638ft below sea surface (5,876ft to 6,832ft below seabed) is characterized by low and occasional moderate -amplitude reflectors interpreted as clays, silts, and occasional sands.

No risk of gas is predicted within Unit G at the proposed well or within 2,000ft.

The well-path will not traverse any faults within Unit G.

3.5 seconds TWT marks the base of Unit G and the base of the interpretation at -10,638ft below sea surface (6,832ft below seabed).

4.9 Shallow Gas Assessment

No risk of gas is predicted at the proposed well.

4.10 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,113ft to -4,377ft below sea surface (307ft to 571ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,820ft to -6,422ft below sea surface (2,014ft to 2,616ft below seabed).

Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,881ft to -7,885ft below sea surface (3,075ft to 4,079ft below seabed).

Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,885ft to -9,682ft below sea surface (4,079ft to 5,876ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  None predicted.

- Unit A

  No drilling hazards or problems interpreted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is interpreted within interval from -4,113ft to -4,377ft below sea surface (307ft to 571ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  No drilling hazards or problems interpreted.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is interpreted from -5,820ft to -6,422ft below sea surface (2,014ft to 2,616ft below seabed).

- Unit E

  Throughout Unit E, a **Slight Shallow Water Flow Risk** is interpreted from -6,881ft to -7,885ft below sea surface (3,075ft to 4,079ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit F

  Throughout Unit F, a **Slight Shallow Water Flow Risk** is interpreted from -7,885ft to -9,682ft below sea surface (4,079ft to 5,876ft below seabed). Appropriate drilling methodology is recommended to contain a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault at -8,677ft below sea surface (4,871ft below seabed).

- Unit G

  No drilling hazards or problems interpreted.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC80_P-J Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

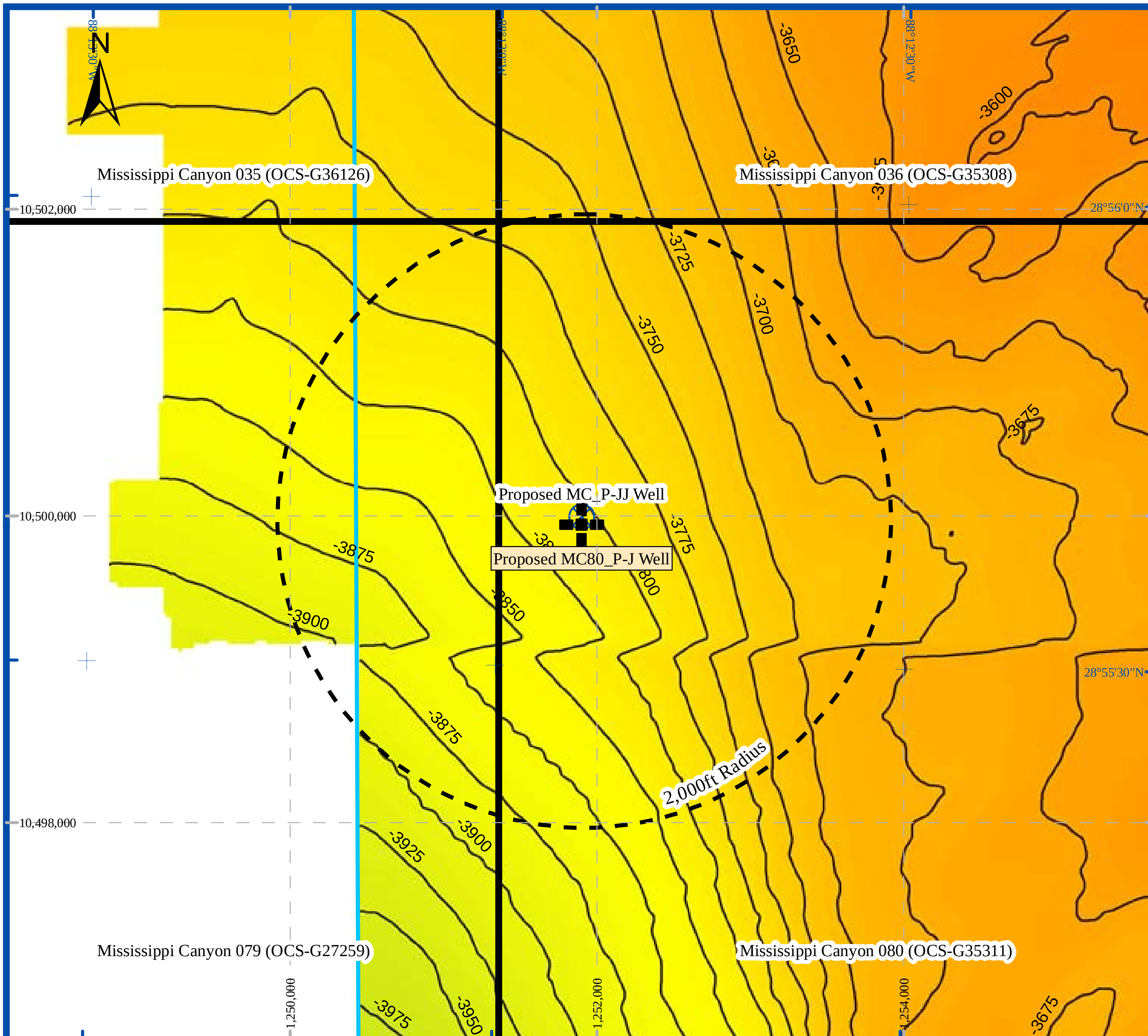
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC80_P-J Well Location (1,251,900ft E / 10,499,944ft N)

Proposed MC80_P-JJ Well Location

Block boundaries

Study area boundary

-3806 Depth in feet below sea surface to seabed, contoured at 25ft intervals

-5400 -5000 -4600 -4200 -3800 -3400

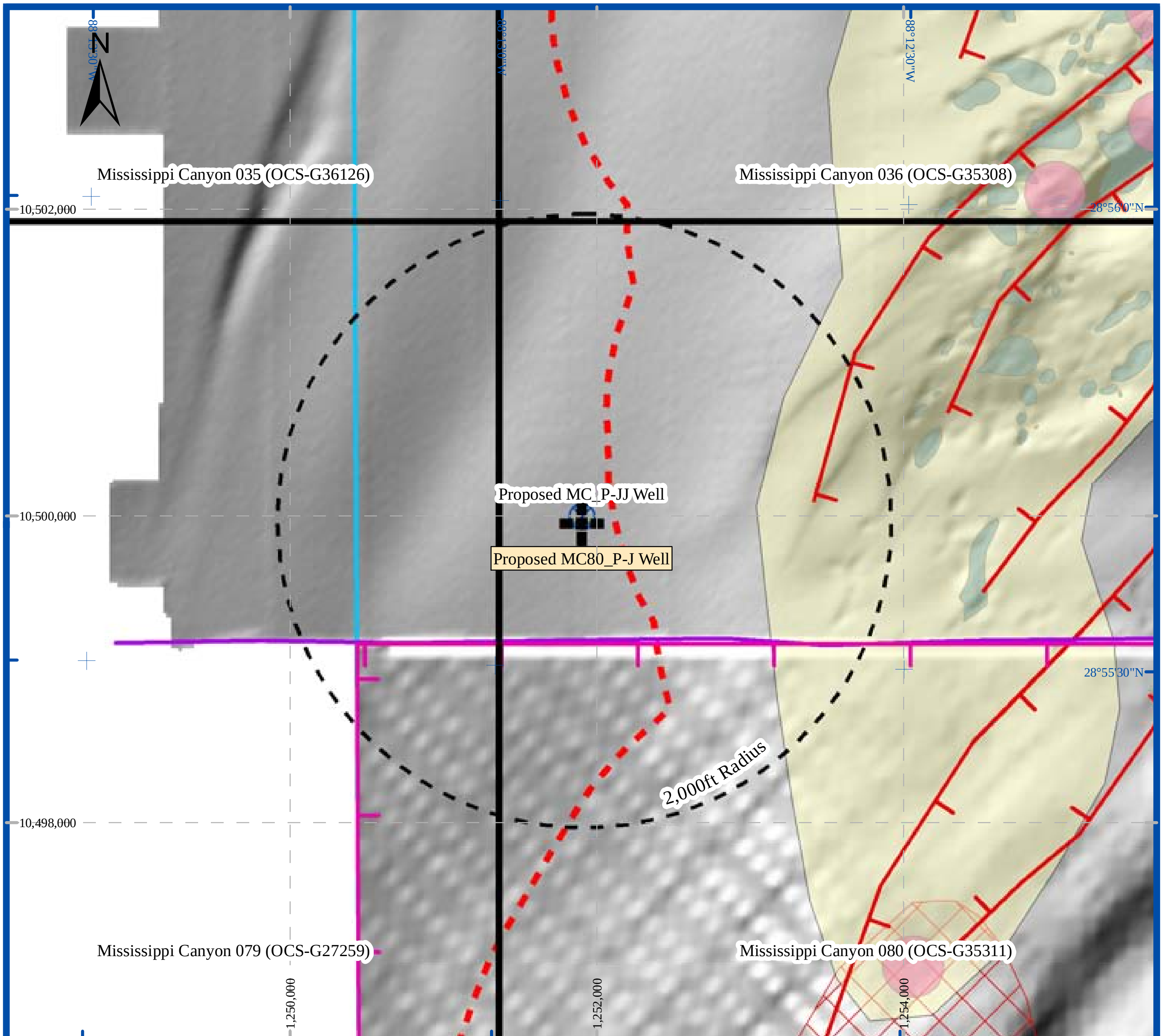
Seabed Depth (Feet)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 1
(MC80_P-J)



Seabed Morphology Extract

Proposed MC80_P-J Well Location (1,251,900ft E / 10,499,944ft N)

Proposed MC80_P-JJ Well Location

No AUV/archaeological coverage

Boundary of Side Scan Sonar Data Coverage

Block boundaries

Study area boundary

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

BOEM database — EM302 plumes (400ft Diam)

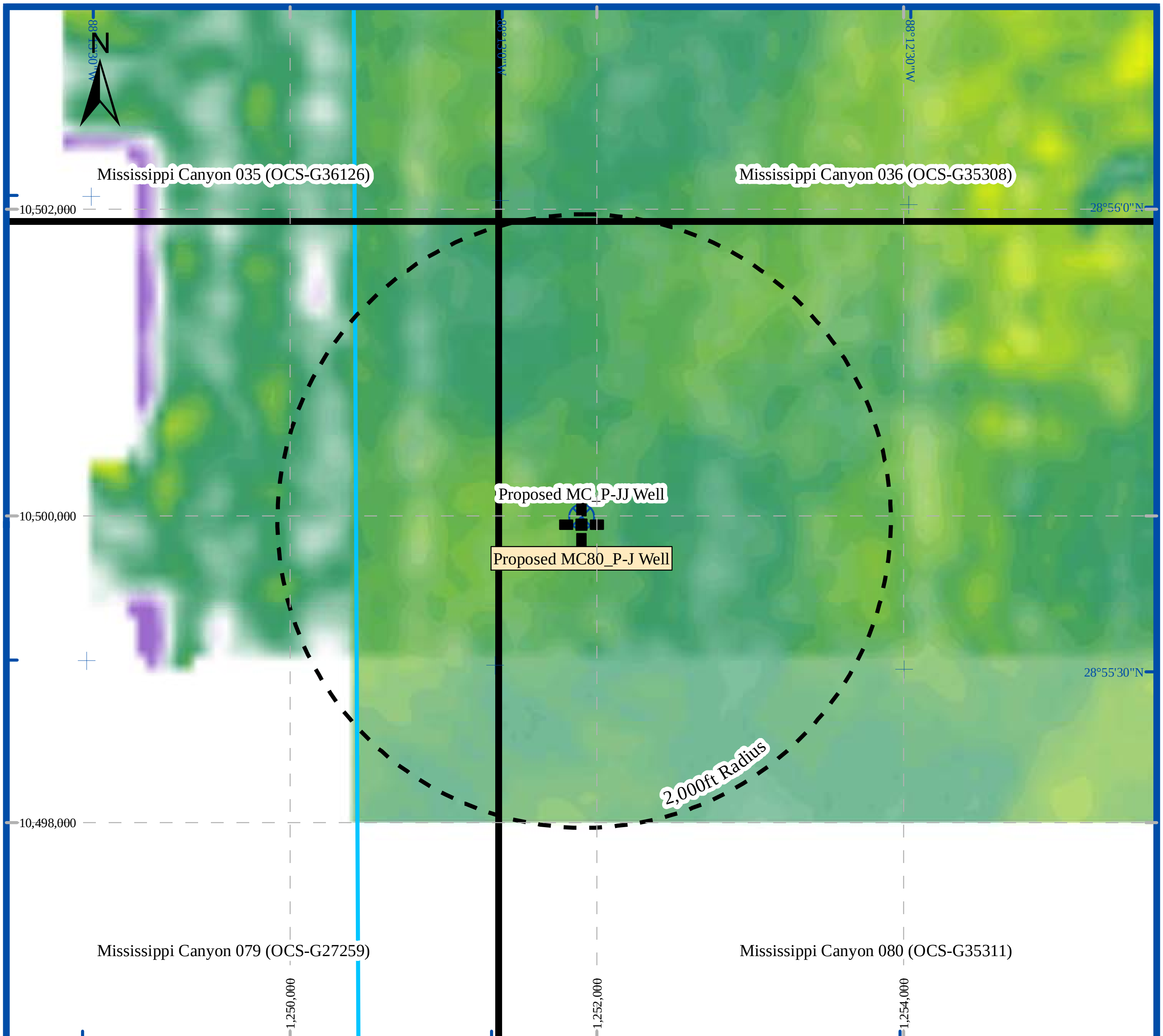
BOEM database — Seep anomaly positives (Confirmed Organisms)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC80_P-J)



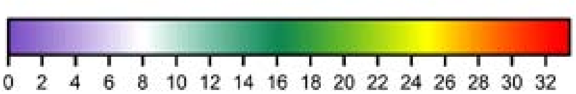
Seabed Amplitude Extract

Proposed MC80_P-J Well Location (1,251,900ft E / 10,499,944ft N)

Proposed MC80_P-JJ Well Location

Block boundaries

Study area boundary



Relative Seabed Amplitude

Chart Scale 1" = 1,000'

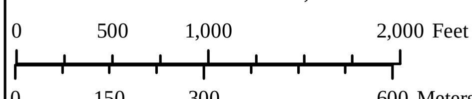
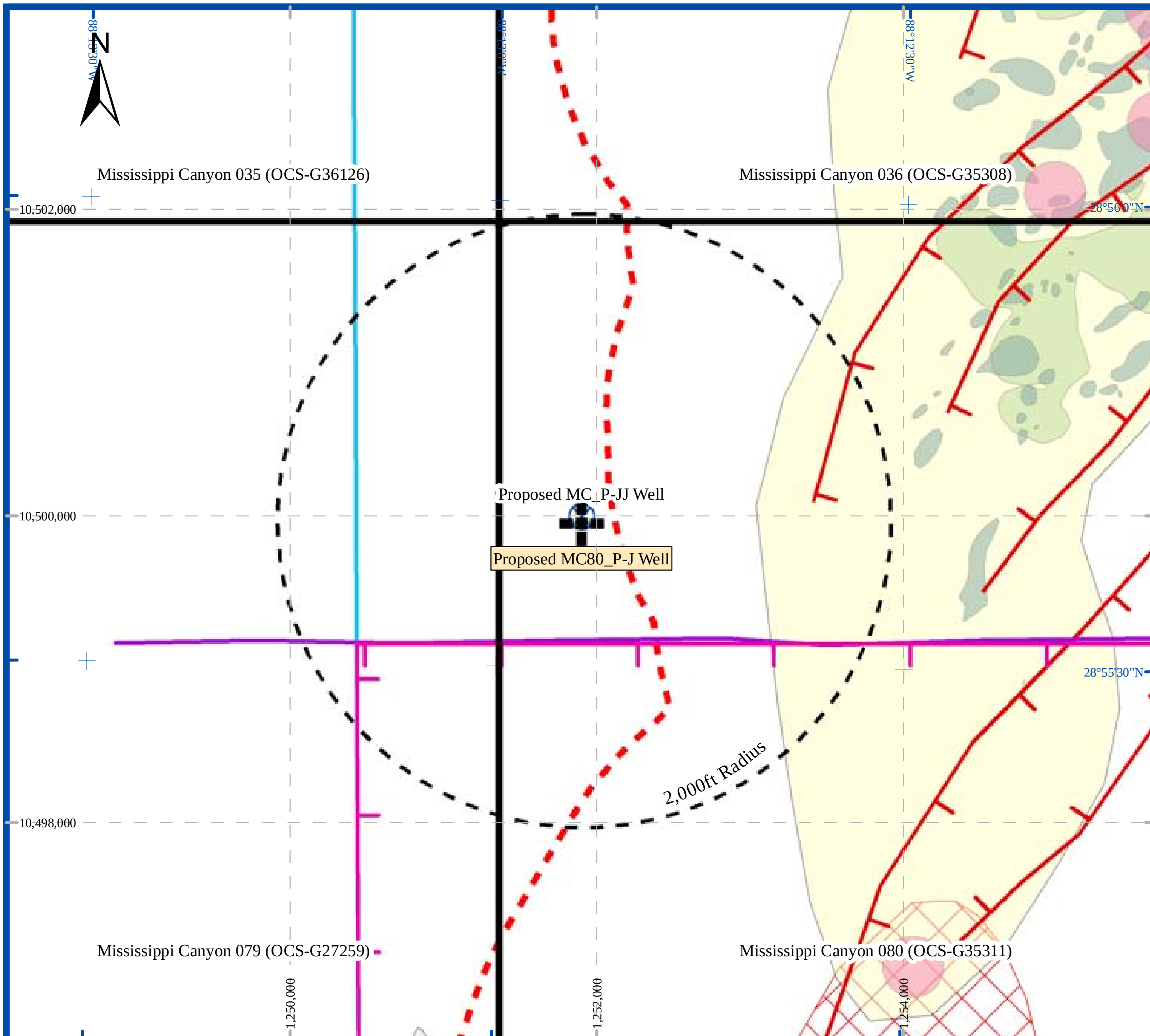


Figure 3 (MC80_P-J)



Geohazard Summary Extract

Proposed MC80_P-J Well Location (1,251,900ft E / 10,499,944ft N)

Proposed MC80_P-JJ Well Location

No AUV/archaeological coverage

Boundary of Side Scan Sonar Data Coverage

Block boundaries

Study area boundary

Seafloor fault intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

BOEM database — EM302 plumes (400ft Diam)

BOEM database — Seep anomaly positives (Confirmed Organisms)

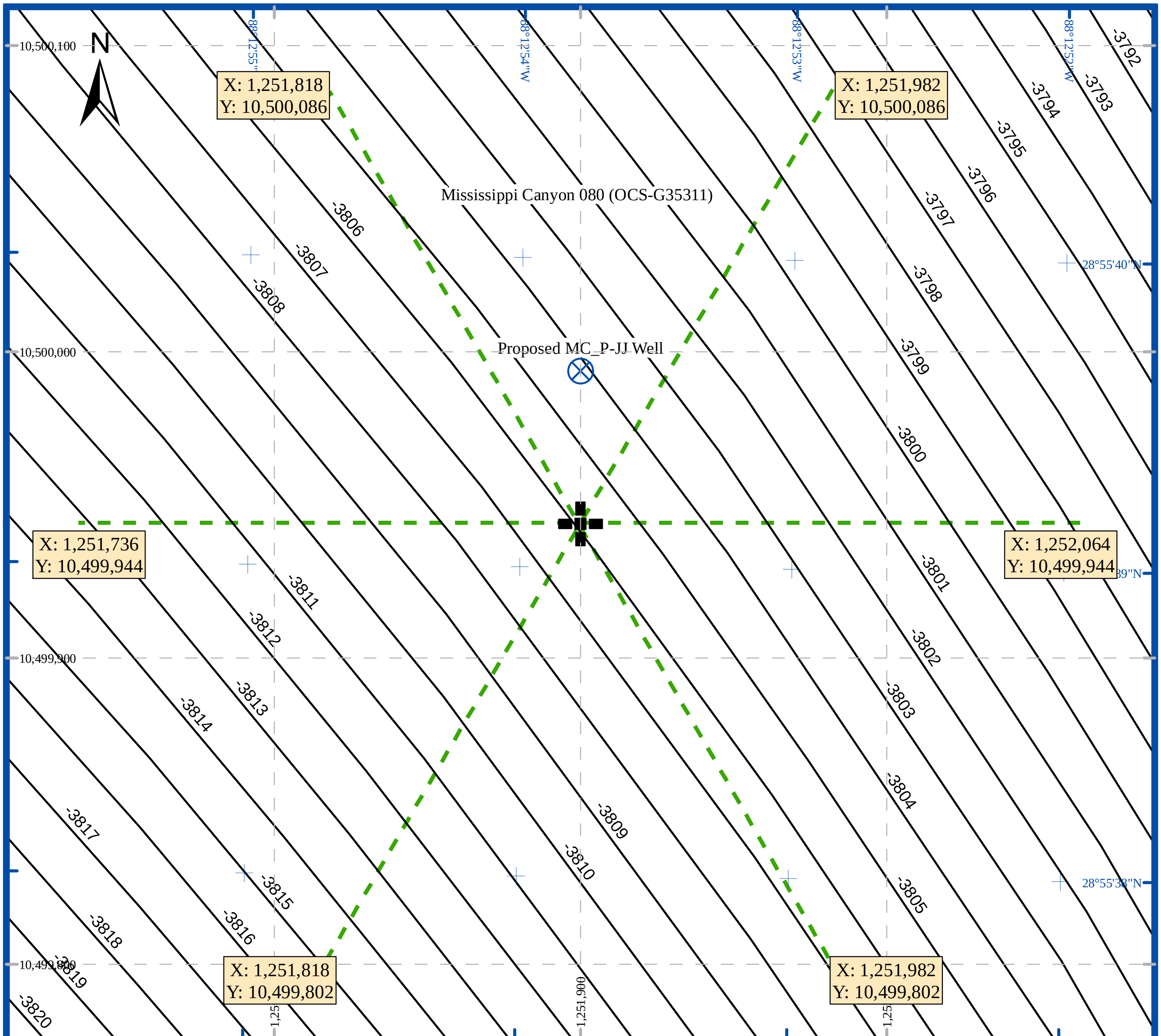
Slight and Moderate Risk of Gas within Unit A

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC80_P-J)



ROV Plat (MC80_P-J)

Proposed MC80_P-J Well Location (1,251,900ft E / 10,499,944ft N)

Proposed MC80_P-JJ Well Location

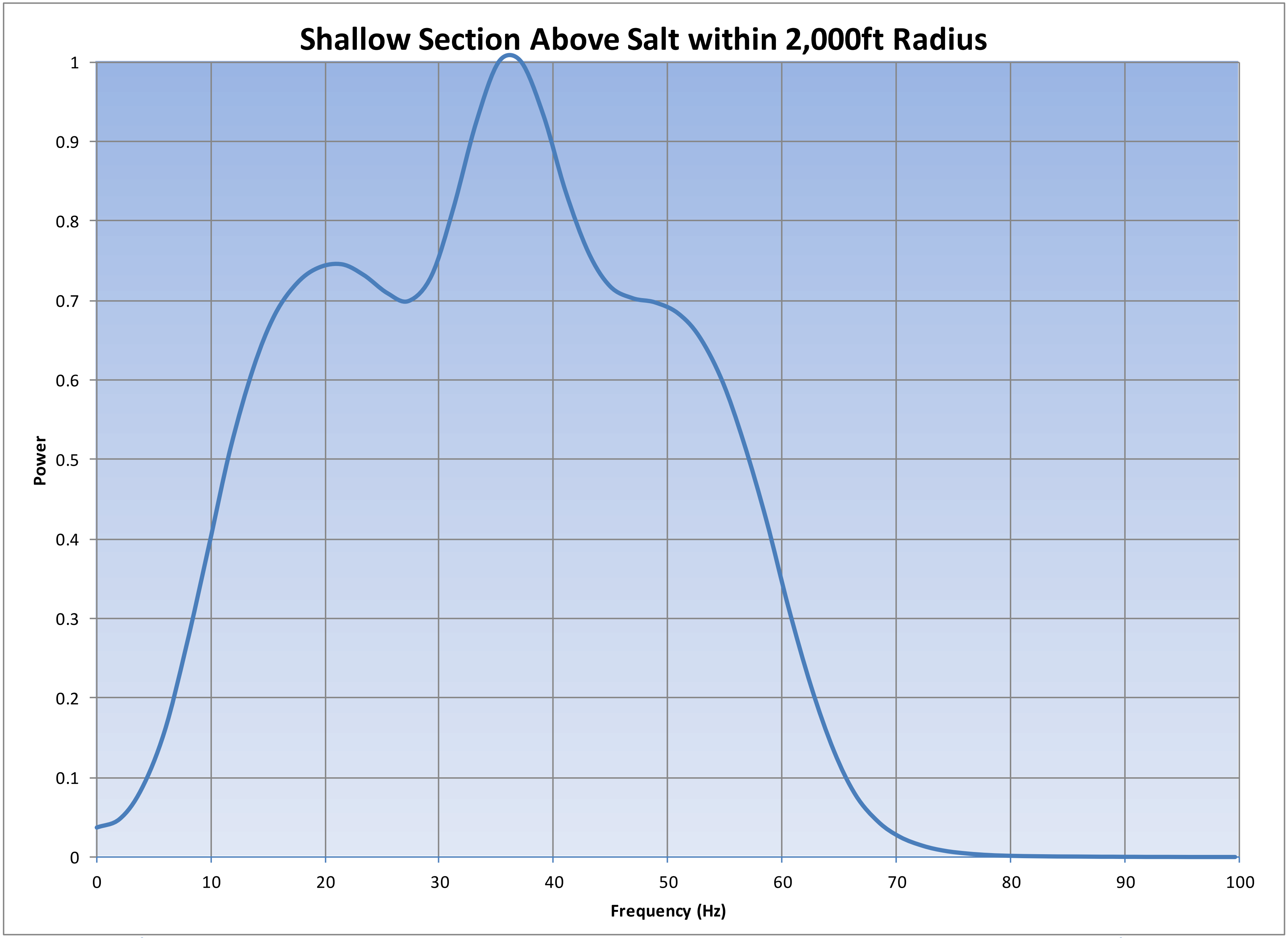
-3806 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9 (MC80_P-J)



MC80_P-J	Power Spectrum	Figure 10

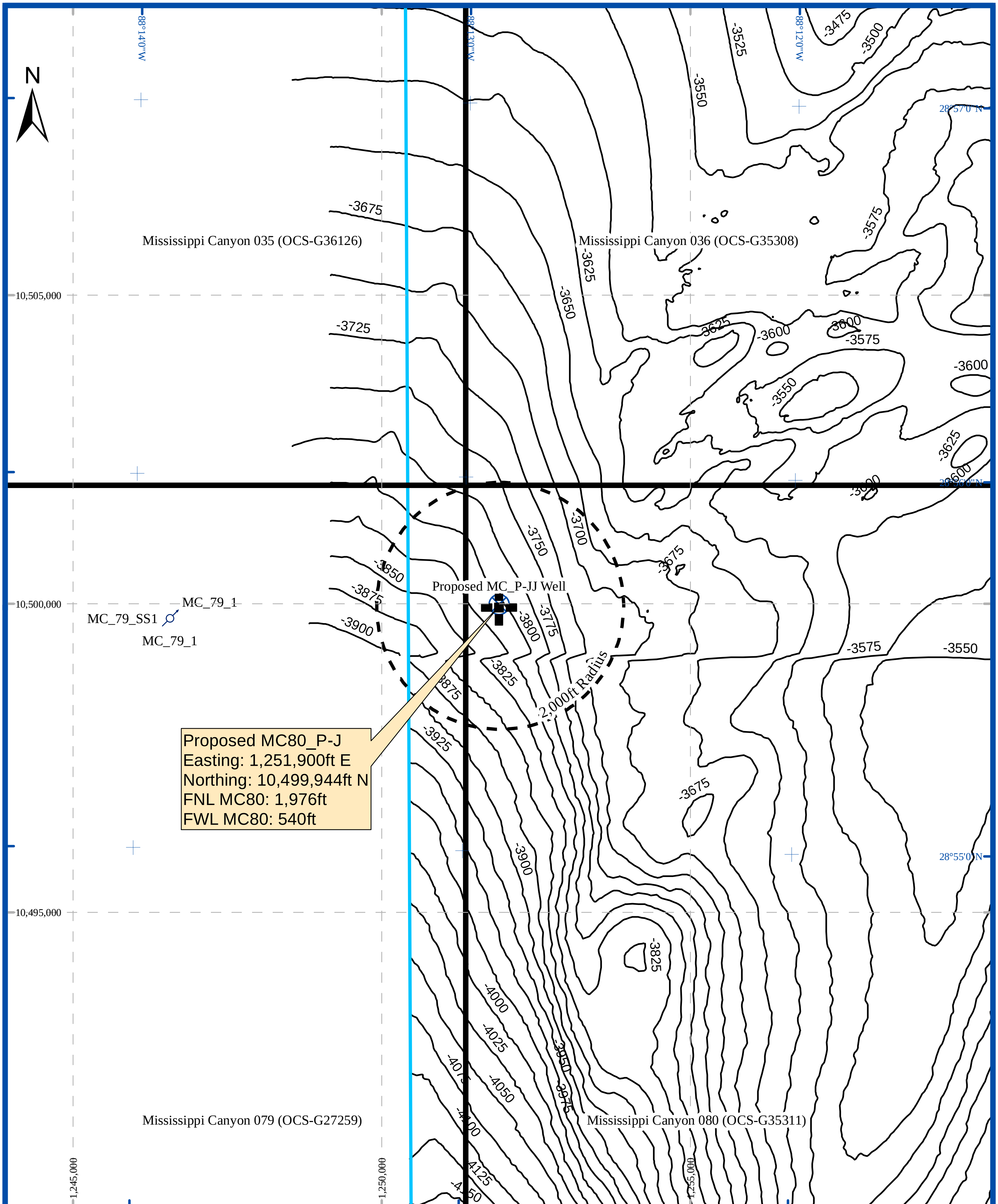


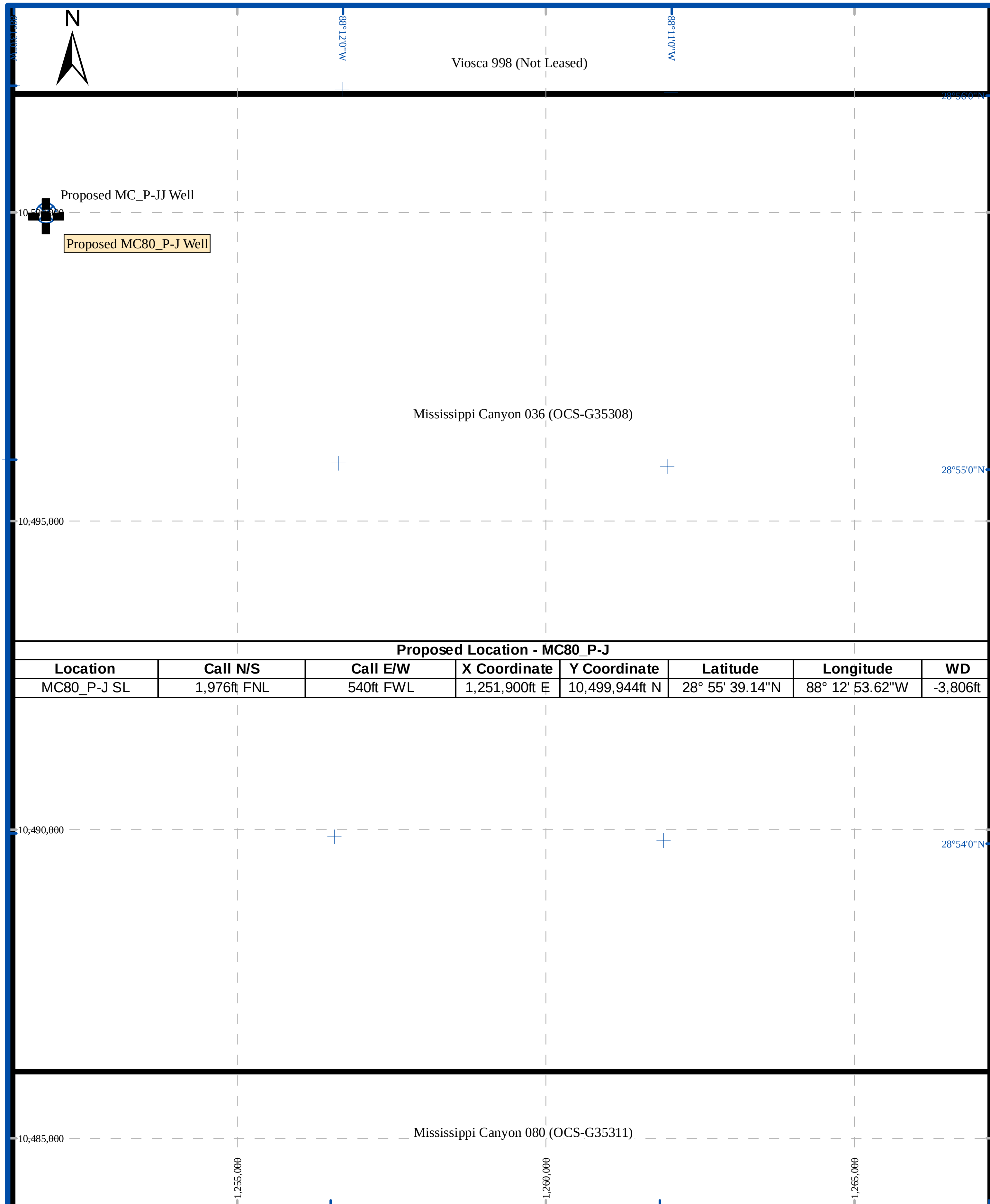
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC80_P-J

Location	Call N/S	Call E/W	X Coordinate	Y Coordinate	Latitude	Longitude	WD
MC80_P-J SL	1,976ft FNL	540ft FWL	1,251,900ft E	10,499,944ft N	28° 55' 39.14"N	88° 12' 53.62"W	-3,806ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

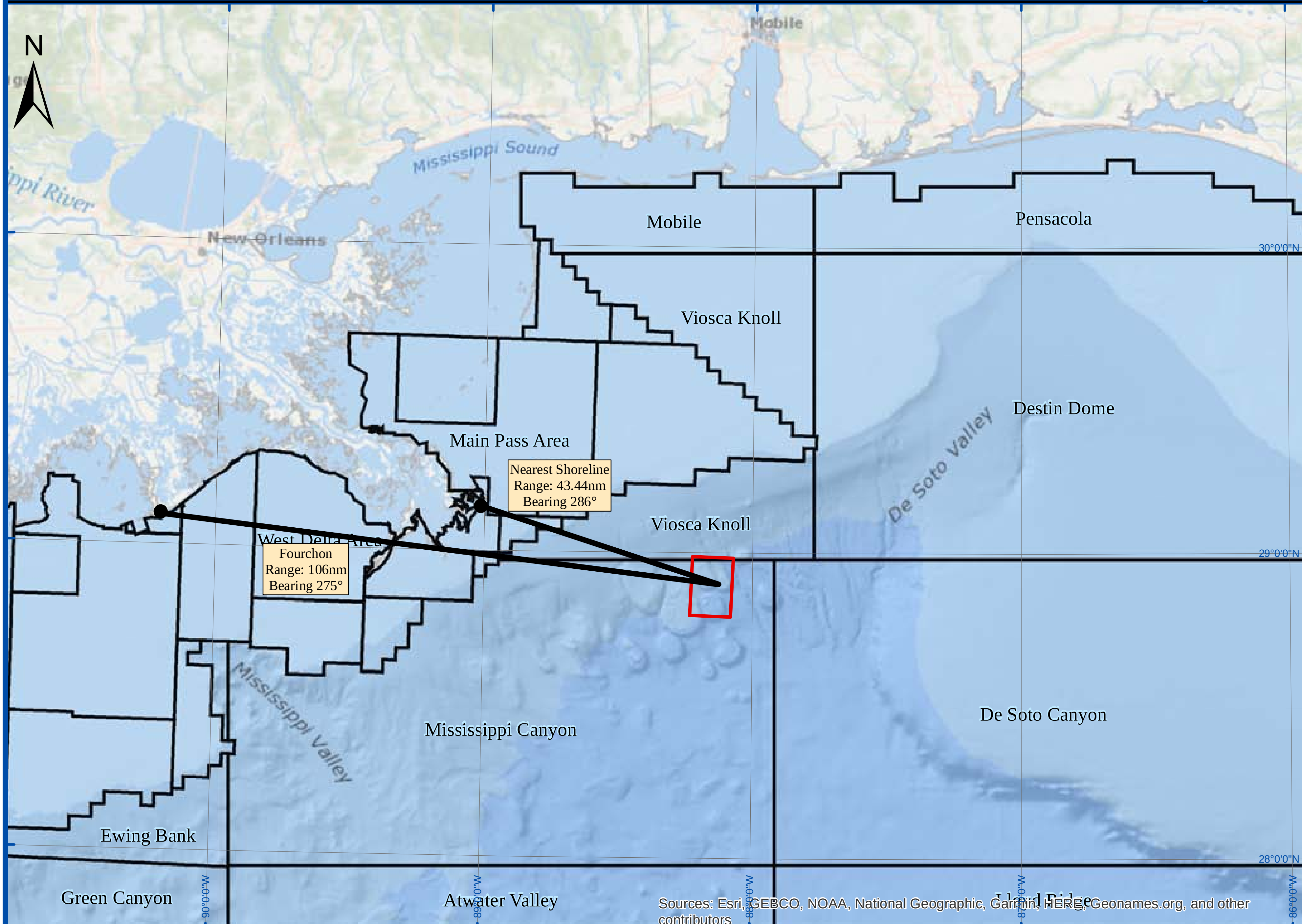
0 150 300 600 Meters

Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 80

Figure 13



Legend

Seabed Well

Platform

Not Leased

Leased

Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 80

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC80_P-J Well Location

August 31, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 80
(OCS-G OCS-G-35311)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC80_P-J well location with surface location in Block 80, Mississippi Canyon Area (OCS-G-35311). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 3.5 seconds two-way time (TWT), -10,638ft below sea surface (6,832ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth, with a gradient of 3.2° to the SW Occasional seabed faults occur within 2,000ft of the proposed well.

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

No seabed infrastructure occurs within 2,000ft radius of the proposed well.

Sub-Seabed Hazards. No risk of gas is assigned at the proposed well or within 2,000ft.

A **Slight Shallow Water Flow Risk** is assigned to sand-rich intervals within Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect a fault within Unit F.

Proposed MC80_P-J Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	55’	39.141”	North	Easting	1,251,900	US ft. E
Longitude	88°	12’	53.619”	West	Northing	10,499,944	US ft. N
Latitude Decimal			28.9275393				
Longitude Decimal			-88.2148942				
FWL Mississippi Canyon 080			540ft		US ft.	Inline	12618
FNL Mississippi Canyon 080			1,976ft		US ft.	Crossline	18061
Water Depth: -3,806ft			Slope: 3.2° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.501 Miles @ 114.334°		

Proposed MC80_P-JJ Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	55’	39.637”	North	Easting	1,251,900.	US ft. E
Longitude	88°	12’	53.625”	West	Northing	10,499,994	US ft. N
Latitude Decimal			28.9276768				
Longitude Decimal			-88.2148958				
FWL Mississippi Canyon 080			540ft		US ft.	Inline	12619
FNL Mississippi Canyon 080			1,926ft		US ft.	Crossline	18065
Water Depth: -3,801ft			Slope: 3.4° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.575 Miles @ 115.482°°		

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

No risk of gas is assigned at the proposed well. A **Slight Shallow Water Flow Risk** occurs in intervals of Unit B, Unit D, and throughout Unit E and Unit F.

The well-path will intersect a fault within Unit F.

Sincerely,
Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC80_P-J Well Location

Anadarko Petroleum Corporation

August 31, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC80_P-J Well Location (OCS-G-35311)

Ladies/Gentlemen:

Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC80_P-J with surface location in Block 80, Mississippi Canyon Area (OCS-G-35311). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities

Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities occurs 2,220ft to the east.

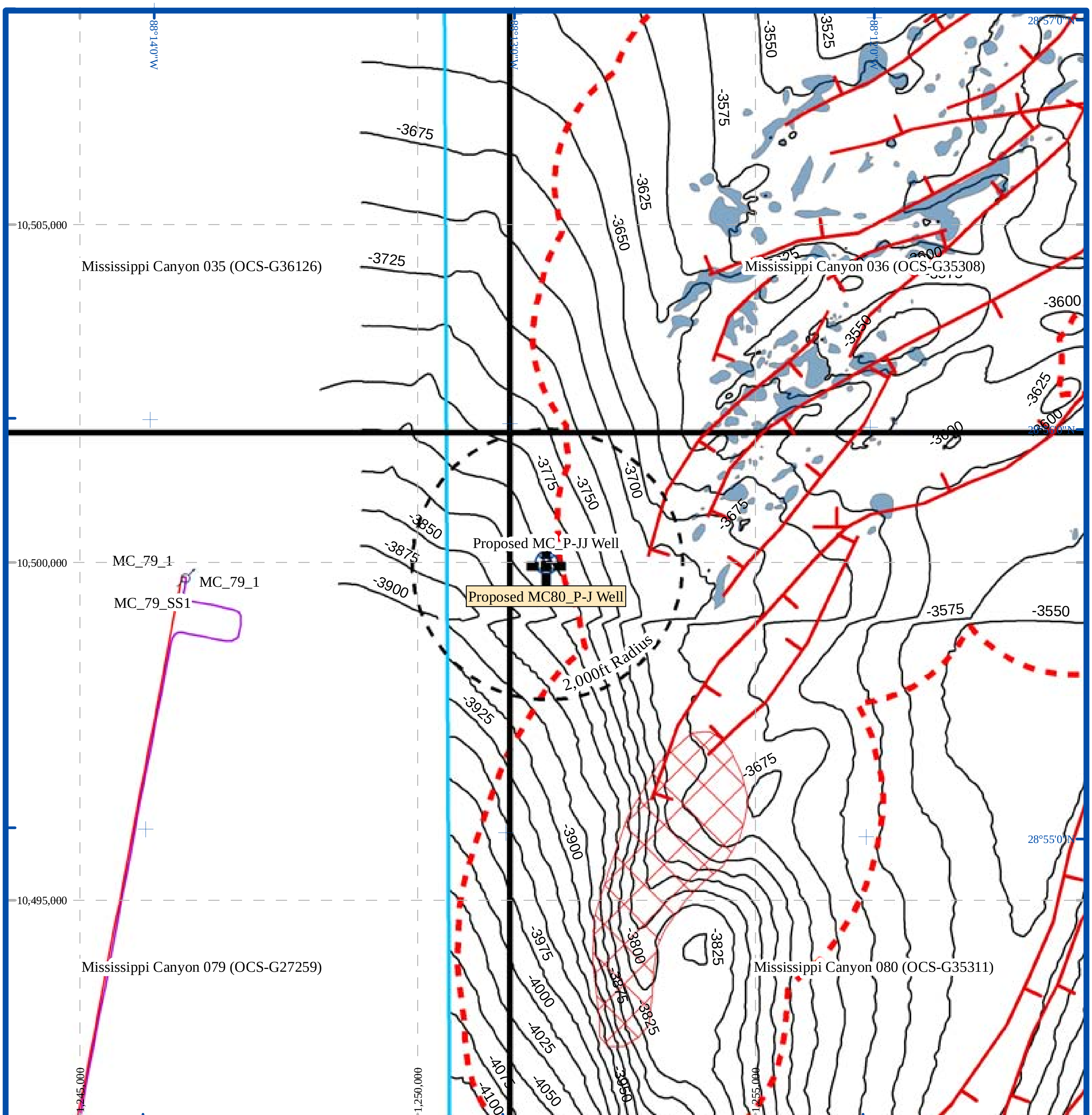
Proposed MC80_P-J Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid				**UTM Zone 16 - CM 87° West**			
Latitude	28°	55'	39.141"	North	Easting	1,251,900	US ft. E
Longitude	88°	12'	53.619"	West	Northing	10,499,944	US ft. N
Latitude Decimal			28.9275393				
Longitude Decimal			-88.2148942				
FWL Mississippi Canyon 080			540ft	US ft.	Inline	12618	
FNL Mississippi Canyon 080			1,976ft	US ft.	Crossline	18061	
Water Depth: -3,806ft			Slope: 3.2° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.501 Miles @ 114.334°		

Proposed MC80_P-JJ Location (Surface)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid				**UTM Zone 16 - CM 87° West**			
Latitude	28°	55'	39.637"	North	Easting	1,251,900.	US ft. E
Longitude	88°	12'	53.625"	West	Northing	10,499,994	US ft. N
Latitude Decimal			28.9276768				
Longitude Decimal			-88.2148958				
FWL Mississippi Canyon 080			540ft	US ft.	Inline	12619	
FNL Mississippi Canyon 080			1,926ft	US ft.	Crossline	18065	
Water Depth: -3,801ft			Slope: 3.4° SW				
Nearest Shoreline			43.44 Nautical Miles @ 286°				
Port of Operation			Fourchon		106 Nautical Miles @ 275°		
Nearest Manned Platform			Horn Mountain in MC127		10.575 Miles @ 115.482°°		

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

Conclusions and Recommendations: The proposed MC80_P-J and proposed MC80_P-JJ well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC80_P-J Well Location (1,251,900ft E / 10,499,944ft N)

Proposed MC80_P-JJ Well Location

Existing Wells

Gas Pipelines

Umbilical Pipelines

Block boundaries

Study area boundary

-3806 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Regions considered favorable for sensitive sessile benthic communities based on 3D seismic data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Peach Prospect
Mississippi Canyon, Block MC80,
Offshore Gulf of Mexico

Description:
Proposed MC80_P-K Well Location

Project Number:
2020-314

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	A.H. .... A Haigh
	Quality Assurance	D Haigh .... D Haigh

Revision	Date	Title	Note
0	August 17, 2020	Draft	
1	August 31, 2020	2nd Draft	Minor location coordinate adjustment
2	September 09, 2020	Final	

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

Ocean Geo Solutions, Inc. has prepared this report for the client identified on the front cover in fulfillment of its contractual obligations under the referenced contract, and the only liabilities Ocean Geo Solutions, Inc. will accept are those contained therein.

Please be aware that further distribution of this report, in whole or part, or the use of the data for a purpose not expressly stated within the contractual work scope is at the client's sole risk, and Ocean Geo Solutions, Inc recommends that this disclaimer is included in any such distribution.

OCEAN GEO SOLUTIONS, INC
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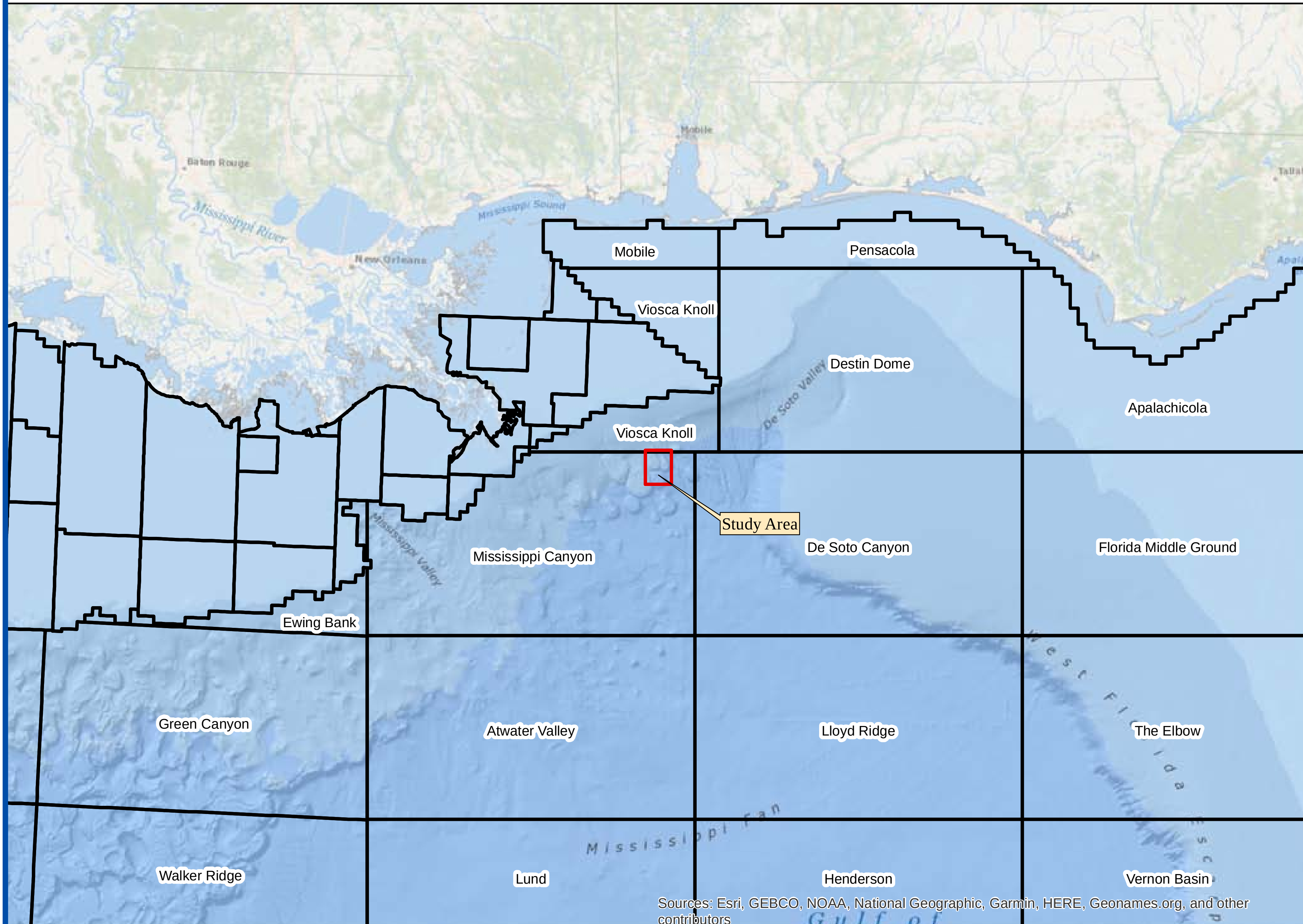
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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LIST OF FIGURES

WELL CLEARANCE LETTER – PROPOSED MC80_P-K WELL LOCATION

September 09, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Rick Kincaid**

Well Clearance Letter
Proposed MC80_P-K Well Location
Mississippi Canyon Block MC80
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC80_P-K Well Location in Block 80, Mississippi Canyon Area (OCS-G- 35311). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is Top of Salt at 1.946 seconds two-way time (TWT), -4,924ft below sea surface (1,202ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC80-_P-K well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report also covers the eastern part of block MC80 and the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC80_P-K Well Location lies in the east-central part of Block MC80 (OCS-G-35311).

Proposed MC80_P-K Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54'	29.146"	North	Easting	1,265,650	US ft E
Longitude	88°	10'	18.057"	West	Northing	10,492,737	US ft N
Latitude Decimal			28.9080962				
Longitude Decimal			-88.1716825				
FEL Mississippi Canyon 80			1,550ft	US ft	Inline	12665	
FSL Mississippi Canyon 80			6,657ft	US ft	Crossline	17341	
Water Depth: -3,722ft		Slope: <1.0° SE					
Nearest Shoreline		49 Nautical Miles @ 289°					
Port of Operation		Fourchon			109 Nautical Miles @ 276°		
Nearest Manned Platform		Horn Mountain in MC127			7.6 Miles @ 113°		

Proposed MC80_P-KK Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54'	29.151"	North	Easting	1,265,700	US ft E
Longitude	88°	10'	17.494"	West	Northing	10,492,737	US ft N
Latitude Decimal			28.9080976				
Longitude Decimal			-88.1715262				
FEL Mississippi Canyon 80			1,500ft	US ft	Inline	12666	
FSL Mississippi Canyon 80			6,657ft	US ft	Crossline	17337	
Water Depth: -3,723ft		Slope: <1.0° SE					
Nearest Shoreline		49 Nautical Miles @ 289°					
Port of Operation		Fourchon			109 Nautical Miles @ 276°		
Nearest Manned Platform		Horn Mountain in MC127			7.6 Miles @ 113°		

Location MC80_P-KK is 50ft from MC80_P-K on a bearing of 90°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the eastern part of MC80 covering the proposed MC80_P-K well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft)=
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)-(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC80_P-K well location is -3,722ft below sea surface (Figure 1). The seafloor slopes to the southeast at <1.0°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC80_P-K well location is in the east-central part of block MC80. The proposed well is located in an area of relatively smooth to slightly undulated seabed atop a salt diapiric uplift (Horn Dome).

The seabed within a 2,000ft radius of the proposed well is generally smooth and slightly undulated, as the well is located near the center of the salt diapiric uplift. Surface undulations are due to the presence of faulting in the underlying intervals above the shallow salt. The faults do not reach the seabed, rather, their expression is seen at the seabed as undulations. No significant seabed features were observed within 2,000ft.

Clays and silts are predicted at the seabed.

No existing wells or pipelines occur within the 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into four units, A, B, C, and D. These are separated by Horizons H05, H10, H20, and Top of Salt (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,935ft below sea surface (213ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,935ft below sea surface (213ft below seabed).

4.3 Unit B

The upper part of Unit B, from -3,935ft to -4,029ft below sea surface (213ft to 307ft below seabed), displays generally low-amplitude reflectors, and is interpreted as layered clays and silts with occasional sands.

From -4,029ft to -4,183ft below sea surface (307ft to 461ft below seabed) the stratigraphy displays seismically as moderate-amplitude reflectors interpreted as layered clays and silts, with several sands. Due to the increased frequency of sand interbeds and the possibility that these may contain small amounts of fluid, a **Slight Shallow Water Flow Risk** is interpreted. Additionally, minor wellbore stability and drilling fluid circulation problems may occur within this interval.

From -4,183ft to -4,314ft below sea surface (461ft to 592ft below seabed) displays generally low-amplitude reflectors interpreted as layered clays, silts, and several sands. Minor wellbore stability and drilling fluid circulation problems may occur within this interval.

The lower part of Unit B from -4,314ft to -4,459ft below sea surface (592ft to 737ft below seabed) is interpreted to consist of low-amplitude, well-layered reflectors with clays, silts, and occasional sands.

No risk of gas is assigned to Unit B at the proposed well location or within 2,000ft.

The well-path will not traverse any faults within Unit B.

Horizon H10 marks the base of Unit B, occurring at -4,459ft below sea surface (737ft below seabed). No risk of gas of gas occurs at the proposed well or within 2,000ft radius of the proposed well at the level of Horizon H10. A fault occurs at the level of Horizon H10 at -4,459ft below sea surface (737ft below seabed). Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

4.4 Unit C

Unit C from -4,459ft to -4,608ft below sea surface (737ft to 886ft below seabed) is characterized by well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional minor sands.

No risk of gas is predicted within Unit C at the proposed well, or within 2,000ft.

Horizon H20 marks the base of Unit C, and of this assessment, at -4,608ft below sea surface (886ft below seabed). A fault traverses the well-path at the level of Horizon H30 at -4,608ft below sea surface (886ft below seabed). Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

4.5 Unit D

Unit D consists of the remaining portion of the shallow siliciclastic section between Horizon H20 and the Top of Salt.

The upper section of Unit D from -4,608ft to -4,681ft below sea surface (886ft to 959ft below seabed) is characterized by chaotic, poorly layered, low amplitude reflectors interpreted as clays, silts, and occasional sands.

The lower section of Unit D from -4,681ft to -4,924ft below sea surface (959ft to 1,202ft below seabed) is characterized by chaotic, moderately well layered, low and moderate amplitude reflectors interpreted as clays, silts, and several sands. Salt movement and uplift has affected this interval and may have created networks of small fractures within this interval that are generally below the resolution of the seismic data. Minor wellbore and drilling fluid circulation problems may occur within this interval. On occasions these salt-stressed and deformed sections can be a greater risk of shallow water flow, but other factors such as small-scale faults may have provided relief of any overpressures that could have been induced. However, as this is the potential well in this setting in the area, it is considered that a **Slight Shallow Water Flow Risk** is appropriate for the interval from -4,681ft to -4,924ft below sea surface (959ft to 1,202ft below seabed).

No risk of gas is predicted within Unit D at the proposed well, or within 2,000ft.

The well-path will traverse a fault at -4,833ft (1,111ft below seabed) downthrown to the north by around 10ft. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

The Top of Salt marks the base of Unit D, and of this assessment, at -4,924ft below sea surface (1,202ft below seabed).

4.6 Shallow Gas Assessment

No shallow gas is interpreted at the proposed well location.

4.7 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is assigned within the interval from -4,029ft to -4,183ft below sea surface (307ft to 461ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is assigned within the interval from -4,681ft to -4,924ft below sea surface (959ft to 1,202ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  No seabed hazards or problems are interpreted.

- Unit A

  None Predicted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is assigned within the interval from -4,029ft to -4,183ft below sea surface (307ft to 461ft below seabed). Appropriate drilling methodology is recommended to deal with a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

  Minor wellbore stability and drilling fluid circulation problems may occur from -4,183ft to -4,314ft below sea surface (461ft to 592ft below seabed).

  The well-path will traverse a fault at the level of Horizon H10 at -4,459ft below sea surface (737ft below seabed). Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

- Unit C

  The well-path will traverse a fault at the level of Horizon H20 at -4,608ft below sea surface (886ft below seabed). Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault. Casing seats should avoid all fault intersections as formation integrity could be compromised.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is assigned within the interval from -4,681ft to -4,924ft below sea surface (959ft to 1,202ft below seabed). Appropriate drilling methodology is recommended to deal with a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible due to the possibility of numerous unresolvable faults.

  The wellbore will penetrate a fault at -4,833ft below sea surface (1,111ft below seabed). Minor drilling fluid circulation and wellbore stability problems may occur. Casing seats should avoid all fault intersections as formation integrity could be compromised.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC80_P-K Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

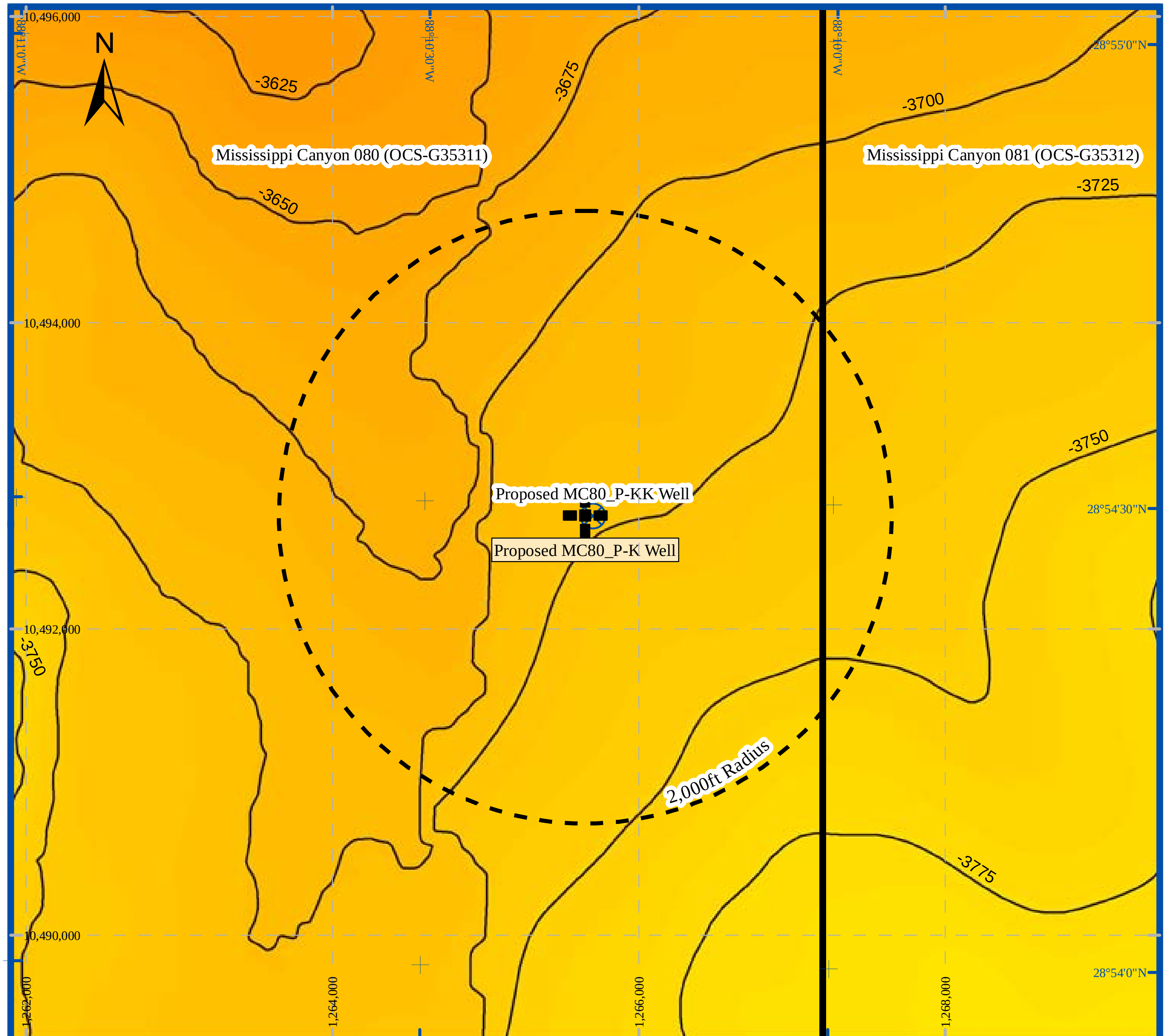
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC80_P-K Well Location
(1,265,650ft E / 10,492,737ft N)

Proposed MC80_P-KK Well Location

Block boundaries

-3722 Depth in feet below sea surface to seabed, contoured at 25ft intervals

Seabed Depth (Feet)

Chart Scale 1" = 1,000'

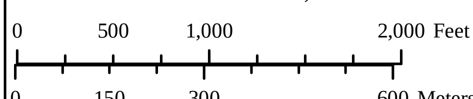
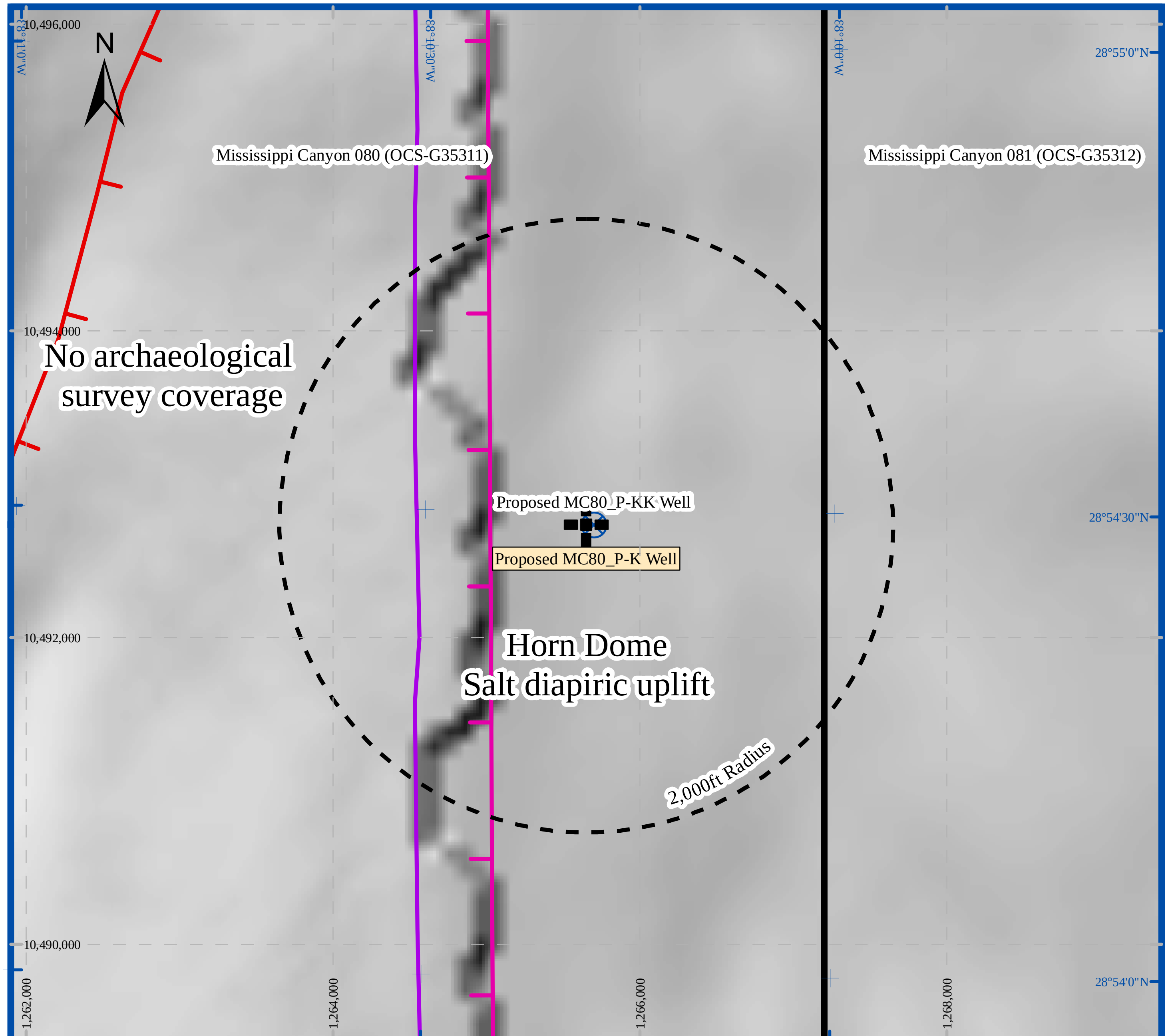


Figure 1
(MC80_P-K)



Seabed Morphology Extract

Proposed MC80_P-K Well Location
(1,265,650ft E / 10,492,737ft N)

Proposed MC80_P-KK Well Location

Block boundaries

Boundary of AUV Multibeam Echo Sounder Data Coverage

Boundary of Side Scan Sonar Data Coverage

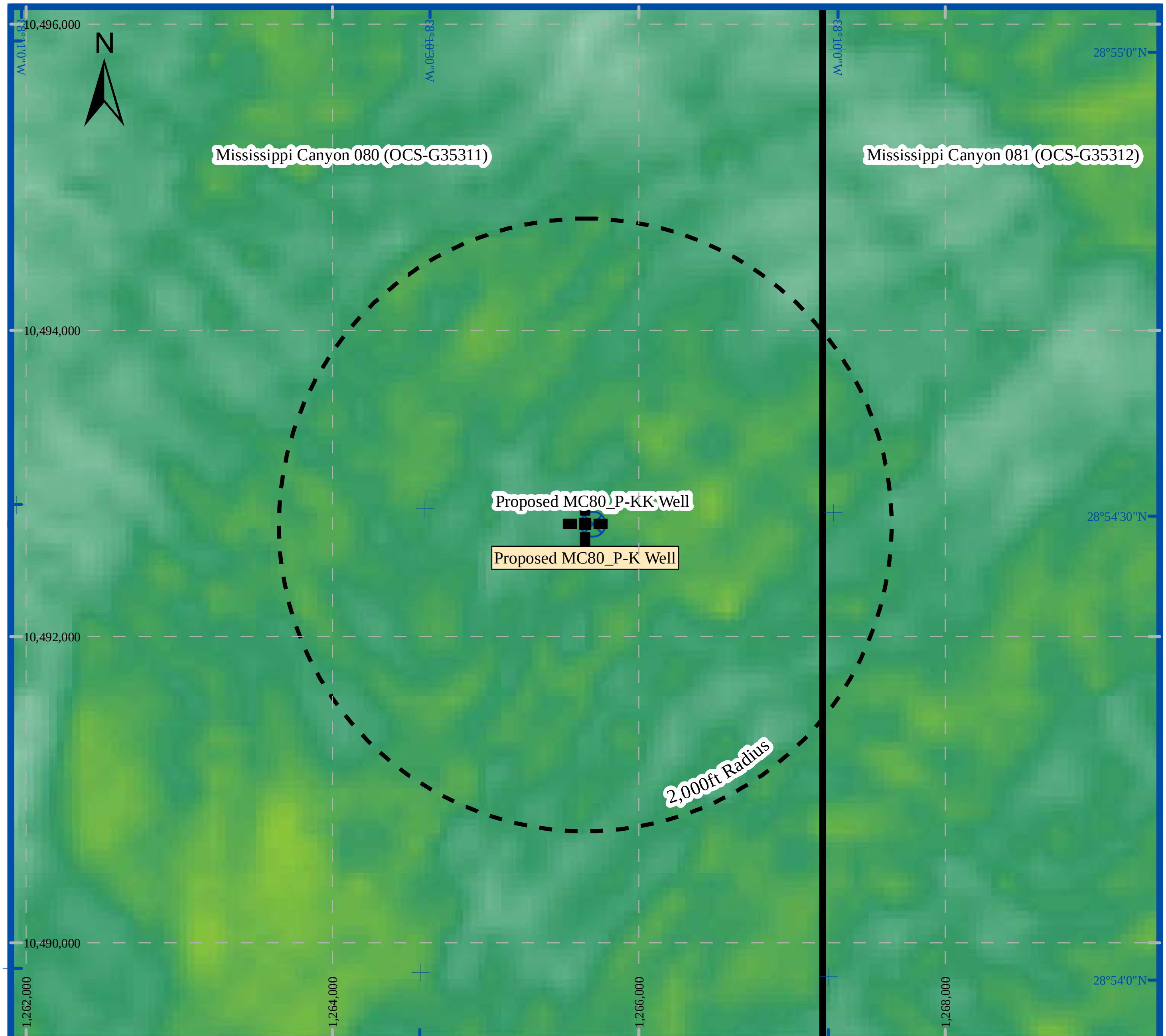
Seafloor fault intersection. Tick denotes downthrown block

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC80_P-K)

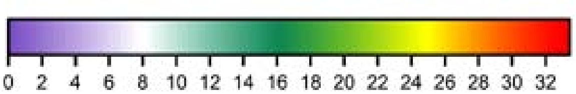


Seabed Amplitude Extract

Proposed MC80_P-K Well Location
(1,265,650ft E / 10,492,737ft N)

Proposed MC80_P-KK Well Location

Block boundaries



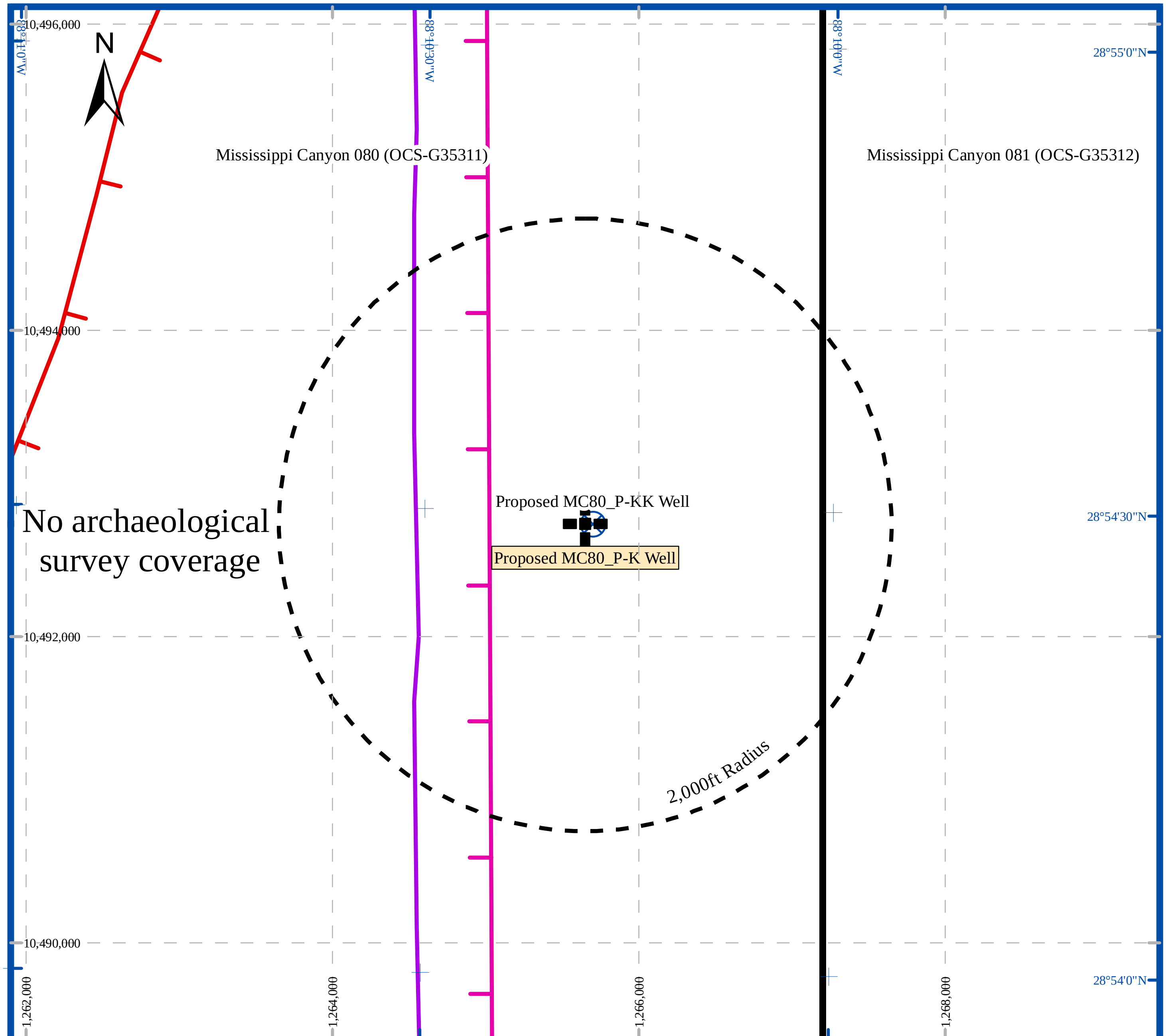
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC80_P-K)



Geohazard Summary Extract

Proposed MC80_P-K Well Location (1,265,650ft E / 10,492,737ft N)

Proposed MC80_P-KK Well Location

Block boundaries

Boundary of AUV Multibeam Echo Sounder Data Coverage

Boundary of Side Scan Sonar Data Coverage

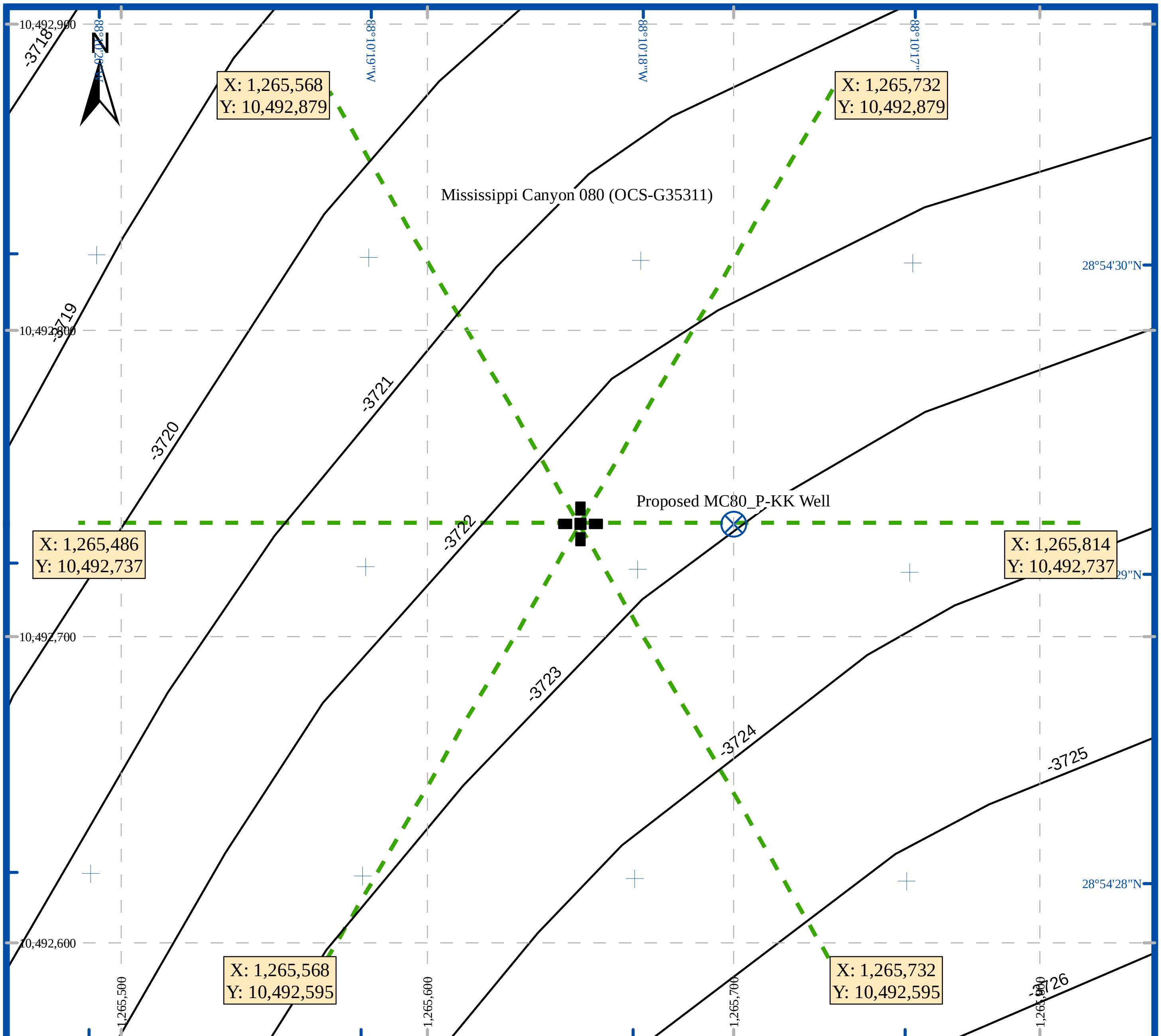
Seafloor fault intersection. Tick denotes downthrown block

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4
(MC80_P-K)



ROV Plat (MC80_P-K)

Proposed MC80_P-K Well Location (1,265,650ft E / 10,492,737ft N)

Proposed MC80_P-KK Well Location

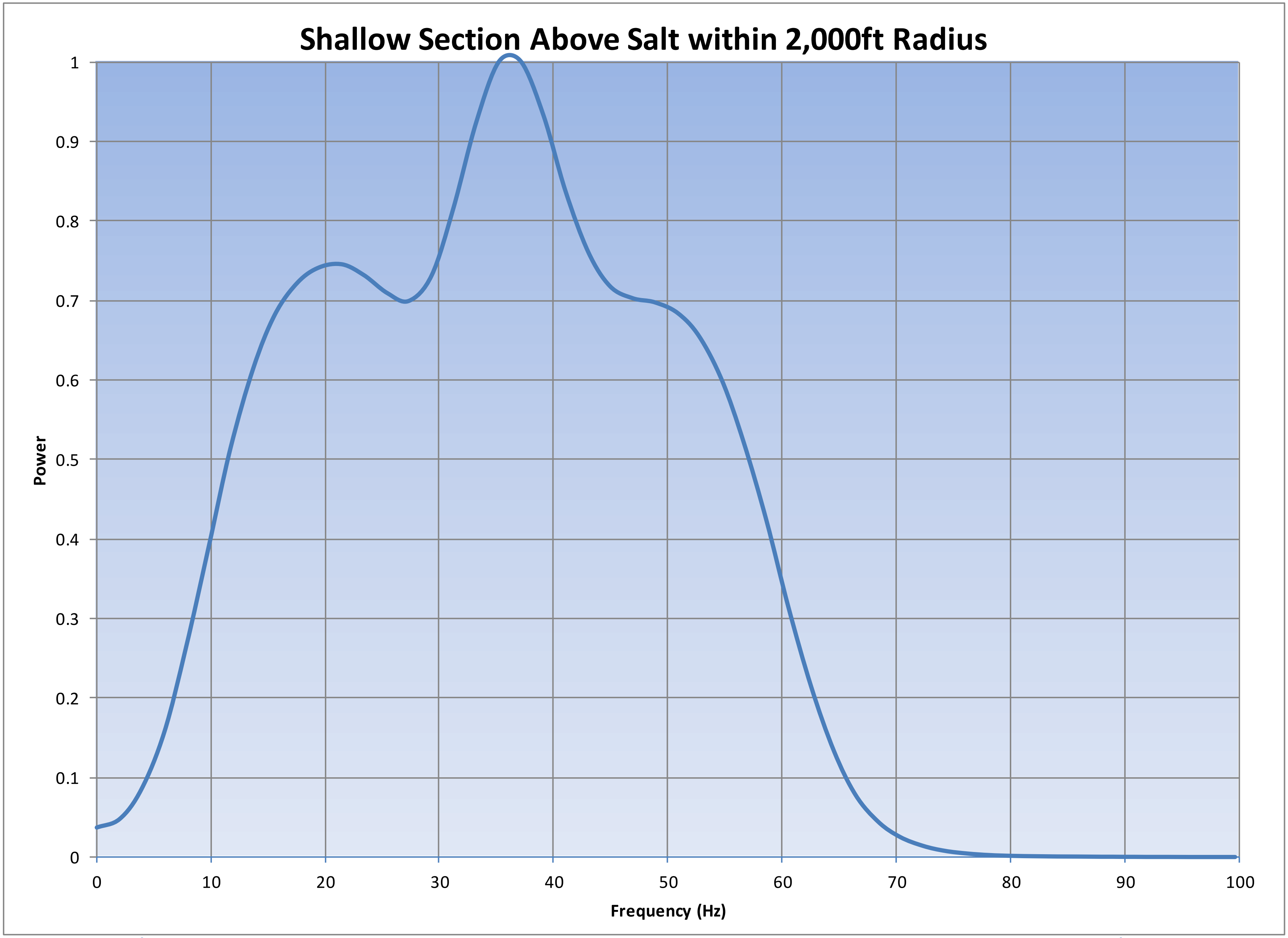
-3722 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

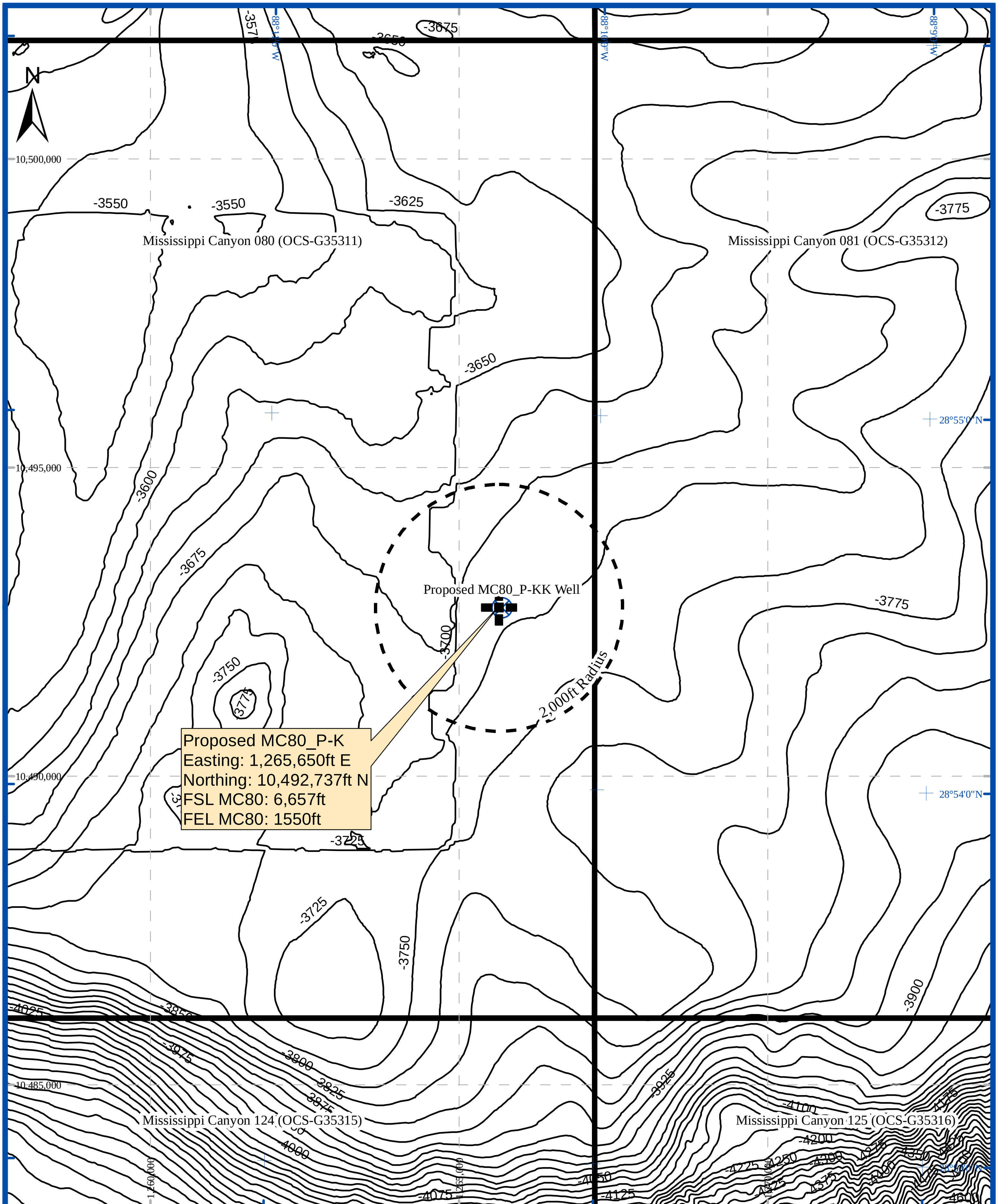
0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC80_P-K)

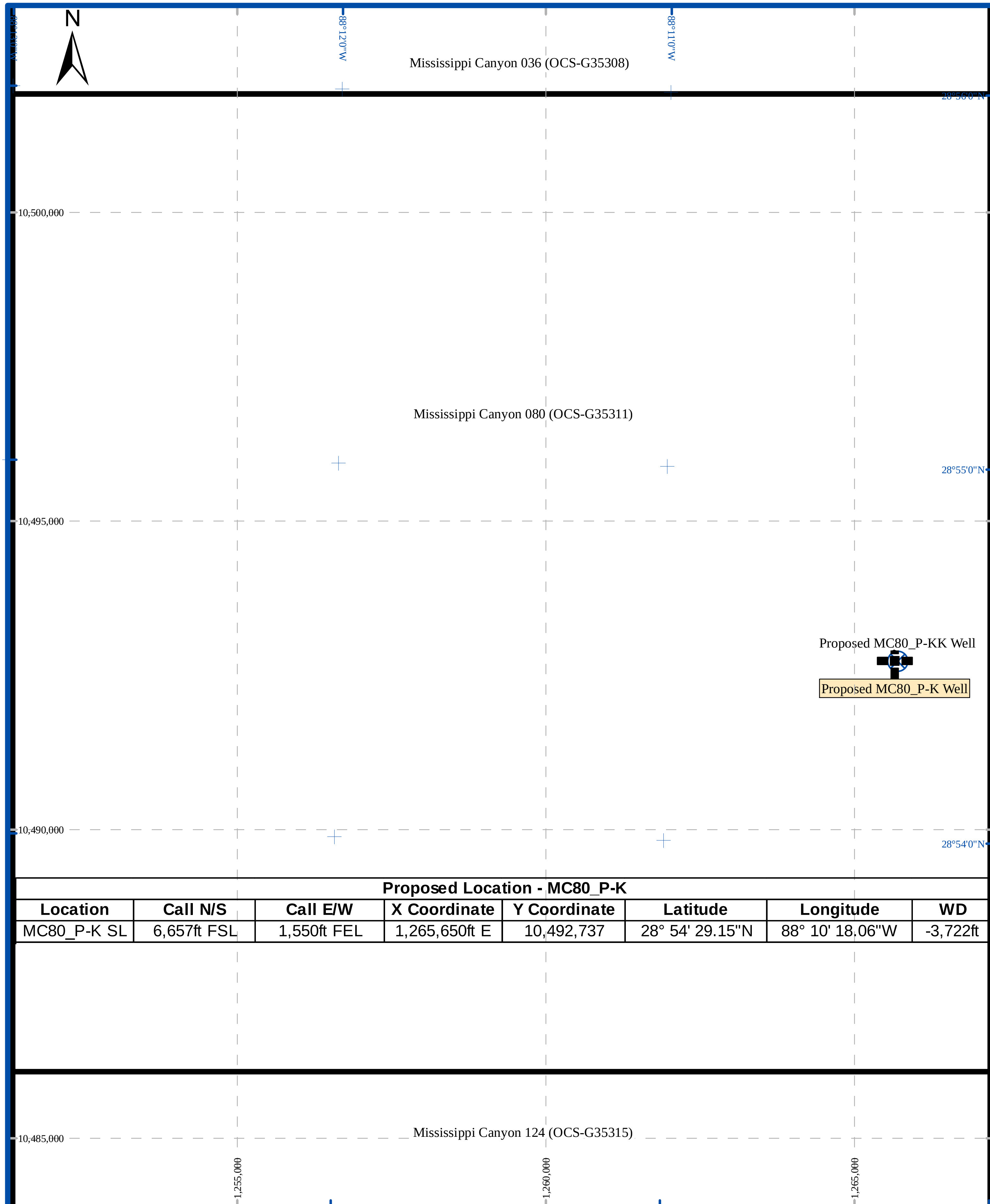


MC80_P-K	Power Spectrum	Figure 10



Bathymetry Plat

Figure 11



Proposed Location - MC80_P-K							
Location	**Call N/S**	**Call E/W**	**X Coordinate**	**Y Coordinate**	**Latitude**	**Longitude**	**WD**
MC80_P-K SL	6,657ft FSL	1,550ft FEL	1,265,650ft E	10,492,737	28° 54' 29.15"N	88° 10' 18.06"W	-3,722ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

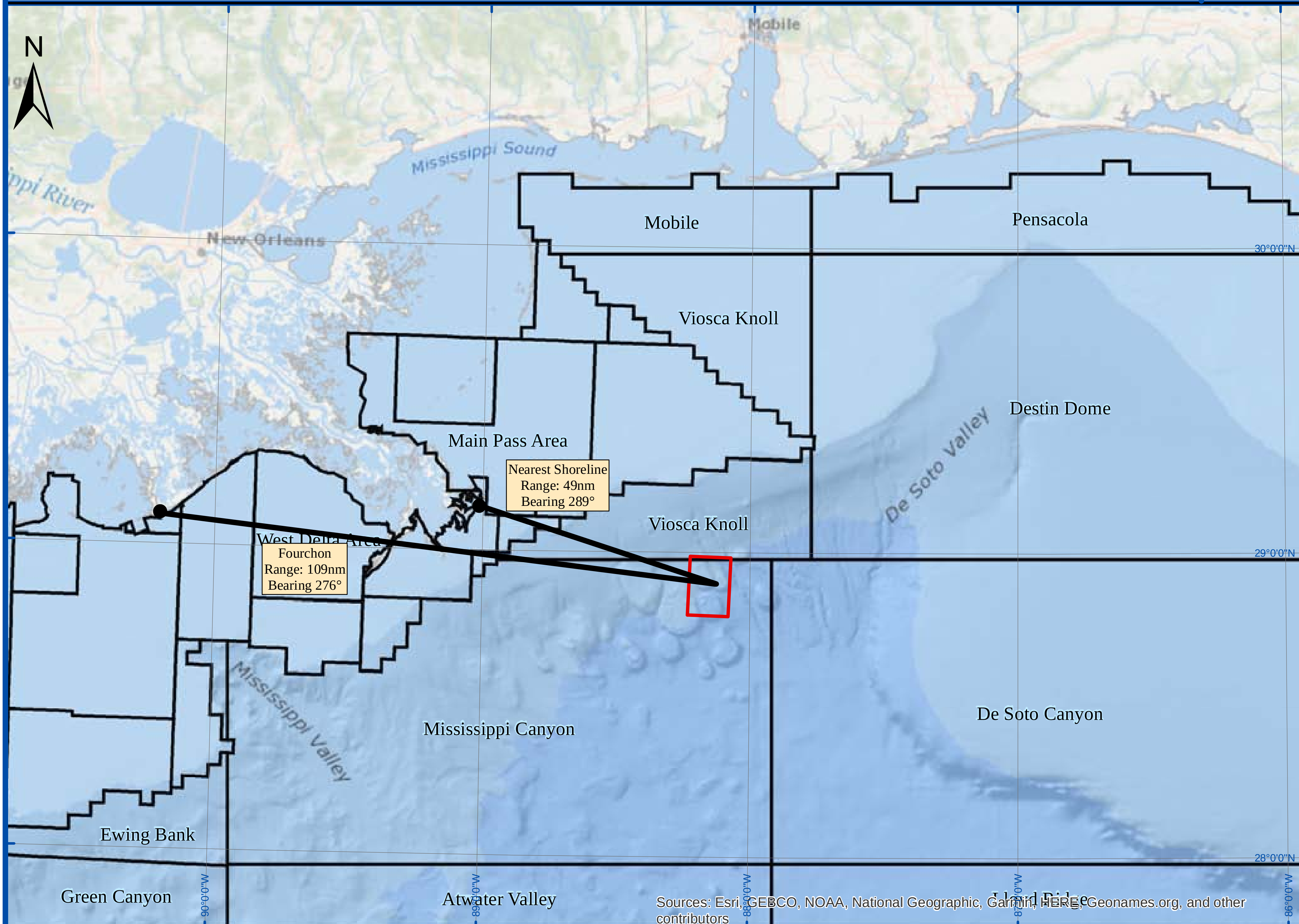
0 150 300 600 Meters

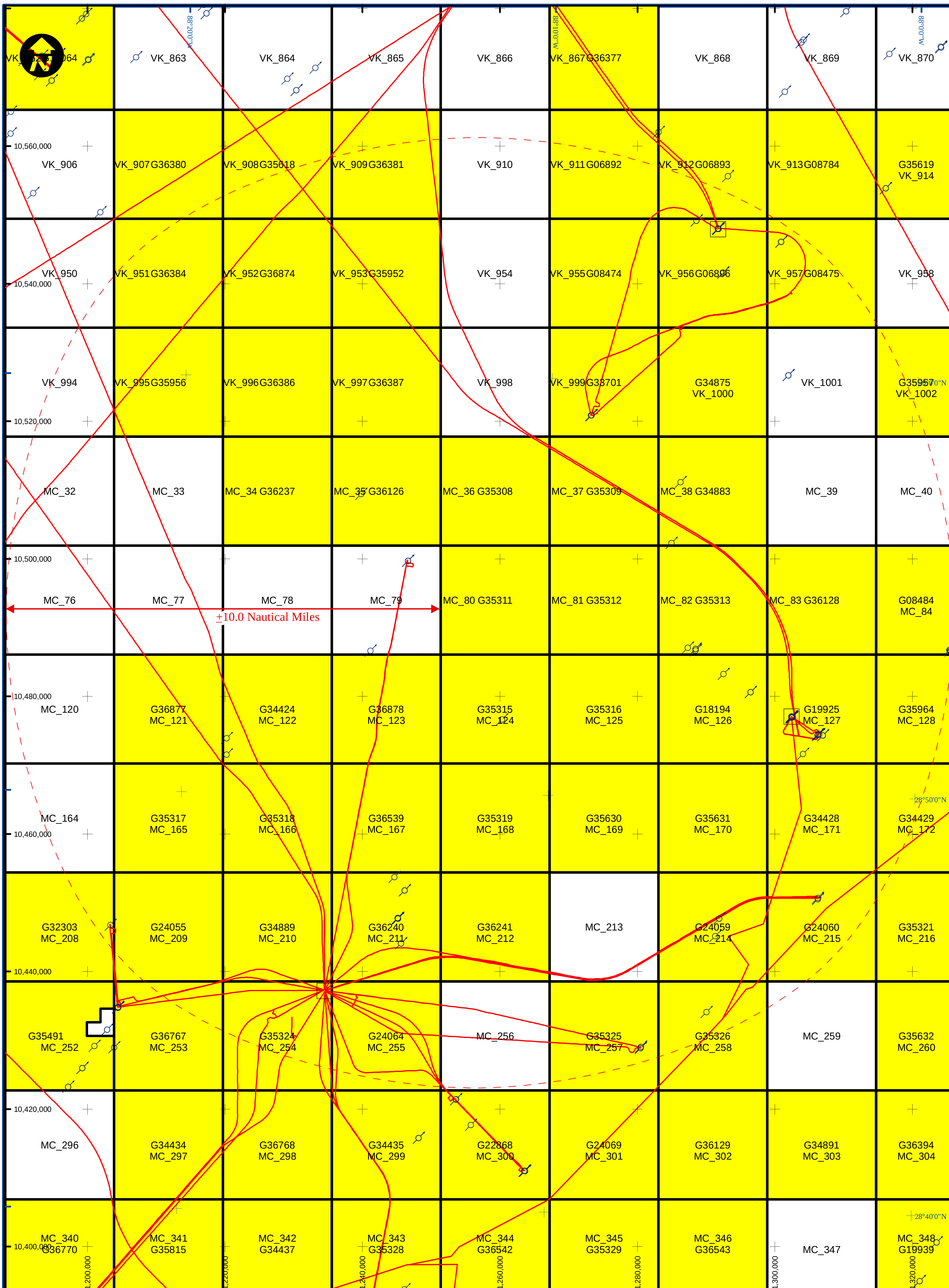
Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 80

Figure 13





Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 80

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC80_P-K Well Location

September 09, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 80
(OCS-G 35311)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC80_P-K well location in Block 80, Mississippi Canyon Area (OCS-G-35311). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is Top Salt at 1.946 seconds two-way time (TWT), -4,924ft below sea surface (1,202ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth to slightly-undulatory, with a gradient of <1.0° to the southeast. The proposed well is in the east-central of the salt diapiric uplift, with no problems anticipated. No seabed faults were identified within 2,000ft of the proposed well.

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

No seabed infrastructure occurs within a 2,000ft radius.

Sub-Seabed Hazards. Identified amplitude anomalies indicative of shallow gas do not occur within the 2,000ft radius. The vertical borehole will not penetrate any identified risk of gas anomalies. The well-path will penetrate a fault at the level of Horizon H10, a fault at the level of Horizon H20, and a fault within Unit D. The faults may cause minor drilling fluid circulation and wellbore stability problems.

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

Proposed MC80_P-K Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54'	29.146"	North	Easting	1,265,650	US ft E
Longitude	88°	10'	18.057"	West	Northing	10,492,737	US ft N
Latitude Decimal	28.9080962						
Longitude Decimal	-88.1716825						
FEL Mississippi Canyon 80	1,550ft			US ft	Inline	12665	
FSL Mississippi Canyon 80	6,657ft			US ft	Crossline	17341	
Water Depth: -3,722ft	Slope: <1.0° SE						
Nearest Shoreline	49 Nautical Miles @ 289°						
Port of Operation	Fourchon				109 Nautical Miles @ 276°		
Nearest Manned Platform	Horn Mountain in MC127				7.6 Miles @ 113°		

Proposed MC80_P-KK Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54'	29.151"	North	Easting	1,265,700	US ft E
Longitude	88°	10'	17.494"	West	Northing	10,492,737	US ft N
Latitude Decimal	28.9080976						
Longitude Decimal	-88.1715262						
FEL Mississippi Canyon 80	1,500ft			US ft	Inline	12666	
FSL Mississippi Canyon 80	6,657ft			US ft	Crossline	17337	
Water Depth: -3,723ft	Slope: <1.0° SE						
Nearest Shoreline	49 Nautical Miles @ 289°						
Port of Operation	Fourchon				109 Nautical Miles @ 276°		
Nearest Manned Platform	Horn Mountain in MC127				7.6 Miles @ 113°		

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

No risk of gas is interpreted. A **Slight Shallow Water Flow Risk** is assigned to a sand-rich interval in Unit B and within D.

Wellbore stability & drilling fluid circulation problems may occur at the faults intersecting the proposed well.

Sincerely,

Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC80_P-K Well Location

Anadarko Petroleum Corporation

September 09, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC80_P-K Well Location in Mississippi Canyon MC80 (OCS-G 35311)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC80_P-K well location in Block 80, Mississippi Canyon Area (OCS-G-35311). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities is located 9,663ft to the NW.

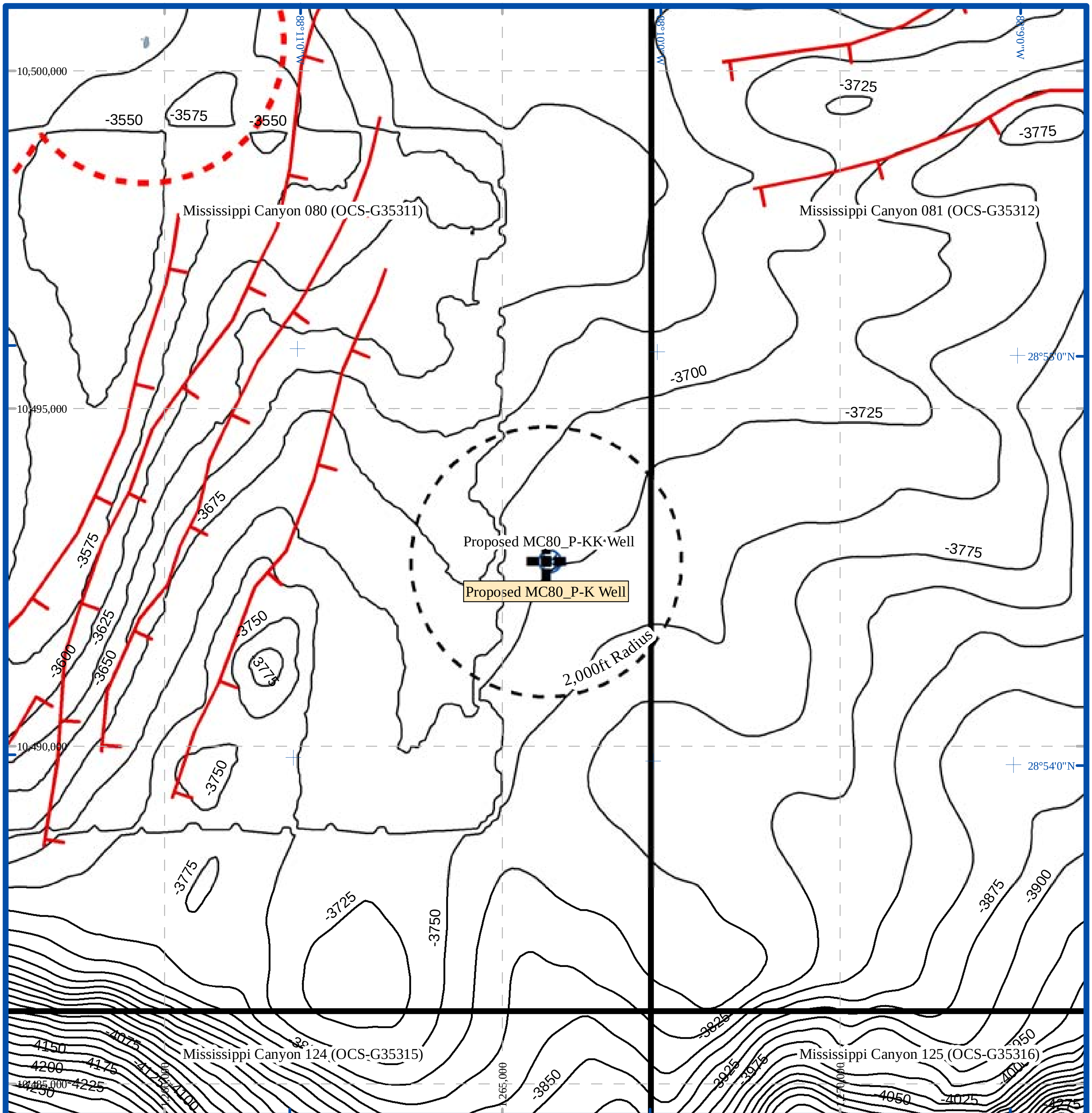
Proposed MC80_P-K Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54’	29.146”	North	Easting	1,265,650	US ft E
Longitude	88°	10’	18.057”	West	Northing	10,492,737	US ft N
Latitude Decimal			28.9080962				
Longitude Decimal			-88.1716825				
FEL Mississippi Canyon 80			1,550ft	US ft	Inline	12665	
FSL Mississippi Canyon 80			6,657ft	US ft	Crossline	17341	
Water Depth: -3,722ft			Slope: <1.0° SE				
Nearest Shoreline			49 Nautical Miles @ 289°				
Port of Operation			Fourchon		109 Nautical Miles @ 276°		
Nearest Manned Platform			Horn Mountain in MC127		7.6 Miles @ 113°		

Proposed MC80_P-KK Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54’	29.151”	North	Easting	1,265,700	US ft E
Longitude	88°	10’	17.494”	West	Northing	10,492,737	US ft N
Latitude Decimal			28.9080976				
Longitude Decimal			-88.1715262				
FEL Mississippi Canyon 80			1,500ft	US ft	Inline	12666	
FSL Mississippi Canyon 80			6,657ft	US ft	Crossline	17337	
Water Depth: -3,723ft			Slope: <1.0° SE				
Nearest Shoreline			49 Nautical Miles @ 289°				
Port of Operation			Fourchon		109 Nautical Miles @ 276°		
Nearest Manned Platform			Horn Mountain in MC127		7.6 Miles @ 113°		

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

Conclusions and Recommendations: The proposed MC80_P-K and proposed MC80_P-KK well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC80_P-K Well Location (1,265,650ft E / 10,492,737ft N)

Proposed MC80_P-KK Well Location

Block boundaries

-3722 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick denotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Peach Prospect
Mississippi Canyon, Block MC80,
Offshore Gulf of Mexico

Description:
Proposed MC80_P-L Well Location

Project Number:
2020-315

Report Status:
Final

Ocean Geo Solutions

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www.oceangeosolutions.com

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	………………… A Haigh
	Quality Assurance	………………… D Haigh

Revision	Date	Title	Note
0	August 18, 2020	Draft	
1	September 01, 2020	2nd Draft	Minor location coordinate adjustment
2	September 09, 2020	Final	

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

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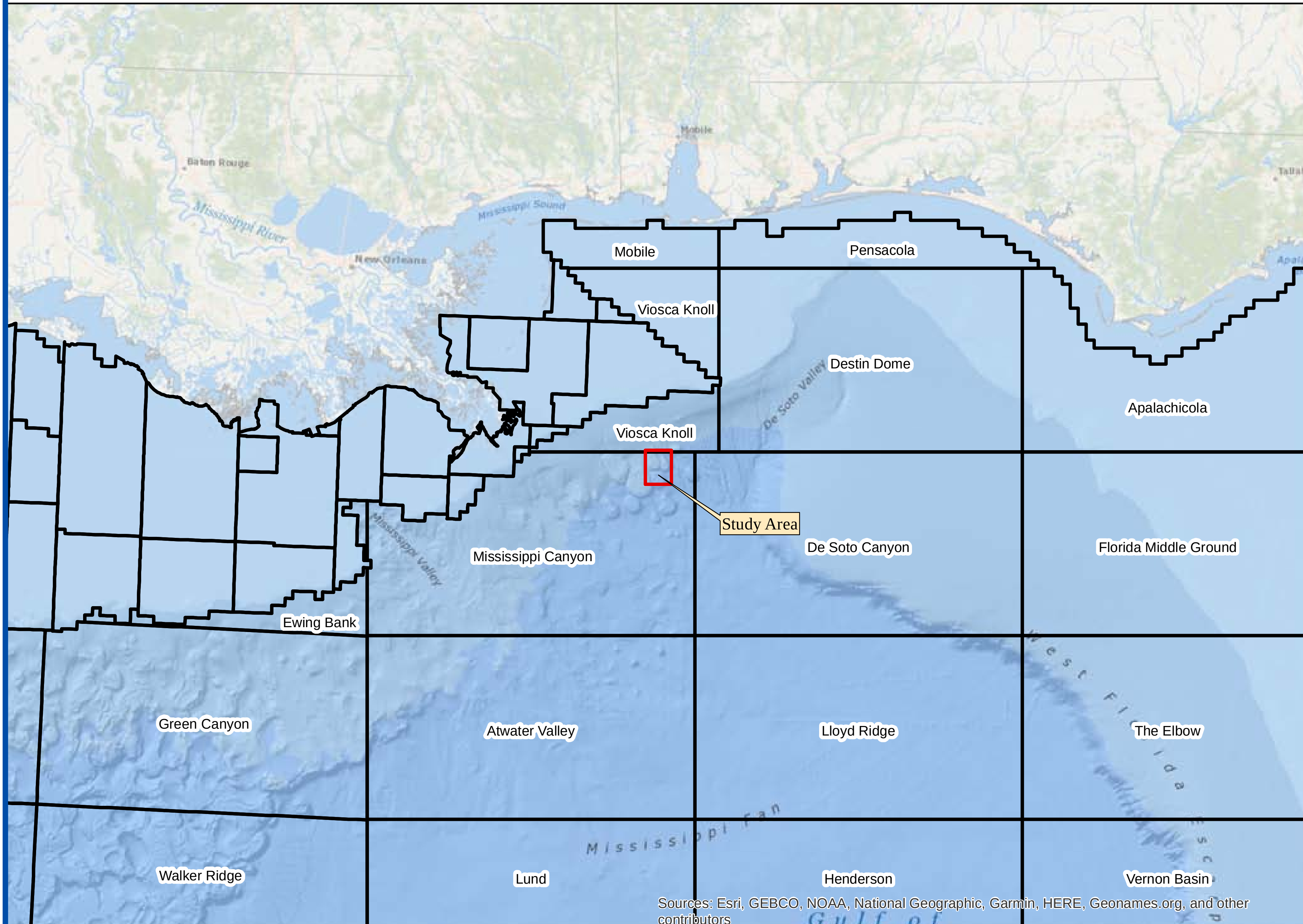
OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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WELL CLEARANCE LETTER – PROPOSED MC80_P-L WELL LOCATION

September 09, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC80_P-L Well Location
Mississippi Canyon Block MC80
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC80_P-L Well Location in Block 80, Mississippi Canyon Area (OCS-G- 35311). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 1.949 seconds two-way time (TWT), -4,931ft below sea surface (1,208ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC80-_P-L well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report also covers the eastern part of block MC80 and the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC80_P-L Well Location lies in the east-central part of Block MC80 (OCS-G-35311).

Proposed MC80_P-L Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54’	28.651”	North	Easting	1,265,650	US ft E
Longitude	88°	10’	18.052”	West	Northing	10,492,687	US ft N
Latitude Decimal			28.9079587				
Longitude Decimal			-88.171681				
FEL Mississippi Canyon 80			1,550ft	US ft	Inline	12665	
FSL Mississippi Canyon 80			6,607ft	US ft	Crossline	17337	
Water Depth: -3,723ft			Slope: 1.1° SE				
Nearest Shoreline			49 Nautical Miles @ 289°				
Port of Operation			Fourchon		109 Nautical Miles @ 276°		
Nearest Manned Platform			Horn Mountain in MC127		7.55 Miles @ 113°		

Proposed MC80_P-LL Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54’	28.656”	North	Easting	1,265,700	US ft E
Longitude	88°	10’	17.489”	West	Northing	10,492,687	US ft N
Latitude Decimal			28.9079601				
Longitude Decimal			-88.1715247				
FEL Mississippi Canyon 80			1,500ft	US ft	Inline	12665	
FSL Mississippi Canyon 80			6,607ft	US ft	Crossline	17341	
Water Depth: -3,724ft			Slope: 1.1° SE				
Nearest Shoreline			49 Nautical Miles @ 289°				
Port of Operation			Fourchon		109 Nautical Miles @ 276°		
Nearest Manned Platform			Horn Mountain in MC127		7.55 Miles @ 113°		

Location MC80_P-LL is 50ft from MC80_P-L on a bearing of 90.0°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the eastern part of MC80 covering the proposed MC80_P-L well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft)=
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)**-**(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC80_P-L well location is -3,723ft below sea surface (Figure 1). The seafloor slopes to the southeast at 1.1°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC80_P-L well location is in the east-central part of block MC80. The proposed well is located in an area of relatively smooth to slightly undulated seabed atop a salt diapiric uplift (Horn Dome).

The seabed within a 2,000ft radius of the proposed well is generally smooth and slightly undulated, as the well is located near the center of the salt diapiric uplift. Surface undulations are due to the presence of faulting in the underlying intervals above the shallow salt. The faults do not reach the seabed, rather, their expression is seen at the seabed as undulations. No significant seabed features were observed within 2,000ft.

Clays and silts are predicted at the seabed.

No existing wells or pipelines occur within the 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into four units, A, B, C, and D. These are separated by Horizons H05, H10, H20, and Top of Salt (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,934ft below sea surface (211ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,934ft below sea surface (211ft below seabed).

4.3 Unit B

The upper part of Unit B, from -3,934ft to -4,025ft below sea surface (211ft to 302ft below seabed), displays generally low-amplitude reflectors, and is interpreted as layered clays and silts with occasional sands.

From -4,025ft to -4,181ft below sea surface (302ft to 458ft below seabed) the stratigraphy displays seismically as moderate-amplitude reflectors interpreted as layered clays and silts, with several sands. Due to the increased frequency of sand interbeds and the possibility that these may contain small amounts of fluid, a **Slight Shallow Water Flow Risk** is interpreted. Additionally, minor wellbore stability and drilling fluid circulation problems may occur within this interval.

The lower part of Unit B from -4,181ft to -4,460ft below sea surface (458ft to 737ft below seabed) displays generally low-amplitude reflectors interpreted as layered clays, silts, and occasional sands.

No risk of gas is assigned to Unit B at the proposed well location or within 2,000ft.

The well-path will not traverse any faults within Unit B.

Horizon H10 marks the base of Unit B, occurring at -4,460ft below sea surface (737ft below seabed).

4.4 Unit C

Unit C from -4,460ft to -4,609ft below sea surface (737ft to 886ft below seabed) is characterized by well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional minor sands.

The well-path will traverse two faults at -4,479ft (756ft below seabed) and at -4,576ft below sea surface (853ft below seabed). The upper fault is downthrown to the south by around 10ft, and the lower fault is downthrown to the north by around 20ft. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the faults.

No risk of gas is predicted within Unit C at the proposed well, or within 2,000ft.

Horizon H20 marks the base of Unit C, and of this assessment, at -4,609ft below sea surface (886ft below seabed).

4.5 Unit D

Unit D consists of the remaining portion of the shallow siliciclastic section between Horizon H20 and the Top of Salt.

The upper section of Unit D from -4,609ft to -4,670ft below sea surface (886ft to 947ft below seabed) is characterized by chaotic, poorly layered, low amplitude reflectors interpreted as clays, silts, and occasional sands.

The lower section of Unit D from -4,670ft to -4,913ft below sea surface (947ft to 1,208ft below seabed) is characterized by chaotic, moderately well layered, low and moderate amplitude reflectors interpreted as clays, silts, and several sands. Salt movement and uplift has affected this interval and may have created networks of small fractures within this interval that are generally below the resolution of the seismic data. Minor wellbore and drilling fluid circulation problems may occur within this interval. On occasions these salt-stressed and deformed sections can be a greater risk of shallow water flow, but other factors such as small-scale faults may have provided relief of any overpressures that could have been induced. However, as this is the potential well in this setting in the area, it is considered that a **Slight Shallow Water Flow Risk** is appropriate for the interval from -4,670ft to -4,931ft below sea surface (947ft to 1,208ft below seabed).

No risk of gas is predicted within Unit D at the proposed well, or within 2,000ft.

The well-path will traverse a fault at -4,820ft (1,097ft below seabed) downthrown to the north by around 10ft. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

The Top of Salt marks the base of Unit D, and of this assessment, at -4,931ft below sea surface (1,208ft below seabed).

4.6 Shallow Gas Assessment

No shallow gas is interpreted at the proposed well location.

4.7 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is assigned within the interval from -4,025ft to -4,181ft below sea surface (302ft to 458ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is assigned within the interval from -4,670ft to -4,931ft below sea surface (947ft to 1,208ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

No seabed hazards or problems are interpreted.

- Unit A

None Predicted.

- Unit B

Within Unit B, a **Slight Shallow Water Flow Risk** is assigned within the interval from -4,025ft to -4,181ft below sea surface (302ft to 458ft below seabed). Appropriate drilling methodology is recommended to deal with a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

The well-path will traverse two faults at -4,479ft below sea surface (756ft below seabed) and at -4,576ft below sea surface (853ft below seabed). Minor drilling fluid circulation and wellbore stability problems may occur. Casing seats should avoid all fault intersections as formation integrity could be compromised.

- Unit D

Within Unit D, a **Slight Shallow Water Flow Risk** is assigned within the interval from -4,670ft to -4,931ft below sea surface (947ft to 1,208ft below seabed). Appropriate drilling methodology is recommended to deal with a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible due to the possibility of numerous unresolvable faults.

The wellbore will penetrate a fault at -4,820ft below sea surface (1,097ft below seabed). Minor drilling fluid circulation and wellbore stability problems may occur. Casing seats should avoid all fault intersections as formation integrity could be compromised.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh	Denise Haigh
Geophysical Manager	Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:

Proposed MC80_P-L Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

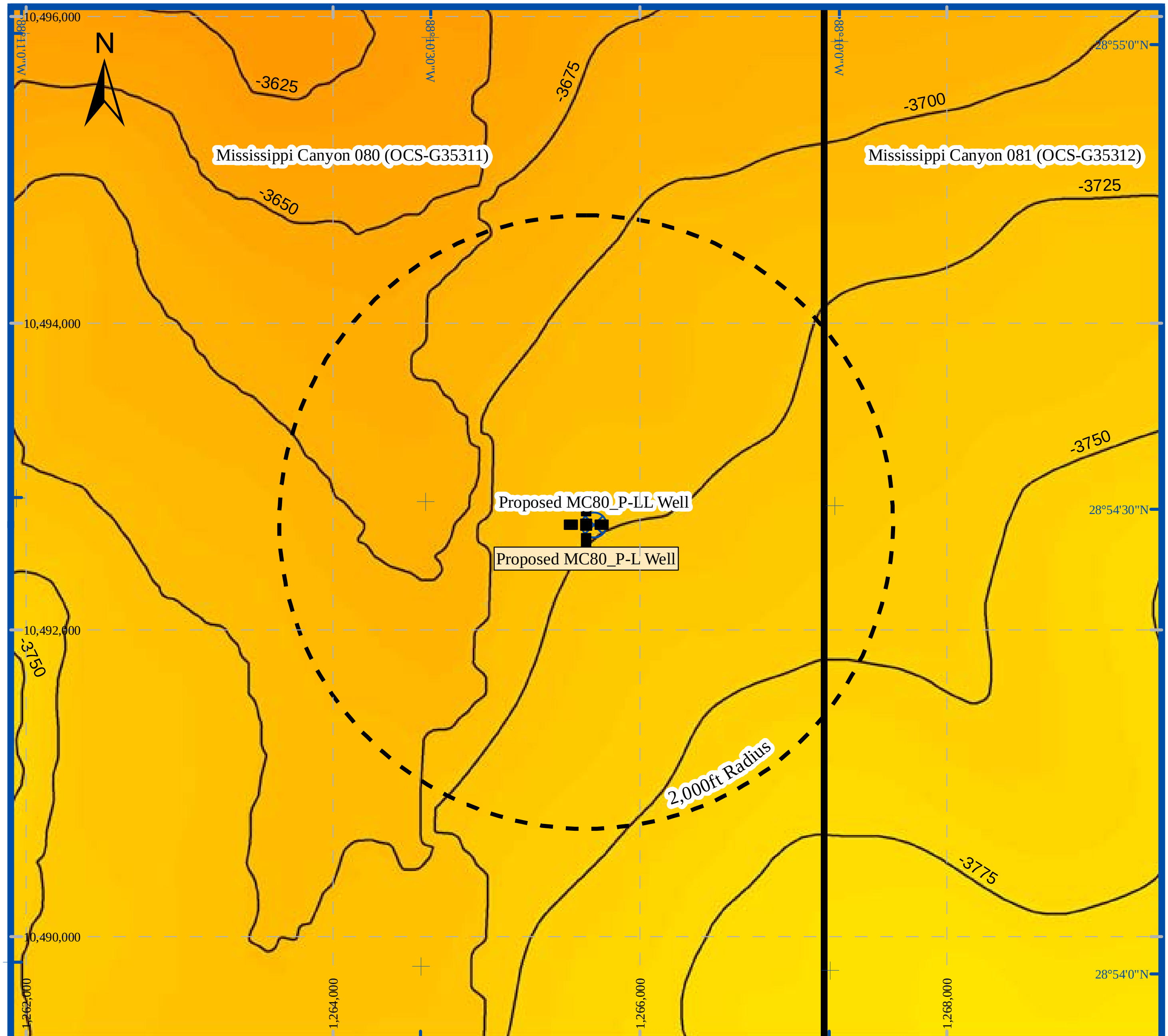
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC80_P-L Well Location
(1,265,650ft E / 10,492,687ft N)

Proposed MC80_P-LL Well Location

Block boundaries

-3723 Depth in feet below sea surface to seabed, contoured at 25ft intervals

Seabed Depth (Feet)

Chart Scale 1" = 1,000'

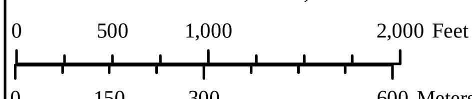
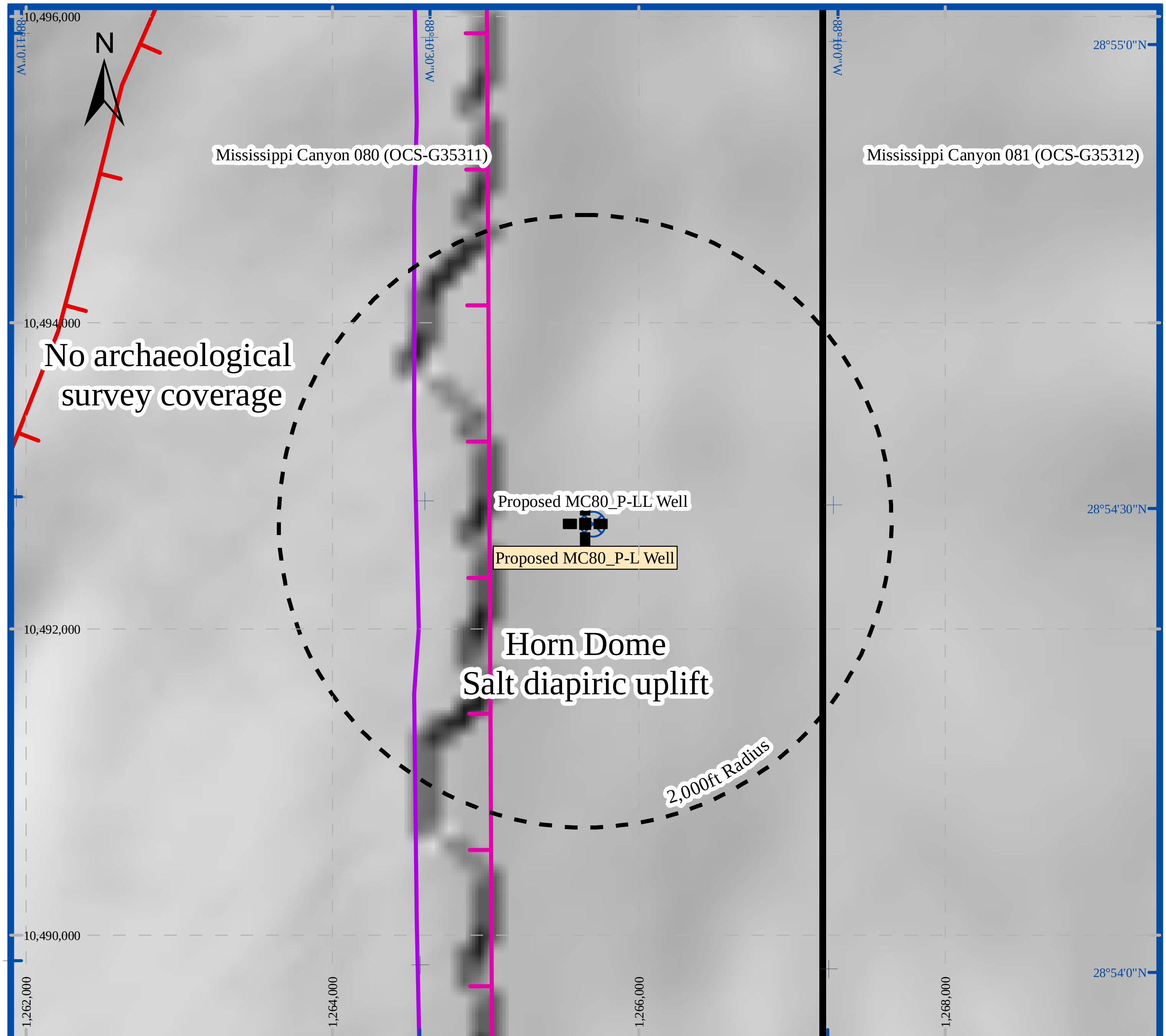


Figure 1
(MC80_P-L)



Seabed Morphology Extract

Proposed MC80_P-L Well Location (1,265,650ft E / 10,492,687ft N)

Proposed MC80_P-LL Well Location

Block boundaries

Boundary of AUV Multibeam Echo Sounder Data Coverage

Boundary of Side Scan Sonar Data Coverage

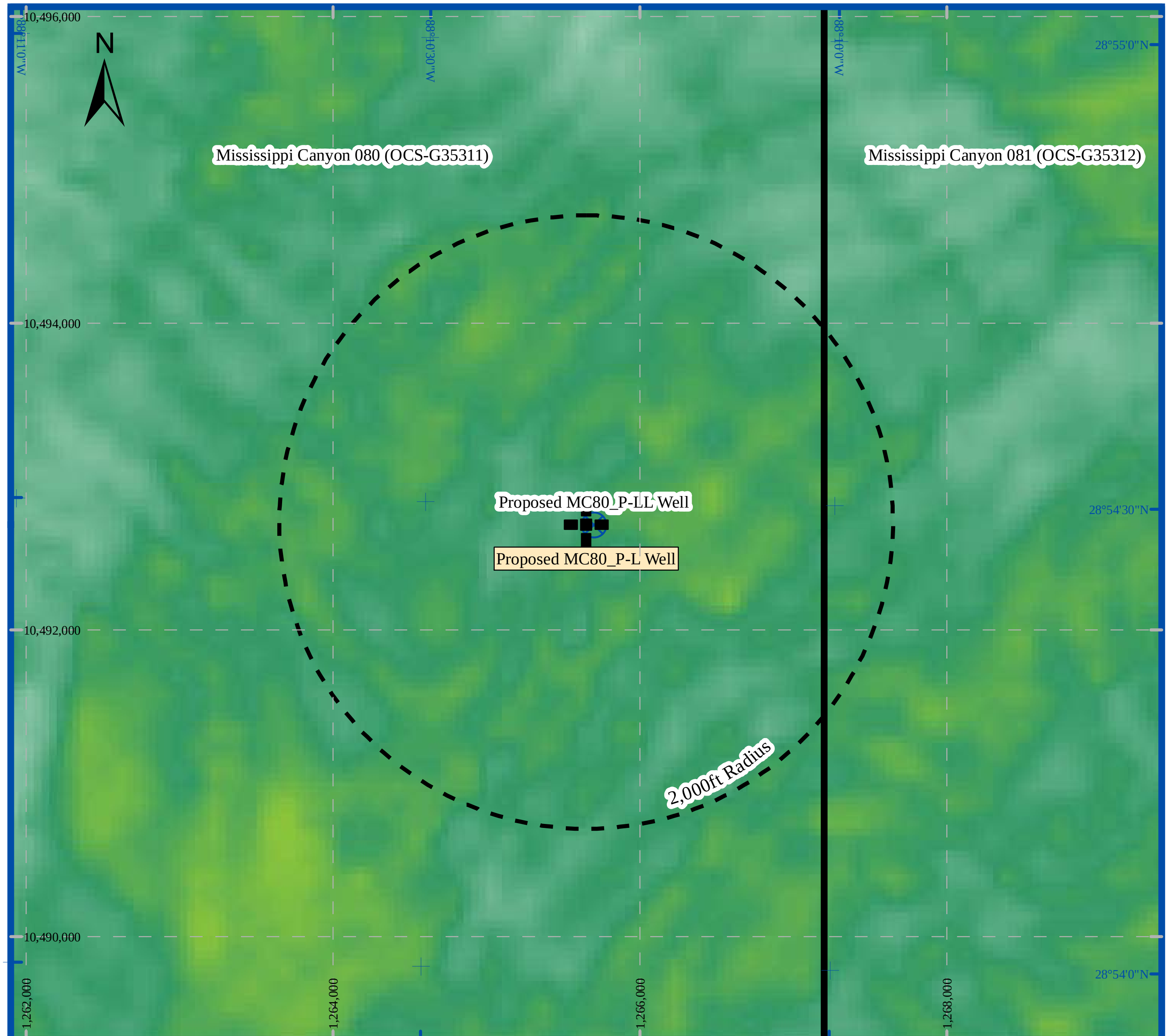
Seafloor fault intersection. Tick denotes downthrown block

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC80_P-L)

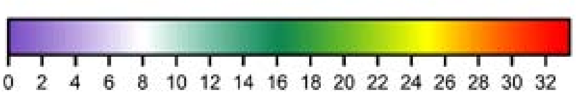


Seabed Amplitude Extract

Proposed MC80_P-L Well Location
(1,265,650ft E / 10,492,687ft N)

Proposed MC80_P-LL Well Location

Block boundaries



Relative Seabed Amplitude

Chart Scale 1" = 1,000'

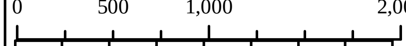
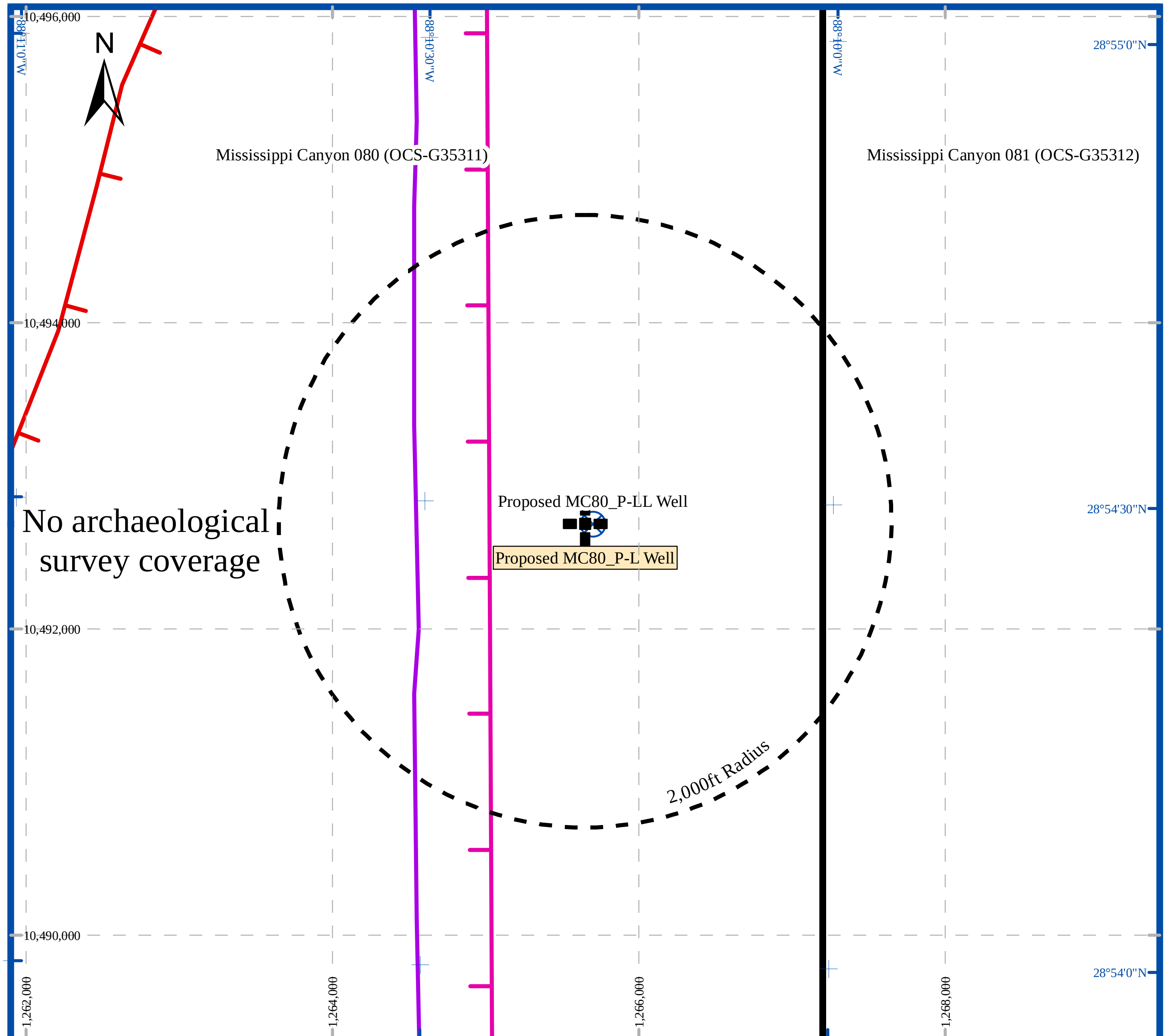


Figure 3
(MC80_P-L)



Geohazard Summary Extract

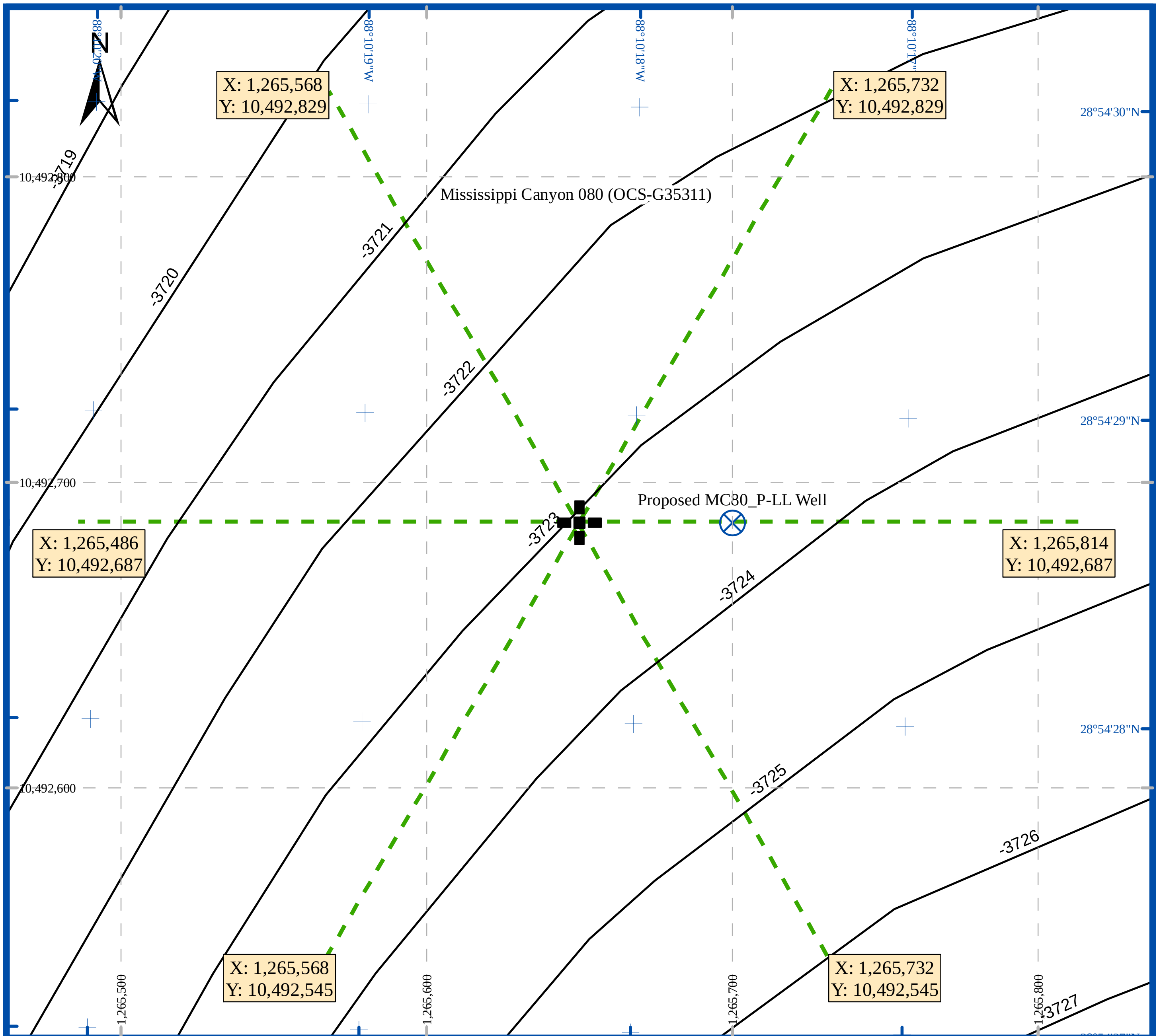
- Proposed MC80_P-L Well Location (1,265,650ft E / 10,492,687ft N)
- Proposed MC80_P-LL Well Location
- Block boundaries
- Boundary of AUV Multibeam Echo Sounder Data Coverage
- Boundary of Side Scan Sonar Data Coverage
- Seafloor fault intersection. Tick denotes downthrown block

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4 (MC80_P-L)



ROV Plat (MC80_P-L)

Proposed MC80_P-L Well Location
(1,265,650ft E / 10,492,687ft N)

Proposed MC80_P-LL Well Location

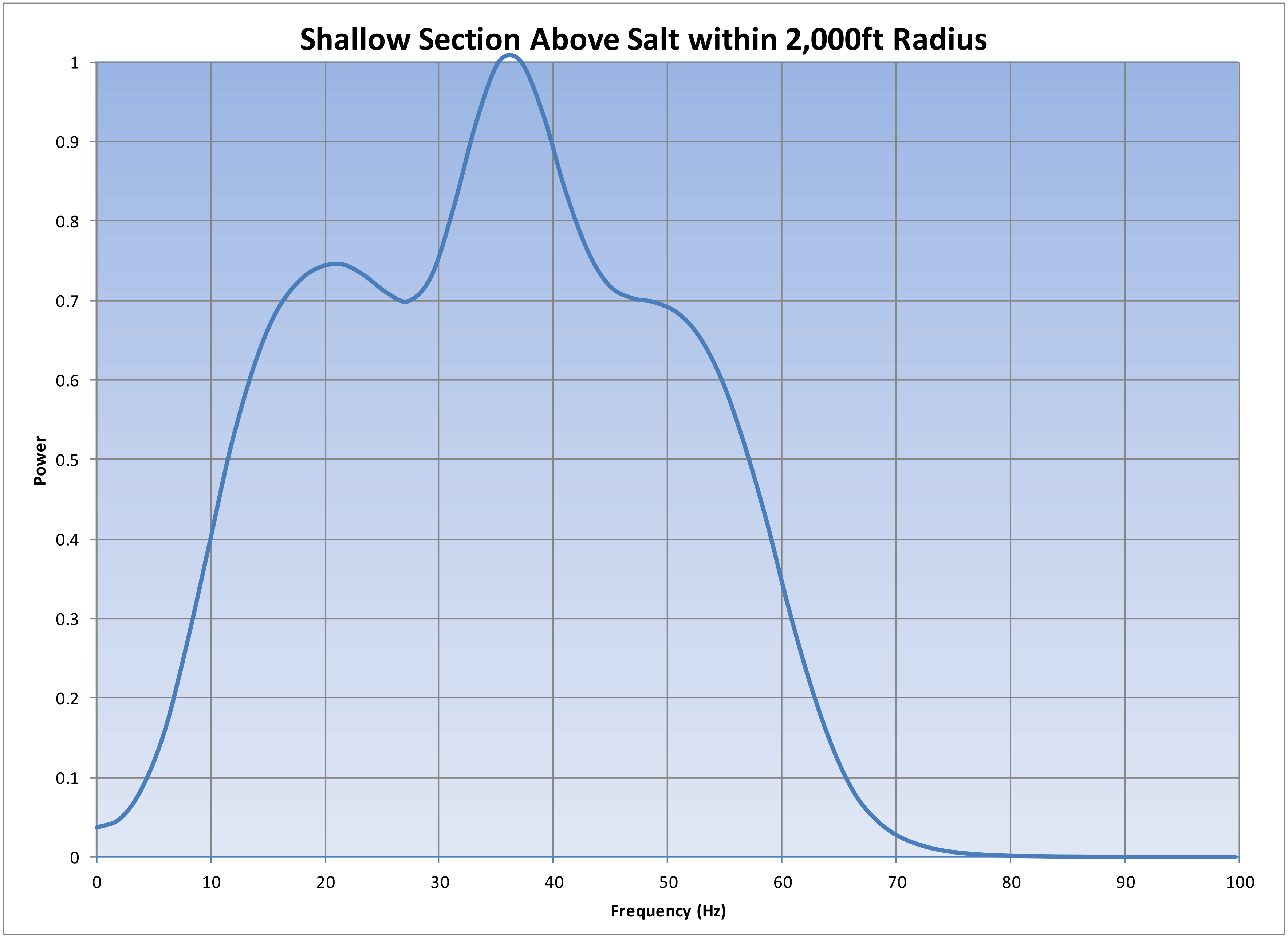
-3723 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC80_P-L)



MC80_P-L	Power Spectrum	Figure 10

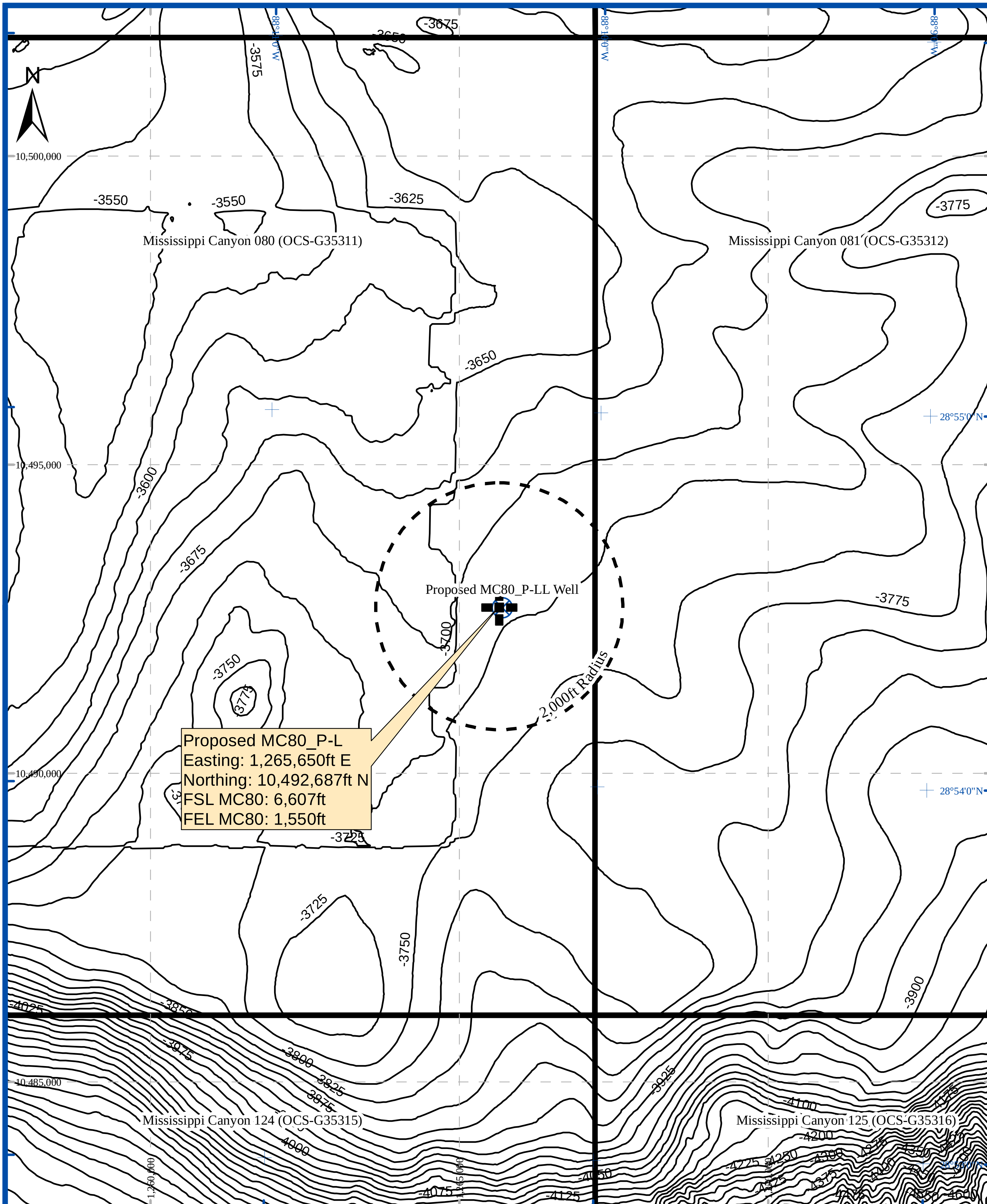


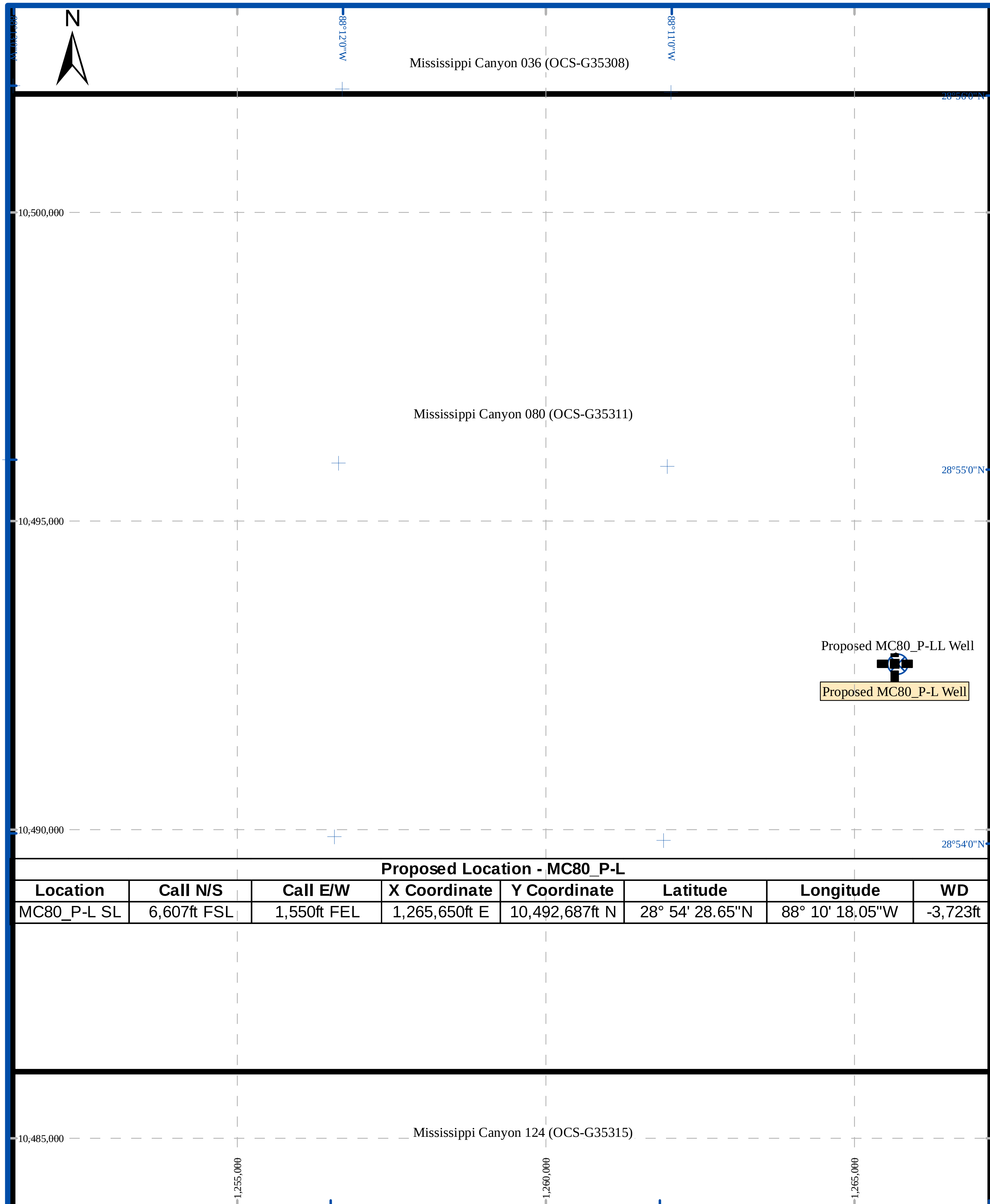
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC80_P-L							
Location	**Call N/S**	**Call E/W**	**X Coordinate**	**Y Coordinate**	**Latitude**	**Longitude**	**WD**
MC80_P-L SL	6,607ft FSL	1,550ft FEL	1,265,650ft E	10,492,687ft N	28° 54' 28.65"N	88° 10' 18.05"W	-3,723ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

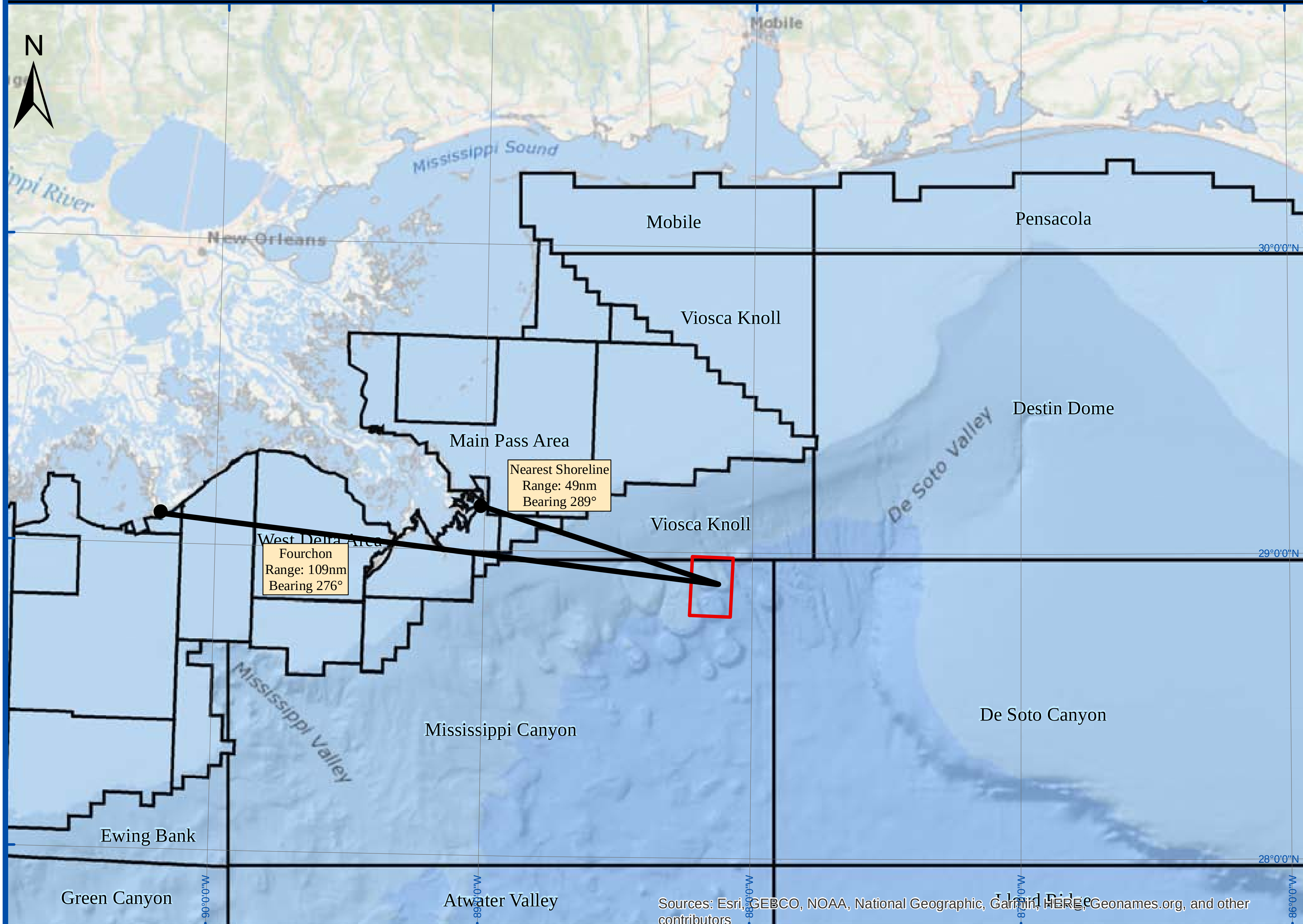
0 150 300 600 Meters

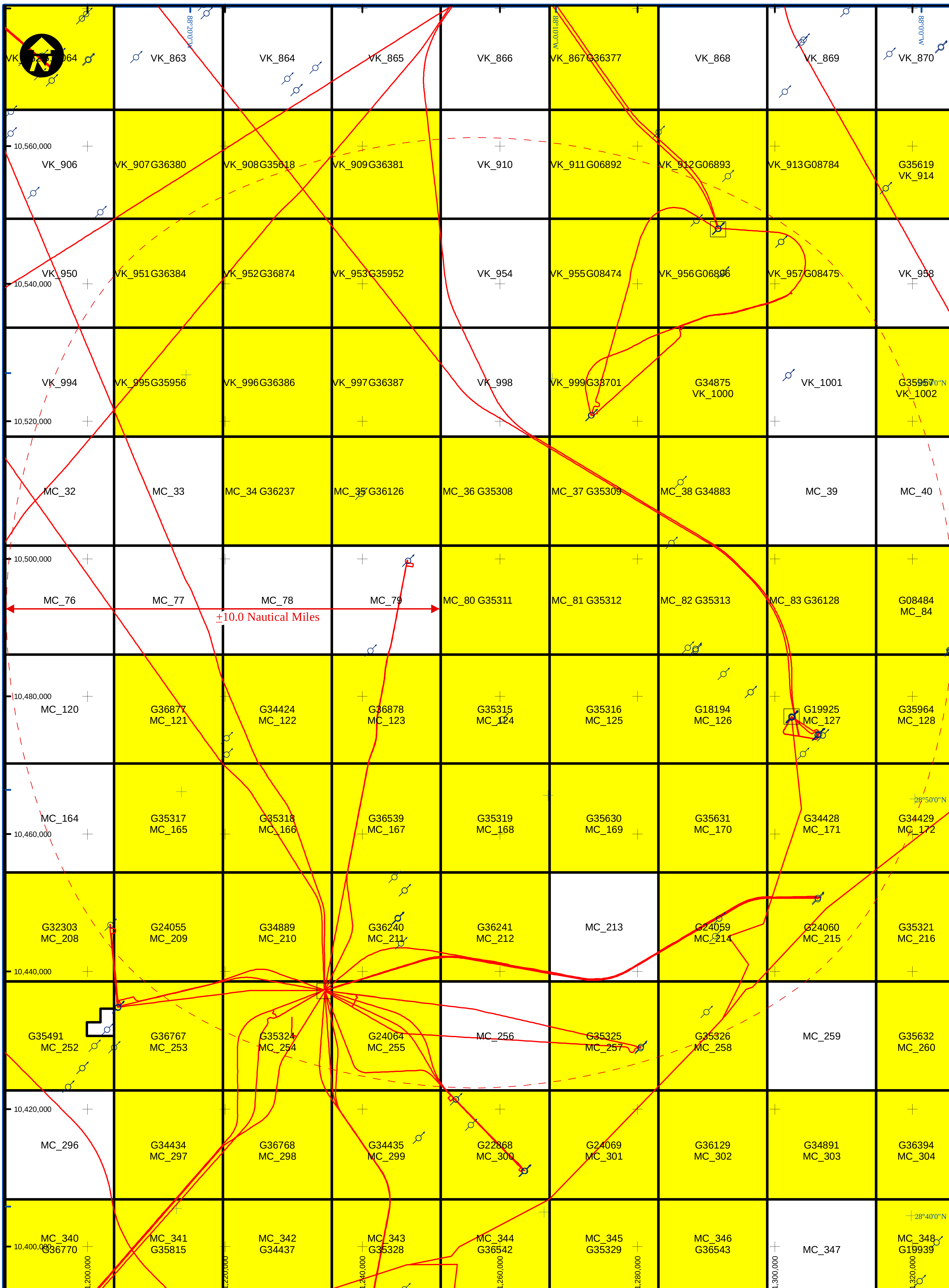
Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 80

Figure 13





Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 80

0 5 10 Miles

1 inch = 2.5 miles

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC80_P-L Well Location

September 09, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 80
(OCS-G 35311)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC80_P-L well location in Block 80, Mississippi Canyon Area (OCS-G-35311). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 1.949 seconds two-way time (TWT), -4,931ft below sea surface (1,208ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth to slightly-undulatory, with a gradient of 1.1° to the southeast. The proposed well is in the east-central of the salt diapiric uplift, with no problems anticipated. No seabed faults were identified within 2,000ft of the proposed well.

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

No seabed infrastructure occurs within a 2,000ft radius.

Sub-Seabed Hazards. Identified amplitude anomalies indicative of shallow gas do not occur within the 2,000ft radius. The vertical borehole will not penetrate any identified risk of gas anomalies. The well-path will penetrate two faults within Unit C, and a fault within Unit D. The faults may cause minor drilling fluid circulation and wellbore stability problems.

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

Proposed MC80_P-L Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54’	28.651”	North	Easting	1,265,650	US ft E
Longitude	88°	10’	18.052”	West	Northing	10,492,687	US ft N
Latitude Decimal			28.9079587				
Longitude Decimal			-88.171681				
FEL Mississippi Canyon 80			1,550ft	US ft	Inline	12665	
FSL Mississippi Canyon 80			6,607ft	US ft	Crossline	17337	
Water Depth: -3,723ft			Slope: 1.1° SE				
Nearest Shoreline			49 Nautical Miles @ 289°				
Port of Operation			Fourchon		109 Nautical Miles @ 276°		
Nearest Manned Platform			Horn Mountain in MC127		7.55 Miles @ 113°		

Proposed MC80_P-LL Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54’	28.656”	North	Easting	1,265,700	US ft E
Longitude	88°	10’	17.489”	West	Northing	10,492,687	US ft N
Latitude Decimal			28.9079601				
Longitude Decimal			-88.1715247				
FEL Mississippi Canyon 80			1,500ft	US ft	Inline	12665	
FSL Mississippi Canyon 80			6,607ft	US ft	Crossline	17341	
Water Depth: -3,724ft			Slope: 1.1° SE				
Nearest Shoreline			49 Nautical Miles @ 289°				
Port of Operation			Fourchon		109 Nautical Miles @ 276°		
Nearest Manned Platform			Horn Mountain in MC127		7.55 Miles @ 113°		

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

No risk of gas is interpreted. A **Slight Shallow Water Flow Risk** is assigned to a sand-rich interval in Unit B and within D.

Wellbore stability & drilling fluid circulation problems may occur at the faults intersecting the proposed well.

Sincerely,

Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC80_P-L Well Location

Anadarko Petroleum Corporation

September 09, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC80_P-L Well Location in Mississippi Canyon MC80 (OCS-G 35311)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC80_P-L well location in Block 80, Mississippi Canyon Area (OCS-G-35311). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities is located 9,704ft to the northwest.

Ocean Geo Solutions

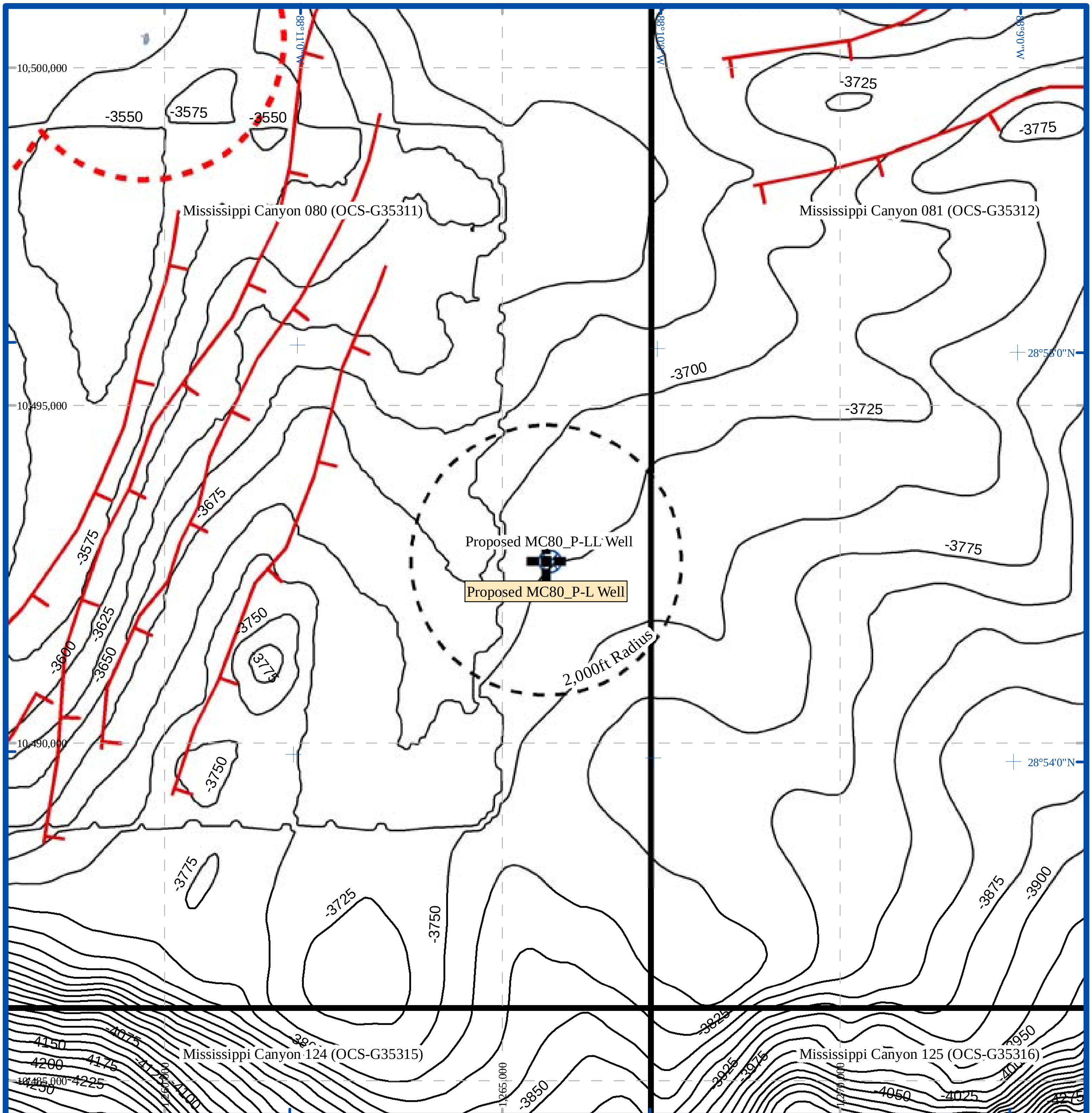
Proposed MC80_P-L Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					**UTM Zone 16 - CM 87° West**		
Latitude	28°	54'	28.651"	North	Easting	1,265,650	US ft E
Longitude	88°	10'	18.052"	West	Northing	10,492,687	US ft N
Latitude Decimal	28.9079587						
Longitude Decimal	-88.171681						
FEL Mississippi Canyon 80	1,550ft			US ft	Inline	12665	
FSL Mississippi Canyon 80	6,607ft			US ft	Crossline	17337	
Water Depth: -3,723ft	Slope: 1.1° SE						
Nearest Shoreline	49 Nautical Miles @ 289°						
Port of Operation	Fourchon				109 Nautical Miles @ 276°		
Nearest Manned Platform	Horn Mountain in MC127				7.55 Miles @ 113°		

Proposed MC80_P-LL Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					**UTM Zone 16 - CM 87° West**		
Latitude	28°	54'	28.656"	North	Easting	1,265,700	US ft E
Longitude	88°	10'	17.489"	West	Northing	10,492,687	US ft N
Latitude Decimal	28.9079601						
Longitude Decimal	-88.1715247						
FEL Mississippi Canyon 80	1,500ft			US ft	Inline	12665	
FSL Mississippi Canyon 80	6,607ft			US ft	Crossline	17341	
Water Depth: -3,724ft	Slope: 1.1° SE						
Nearest Shoreline	49 Nautical Miles @ 289°						
Port of Operation	Fourchon				109 Nautical Miles @ 276°		
Nearest Manned Platform	Horn Mountain in MC127				7.55 Miles @ 113°		

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

Conclusions and Recommendations: The proposed MC80_P-L and proposed MC80_P-LL well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



Proposed MC80_P-L Well Location (1,265,650ft E / 10,492,687ft N)

Proposed MC80_P-LL Well Location

Block boundaries

-3723 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

Attachment C-4

Well Clearance Letter for **Anadarko Petroleum Corporation**

Project:
Peach Prospect
Mississippi Canyon, Block MC80,
Offshore Gulf of Mexico

Description:
Proposed MC80_P-M Well Location

Project Number:
2020-316

Report Status:
Final

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

REPORT AUTHORISATION AND DISTRIBUTION

Compilation	Geophysics	L Fuentes
Authorization	Geophysics	…………………. A Haigh
	Quality Assurance	…………………. D Haigh

Revision	**Date**	**Title**	**Note**
0	August 19, 2020	Draft	
1	September 02, 2020	2nd Draft	Minor location coordinate change
2	September 09, 2020	Final	

Distribution

1 copy

Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

For the attention of:
Faye Geiger

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care, diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work, carried out under the contract. As such, the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and, unless clearly stated, is not a recommendation of any course of action.

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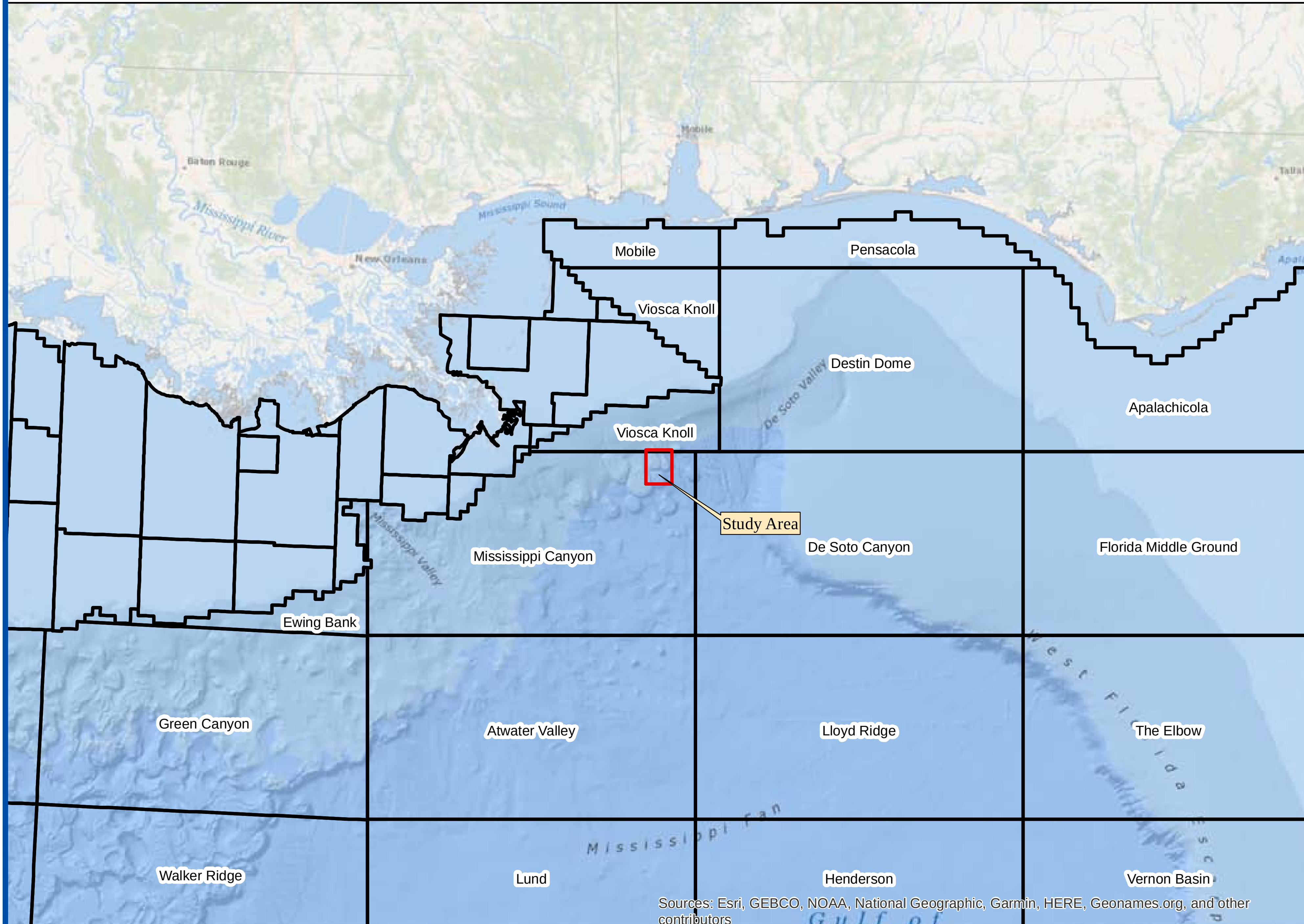
OCEAN GEO SOLUTIONS, INC
8399 Westview Dr, Suite 200, Houston, Texas 77055, USA
Telephone 713 481 4630 Fax 713 464 8275
www.oceangeosolutions.com

Location Map



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WELL CLEARANCE LETTER – PROPOSED MC80_P-M WELL LOCATION

September 9, 2020
Anadarko Petroleum Corporation
1201 Lake Robbins Drive
The Woodlands, TX 77380

Attention: **Faye Geiger**

Well Clearance Letter
Proposed MC80_P-M Well Location
Mississippi Canyon Block MC80
Offshore Gulf of Mexico

Ocean Geo Solutions Inc. was contracted by Anadarko Petroleum Corporation to prepare a Well Clearance Letter for the proposed MC80_P-M Well Location in Block 80, Mississippi Canyon Area (OCS-G- 35311). This assessment addresses seafloor and shallow geologic conditions that may impact drilling operations within 2,000ft of the proposed well site. The depth limit of this geohazard assessment is 1.949 seconds two-way time (TWT), -4,931ft below sea surface (1,208ft below seabed). We understand that Anadarko Petroleum Corporation plans to drill the proposed development well from a dynamically positioned drillship; therefore, an anchoring assessment was not requested. Relevant letter-size chart extracts, data examples, and a Top-Hole Prognosis are presented with this Well Clearance Letter.

3D Geophysical Survey. Anadarko Petroleum Corporation provided the 3D dataset to Ocean Geo Solutions Inc. in SEG-Y format for loading onto a Kingdom Suite workstation. Inlines are oriented northwest to southeast, have a numerical increment of one, and exhibit a line spacing of 98.4ft. Crosslines are oriented northeast to southwest, have a numerical increment of four, and exhibit a line spacing of 82.02ft. Sample rate of the data was 4ms, and record length is 4 seconds.

The data presents an acceptable frequency response across the upper one second below seabed, with an effective frequency range at 50% power of 10-58Hz. The data exhibits a dominant frequency in the siliciclastic section above shallow salt of approximately 41Hz plus significant higher usable frequencies above 50Hz, resulting in a mean vertical resolvability of typically 32ft and a layer detectability of 8ft.

The dataset was a time-stretched version of the raw (no Q compensation applied) Kirchoff pre-stack depth migration of the speculative TGS Declaration multi-wide azimuth (MWAZ) data. The time-stretching was done using the final migration velocity model. The MWAZ data are a merge of two orthogonal Declaration and Justice WAZ datasets.

Spectral whitening was applied to the data set as a post-processing step to improve interpretability.

In summary and with reference to NTL No. 2008-G04:

a) The data provides imaging of sufficient resolution of the shallow section, allowing a clear analysis of the shallow conditions.
b) The data can be loaded to a workstation at 16-bit resolution or greater and is unscaled.

c) There is no trace or sample decimation.
d) The sample interval and bin size are maintained throughout the assessment area.
e) The data possess a frequency content of 50Hz or higher at 50% power across the first second below seabed.
f) Seabed reflection is free of gaps and is defined by a wavelet of stable shape and phase, allowing auto-tracking of the seabed event with minimum user intervention and guidance.
g) There are no significant acquisition artifacts throughout the dataset. A slight northwest to southeast and northeast to southwest banding occurs in amplitudes, but this does not impede the identification of geohazards.
h) There are no merge points in the data.
i) Processed bin size is 98.4ft x 82.02ft.
j) The sample rate of the data is 4ms.
k) An accurate velocity model has been utilized in the shallow section, allowing optimum structural and stratigraphy resolution with no evidence of under- or over-migration.
l) There is no significant multiple energy.

The proposed activities are within an area defined by BOEM as having high archaeological potential (see NTL No. 2011-JOINT-G-01). In accordance with stipulations for archaeological assessment, an archeological report was previously prepared that together cover the Proposed MC80-_P-M well location:

- C&C Technologies, December 2014 - Archeological for blocks VK1000 & 1001, MC36-38, MC81, MC124-125, and MC168 for Freeport McMoran Oil & Gas.

This report also covers the eastern part of block MC80 and the proposed wellsite location. This report is presented under a separate cover.

Multibeam Echo Sounder, Side Scan Sonar and Sub-Bottom Profiler data from these AUV surveys were also supplied. The datasets were of excellent quality.

1. LOCATION COORDINATES

1.1 Proposed Well Location

Proposed MC80_P-M Well Location lies in the east-central part of Block MC80 (OCS-G-35311).

Proposed MC80_P-M Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54’	28.156”	North	Easting	1,265,650	US ft E
Longitude	88°	10’	18.046”	West	Northing	10,492,637	US ft N
Latitude Decimal			28.9078212				
Longitude Decimal			-88.1716794				
FEL Mississippi Canyon 80			1,550ft	US ft	Inline	12665	
FSL Mississippi Canyon 80			6,557ft	US ft	Crossline	17337	
Water Depth: -3,723ft			Slope: 1.1° SE				
Nearest Shoreline			49 Nautical Miles @ 289°				
Port of Operation			Fourchon		109 Nautical Miles @ 276°		
Nearest Manned Platform			Horn Mountain in MC127		7.55 Miles @ 113°		

Proposed MC80_P-MM Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54’	28.161”	North	Easting	1,265,700	US ft E
Longitude	88°	10’	17.483”	West	Northing	10,492,637	US ft N
Latitude Decimal			28.9078225				
Longitude Decimal			-88.1715231				
FEL Mississippi Canyon 80			1,500ft	US ft	Inline	12665	
FSL Mississippi Canyon 80			6,557ft	US ft	Crossline	17337	
Water Depth: -3,722ft			Slope: 1.1° SE				
Nearest Shoreline			49 Nautical Miles @ 289°				
Port of Operation			Fourchon		109 Nautical Miles @ 276°		
Nearest Manned Platform			Horn Mountain in MC127		7.55 Miles @ 113°		

Location MC80_P-MM is 50ft from MC80_P-M on a bearing of 90.0°.

2. VELOCITY DATA

2.1 Seabed Depth

Water depths derived for the AUV archaeological surveys was utilized over most of the study area, including the eastern part of MC80 covering the proposed MC80_P-M well location.

Where 3D data seafloor was utilized time-to-depth conversion used the Advocate & Hood formula:

Depth (ft)=
(0.1105-(5066.9193*(A/2))+(468.6693*(A/2)^2)-(554.7107*(A/2)^3)+(340.7019*(A/2)^4)-(116.991*(A/2)^5)+(20.728*(A/2)^6)-(1.4658*(A/2)^7))

Where A is One Way Time to seabed in Seconds

2.1 Sub-seabed Depth

Anadarko Petroleum Corporation provided 3D seismic data as two-way time volumes. Horizons mapped in TWT were converted to depth below seabed using a sediment velocity polynomial.

Depth (ft) = 364.97* A^2 + 2539*A
Where A is Two-way time in seconds.

Depths below seabed were then added to water depths to obtain structure depths.

3. SEABED CONDITIONS

3.1 Seabed Depth

Water depth at the proposed MC80_P-M well location is -3,723ft below sea surface (Figure 1). The seafloor slopes to the southeast at 1.1°.

3.2 Seafloor Morphology and Man-Made Features

The proposed MC80_P-M well location is in the east-central part of block MC80. The proposed well is located in an area of relatively smooth to slightly undulated seabed atop a salt diapiric uplift (Horn Dome).

The seabed within a 2,000ft radius of the proposed well is generally smooth and slightly undulated, as the well is located near the center of the salt diapiric uplift. Surface undulations are due to the presence of faulting in the underlying intervals above the shallow salt. The faults do not reach the seabed, rather, their expression is seen at the seabed as undulations. No significant seabed features were observed within 2,000ft.

Clays and silts are predicted at the seabed.

No existing wells or pipelines occur within the 2,000ft radius.

There are no anomalous seabed amplitudes indicative of hydrocarbon macroseepage observed within a 2,000ft radius of the proposed location (Figure 3). Therefore, no features or areas that could support high-density sensitive sessile benthic communities are located within 2,000ft of any mud or cuttings location.

4. SUB-SEABED CONDITIONS

4.1 Geology and Lithology

The sub-seabed geology has been divided into four units, A, B, C, and D. These are separated by Horizons H05, H10, H20, and Top of Salt (Figures 4 through 8).

4.2 Unit A

Unit A from seabed to -3,934ft below sea surface (211ft below seabed) is characterized by well-layered, low- and slightly moderate-amplitude reflectors interpreted as clays and silts with occasional sands.

No risk of gas or shallow water flow is interpreted within Unit A at the well location or within 2,000ft.

The well-path will not traverse any faults within Unit A.

Horizon H05 marks the base of Unit A occurring at -3,934ft below sea surface (211ft below seabed).

4.3 Unit B

The upper part of Unit B, from -3,934ft to -4,025ft below sea surface (211ft to 302ft below seabed), displays generally low-amplitude reflectors, and is interpreted as layered clays and silts with occasional sands.

From -4,025ft to -4,181ft below sea surface (302ft to 458ft below seabed) the stratigraphy displays seismically as moderate-amplitude reflectors interpreted as layered clays and silts, with several sands. Due to the increased frequency of sand interbeds and the possibility that these may contain small amounts of fluid, a **Slight Shallow Water Flow Risk** is interpreted. Additionally, minor wellbore stability and drilling fluid circulation problems may occur within this interval.

The lower part of Unit B from -4,181ft to -4,460ft below sea surface (458ft to 737ft below seabed) displays generally low-amplitude reflectors interpreted as layered clays, silts, and occasional sands.

No risk of gas is assigned to Unit B at the proposed well location or within 2,000ft.

The well-path will not traverse any faults within Unit B.

Horizon H10 marks the base of Unit B, occurring at -4,460ft below sea surface (737ft below seabed).

4.4 Unit C

Unit C from -4,460ft to -4,609ft below sea surface (737ft to 886ft below seabed) is characterized by well-layered, low-amplitude reflectors interpreted as clays, silts, and occasional minor sands.

The well-path will traverse two faults at -4,479ft (756ft below seabed) and at -4,576ft below sea surface (853ft below seabed). The upper fault is downthrown to the south by around 10ft, and the lower fault is downthrown to the north by around 20ft. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the faults.

No risk of gas is predicted within Unit C at the proposed well, or within 2,000ft.

Horizon H20 marks the base of Unit C, and of this assessment, at -4,609ft below sea surface (886ft below seabed).

4.5 Unit D

Unit D consists of the remaining portion of the shallow siliciclastic section between Horizon H20 and the Top of Salt.

The upper part of Unit D from -4,609ft to -4,670ft below sea surface (886ft to 947ft below seabed) is characterized by chaotic, poorly-layered, low amplitude reflectors interpreted as clays, silts, and occasional sands.

The lower section of Unit D from -4,670ft to -4,931ft below sea surface (947ft to 1,208ft below seabed) is characterized by chaotic, moderately well layered, low and moderate amplitude reflectors interpreted as clays, silts, and several sands. Salt movement and uplift has affected this interval and may have created networks of small fractures within this interval that are generally below the resolution of the seismic data. Minor wellbore and drilling fluid circulation problems may occur within this interval. On occasions these salt-stressed and deformed sections can be a greater risk of shallow water flow, but other factors such as small-scale faults may have provided relief of any overpressures that could have been induced. However, as this is the potential well in this setting in the area, it is considered that a **Slight Shallow Water Flow Risk** is appropriate for the interval from -4,670ft to -4,931ft below sea surface (947ft to 1,208ft below seabed).

No risk of gas is predicted within Unit D at the proposed well, or within 2,000ft.

The well-path will traverse a fault at -4,820ft (1,097ft below seabed) downthrown to the north by around 10ft. Minor wellbore stability and drilling fluid circulation problems may occur at the level of the fault.

The Top of Salt marks the base of Unit D, and of this assessment, at -4,931ft below sea surface (1,208ft below seabed).

4.6 Shallow Gas Assessment

No shallow gas is interpreted at the proposed well location.

4.7 Shallow Water Flow Assessment

Within Unit B, a **Slight Shallow Water Flow Risk** is assigned within the interval from -4,025ft to -4,181ft below sea surface (302ft to 458ft below seabed).

Within Unit D, a **Slight Shallow Water Flow Risk** is assigned within the interval from -4,670ft to -4,931ft below sea surface (947ft to 1,208ft below seabed).

5. CONCLUSIONS AND RECOMMENDATIONS

- Seabed

  No seabed hazards or problems are interpreted.

- Unit A

  None Predicted.

- Unit B

  Within Unit B, a **Slight Shallow Water Flow Risk** is assigned within the interval from -4,025ft to -4,181ft below sea surface (302ft to 458ft below seabed). Appropriate drilling methodology is recommended to deal with a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible.

- Unit C

  The well-path will traverse two faults at -4,479ft below sea surface (756ft below seabed) and at -4,576ft below sea surface (853ft below seabed). Minor drilling fluid circulation and wellbore stability problems may occur. Casing seats should avoid all fault intersections as formation integrity could be compromised.

- Unit D

  Within Unit D, a **Slight Shallow Water Flow Risk** is assigned within the interval from -4,670ft to -4,931ft below sea surface (947ft to 1,208ft below seabed). Appropriate drilling methodology is recommended to deal with a short-lived non-persistent possible water flow event. Minor wellbore stability and drilling fluid circulation problems are also considered possible due to the possibility of numerous unresolvable faults.

  The wellbore will penetrate a fault at -4,820ft below sea surface (1,097ft below seabed). Minor drilling fluid circulation and wellbore stability problems may occur. Casing seats should avoid all fault intersections as formation integrity could be compromised.

We appreciate the opportunity to work with you on this project and look forward to continuing as your geohazards consultants. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Ocean Geo Solutions Inc.

Andrew Haigh
Geophysical Manager

Denise Haigh
Quality Assurance

Copies Submitted: 1 copy to Faye Geiger at Anadarko Petroleum Corporation

Attachments:
Proposed MC80_P-M Well Location

Seabed Depth Extract

Seabed Morphology Extract

Seabed Amplitude Extract

Geohazard Summary Extract

Sand Lithology Summary Extract

Inline Data Example

Crossline Data Example

Top Hole Prognosis

ROV Plat

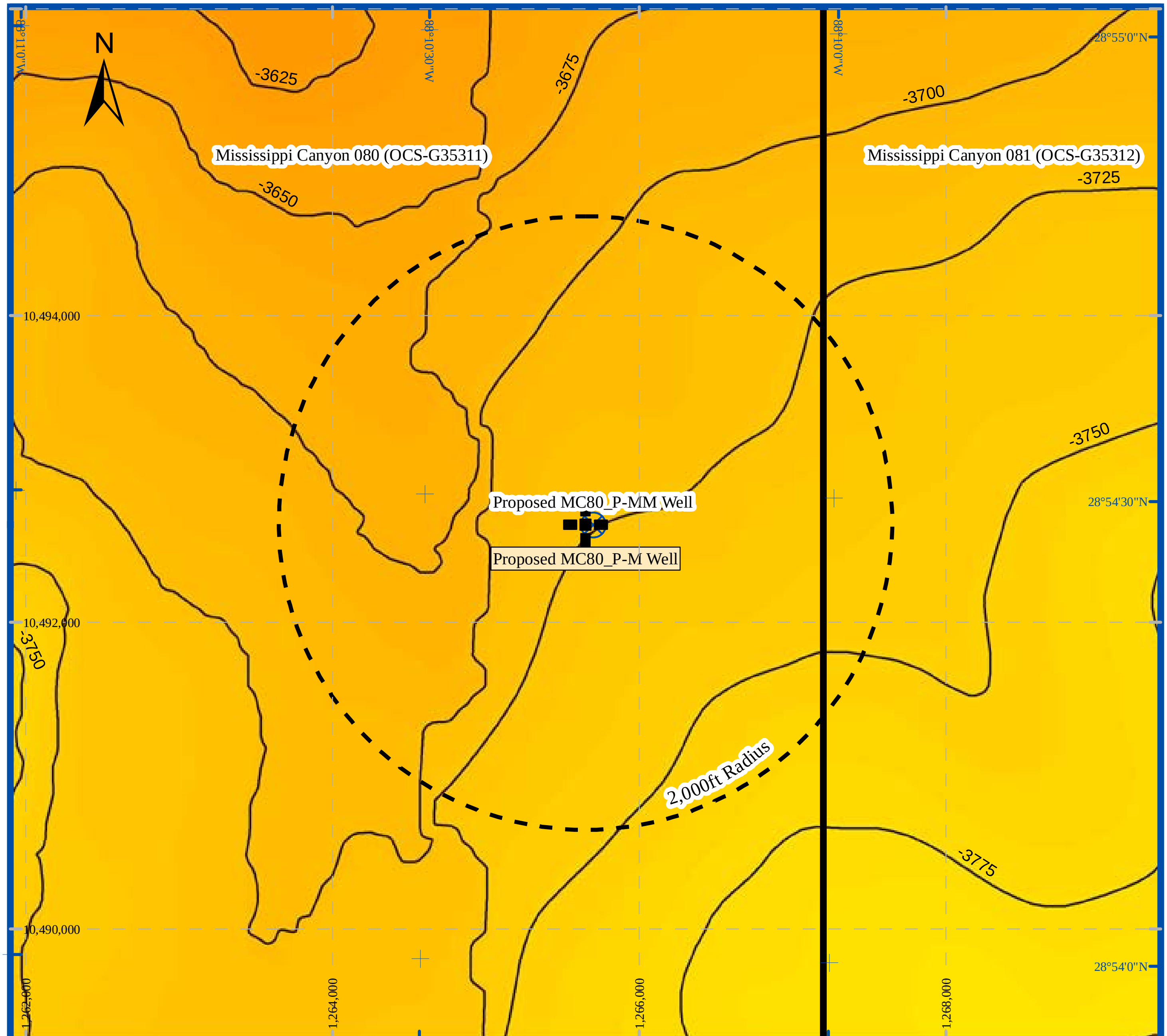
Power Spectrum

Bathymetry Plat

Public Information Plat

Vicinity Plat

10-Mile Radius Plat



Seabed Depth Extract

Proposed MC80_P-M Well Location (1,265,650ft E / 10,492,637ft N)

Proposed MC80_P-MM Well Location

Block boundaries

-3723 Depth in feet below sea surface to seabed, contoured at 25ft intervals

-5400 -5000 -4600 -4200 -3800 -3400

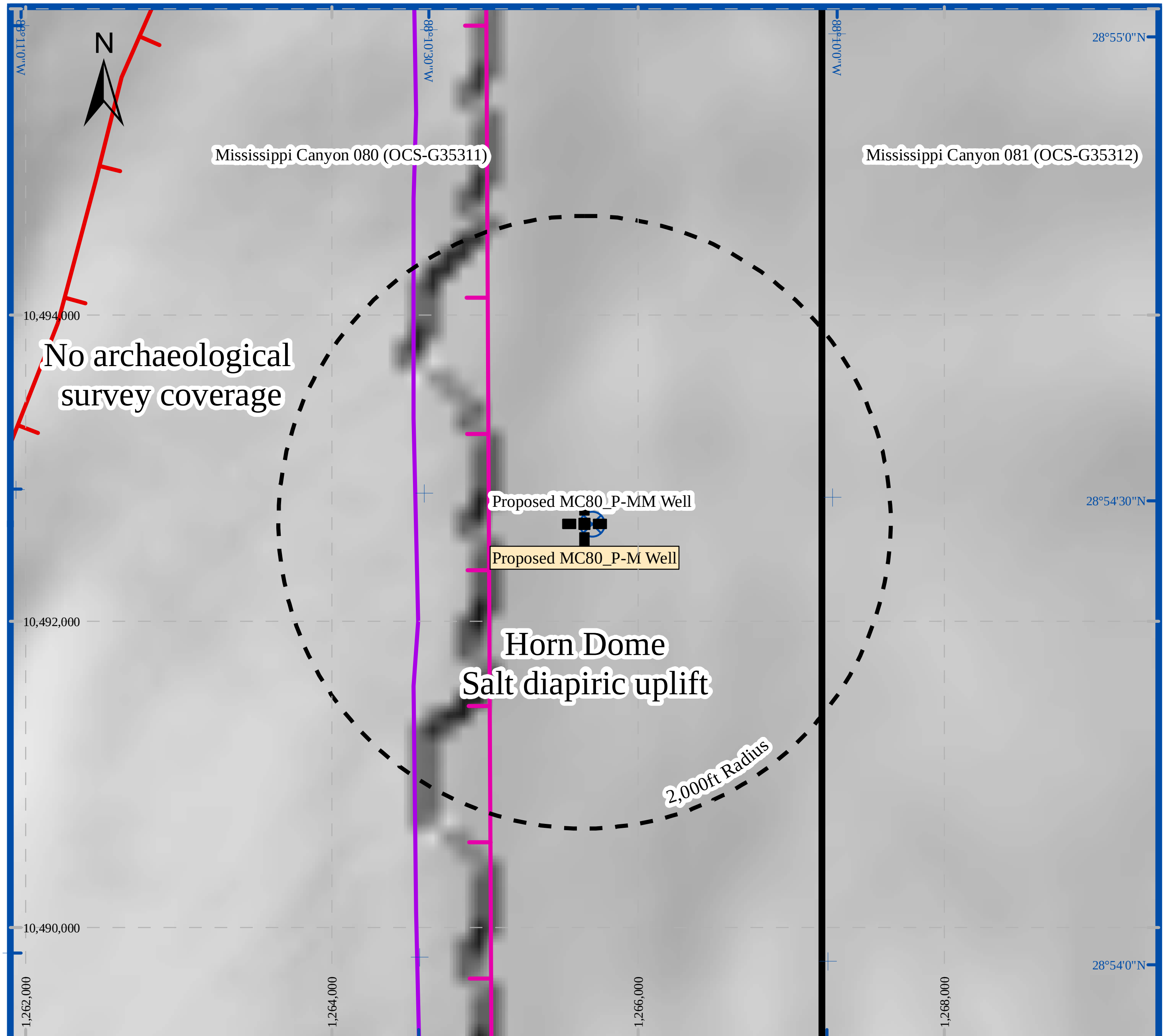
Seabed Depth (Feet)

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 1
(MC80_P-M)



Seabed Morphology Extract

Proposed MC80_P-M Well Location
(1,265,650ft E / 10,492,637ft N)

Proposed MC80_P-MM Well Location

Block boundaries

Boundary of AUV Multibeam Echo Sounder Data Coverage

Boundary of Side Scan Sonar Data Coverage

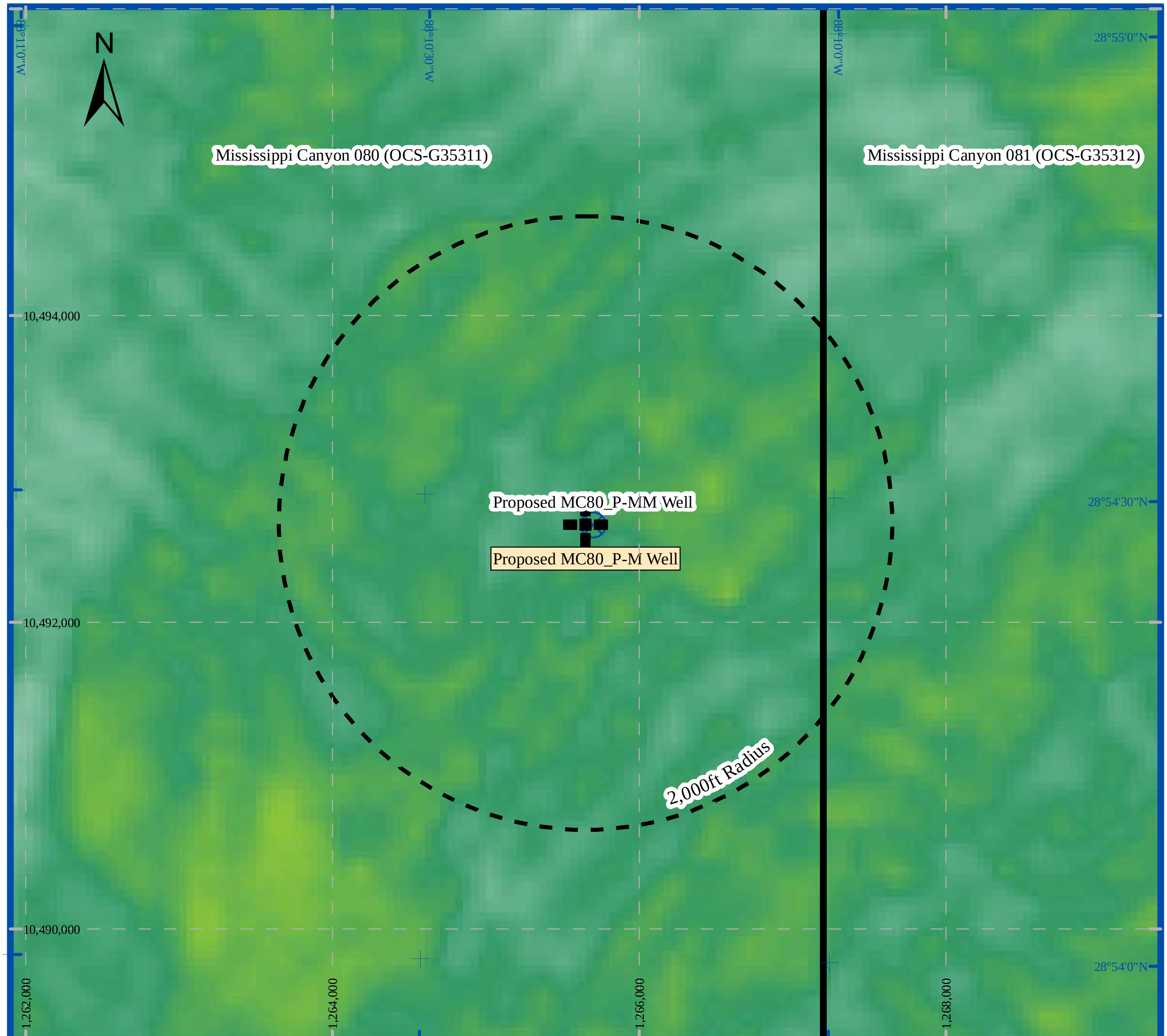
Seafloor fault intersection. Tick denotes downthrown block

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 2
(MC80_P-M)

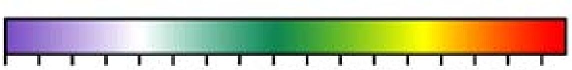


Seabed Amplitude Extract

Proposed MC80_P-M Well Location
(1,265,650ft E / 10,492,637ft N)

Proposed MC80_P-MM Well Location

Block boundaries



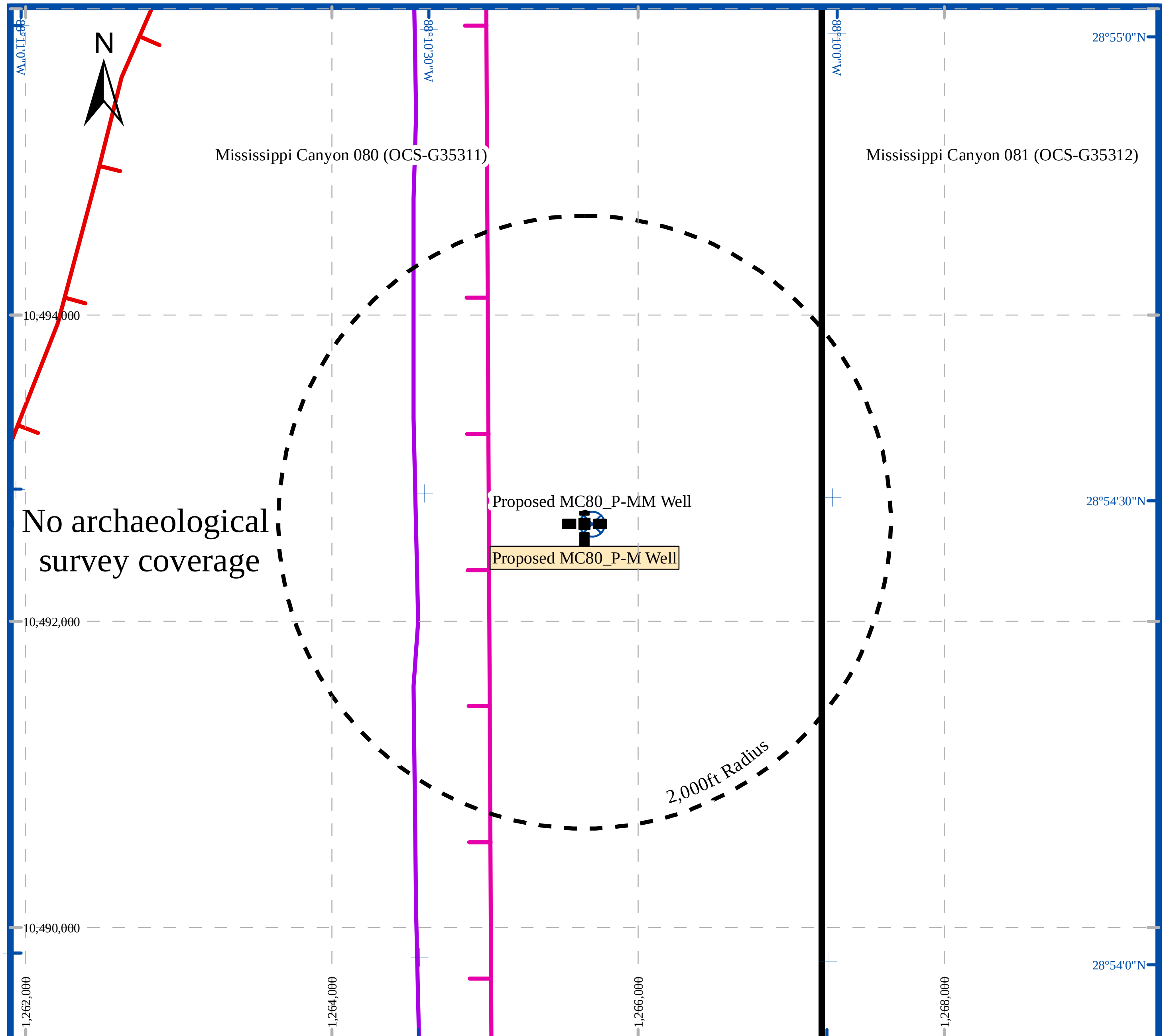
Relative Seabed Amplitude

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 3
(MC80_P-M)



Geohazard Summary Extract

Proposed MC80_P-M Well Location (1,265,650ft E / 10,492,637ft N)

Proposed MC80_P-MM Well Location

Block boundaries

Boundary of AUV Multibeam Echo Sounder Data Coverage

Boundary of Side Scan Sonar Data Coverage

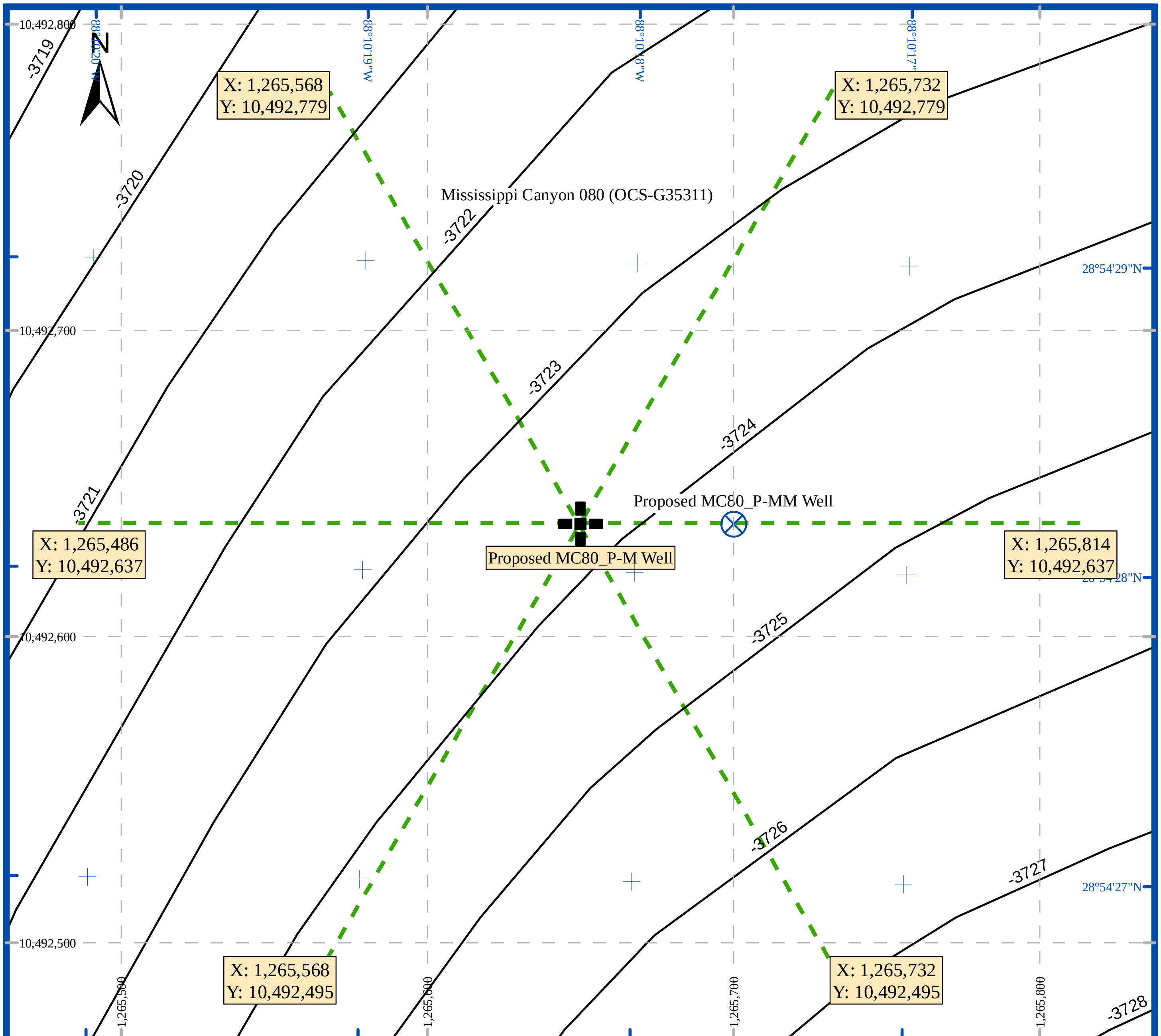
Seafloor fault intersection. Tick denotes downthrown block

Chart Scale 1" = 1,000'

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Figure 4 (MC80_P-M)



ROV Plat (MC80_P-M)

Proposed MC80_P-M Well Location
(1,265,650ft E / 10,492,637ft N)

Proposed MC80_P-MM Well Location

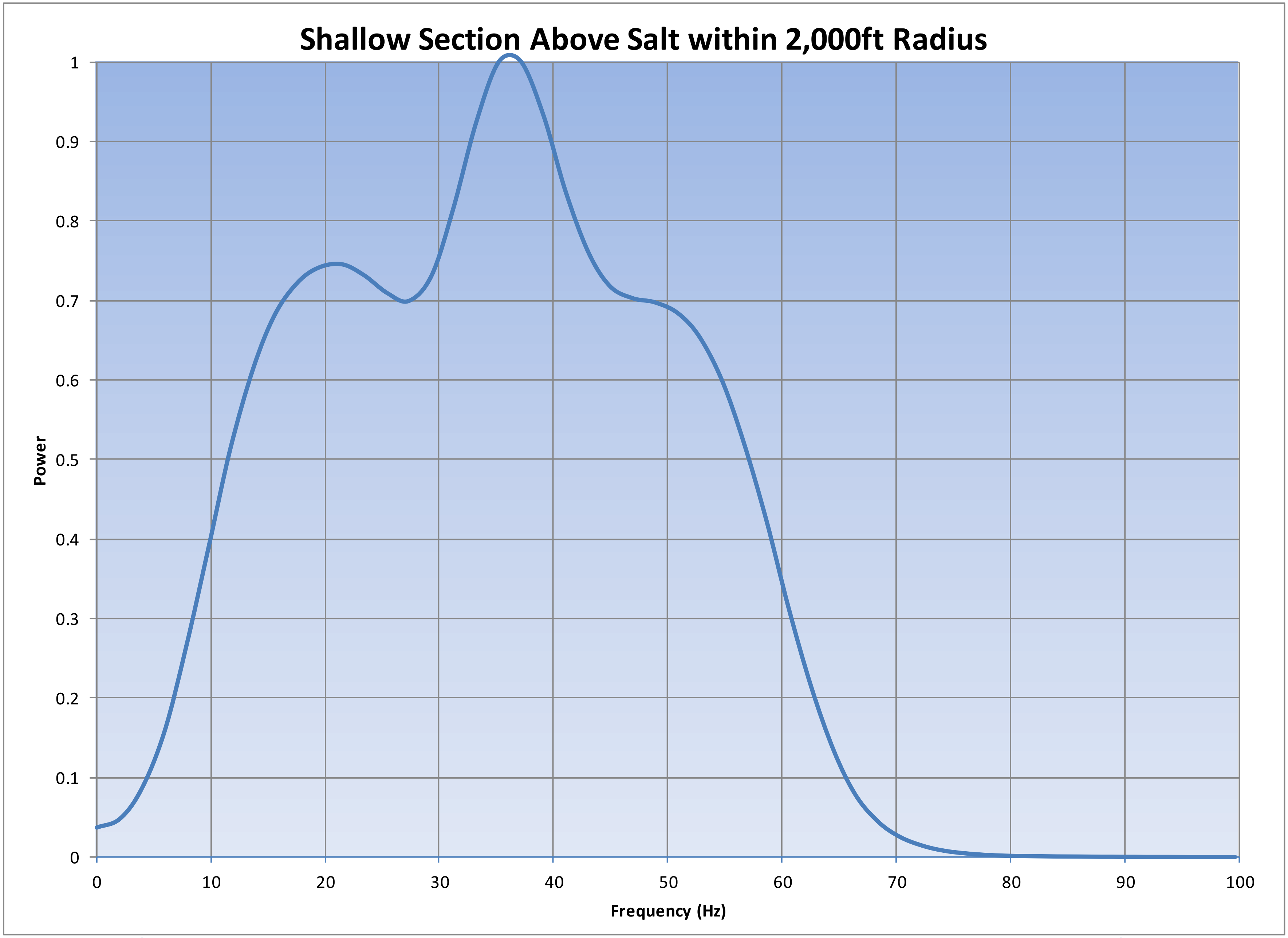
-3723 Depth in feet below sea surface to seabed, contoured at 1ft intervals

Chart Scale 1" = 50'

0 50 100 200 Feet

0 15 30 60 Meters

Figure 9
(MC80_P-M)



MC80_P-M	Power Spectrum	Figure 10

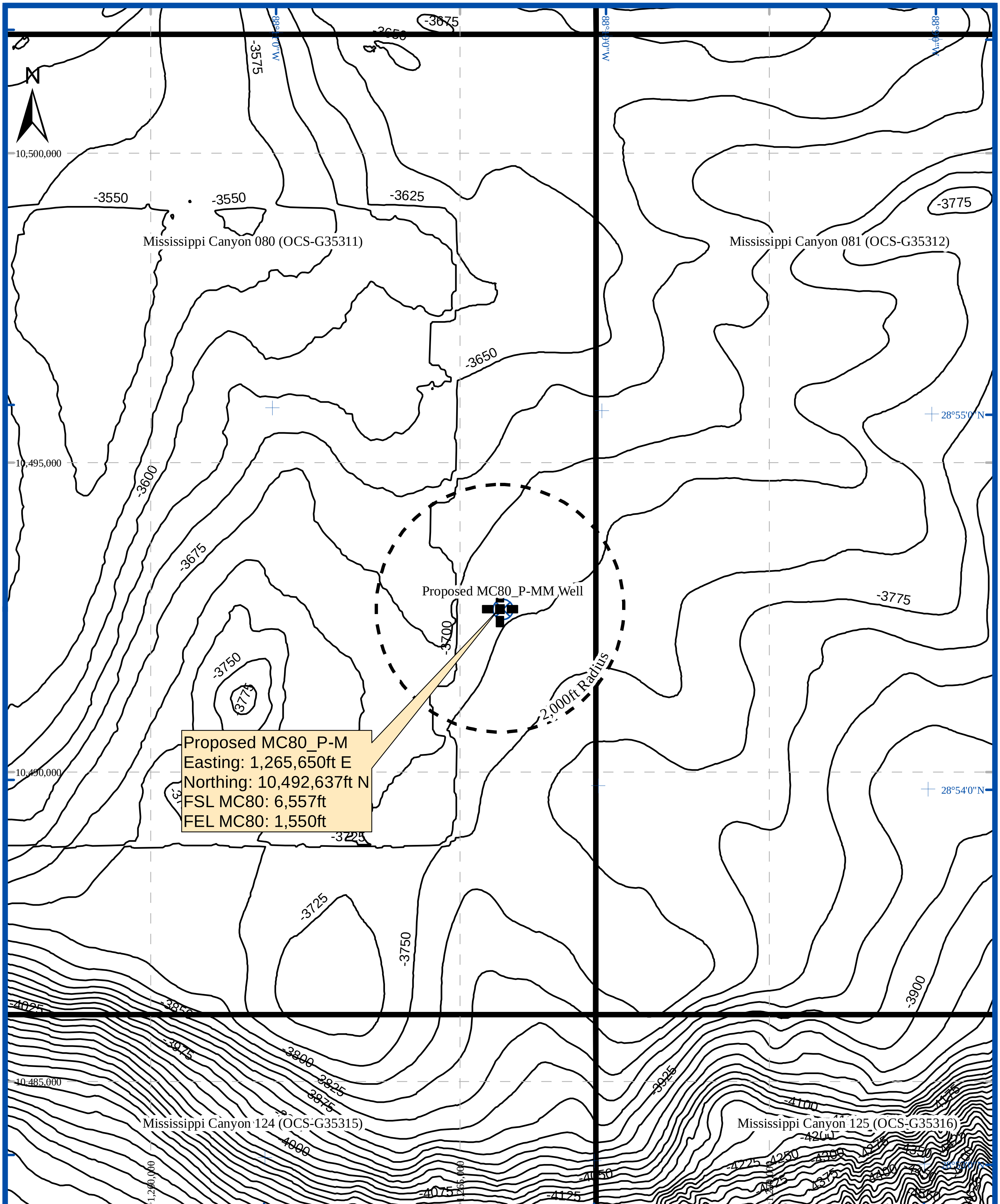


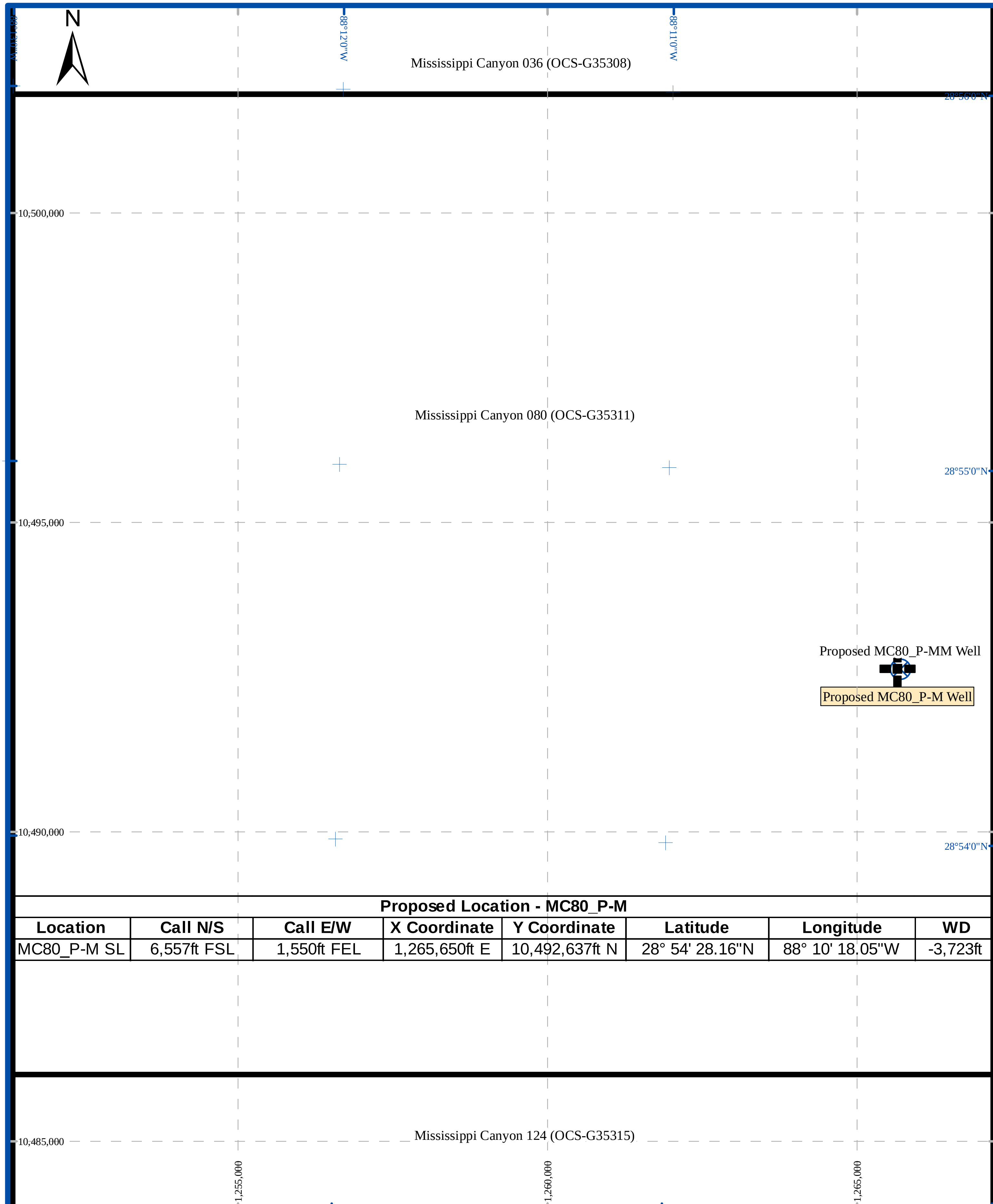
Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Bathymetry Plat

Figure 11



Proposed Location - MC80_P-M							
Location	**Call N/S**	**Call E/W**	**X Coordinate**	**Y Coordinate**	**Latitude**	**Longitude**	**WD**
MC80_P-M SL	6,557ft FSL	1,550ft FEL	1,265,650ft E	10,492,637ft N	28° 54' 28.16"N	88° 10' 18.05"W	-3,723ft

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

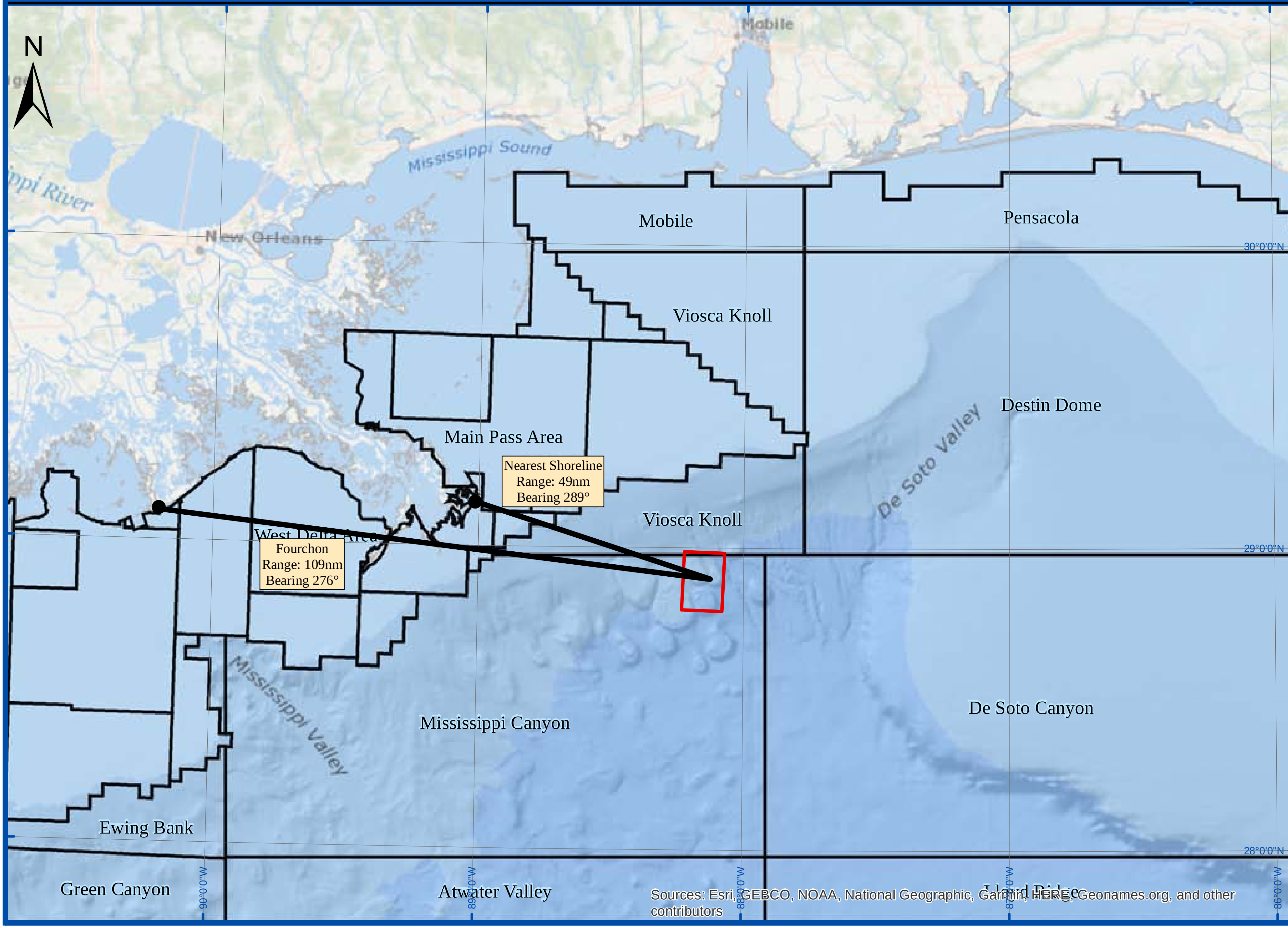
0 150 300 600 Meters

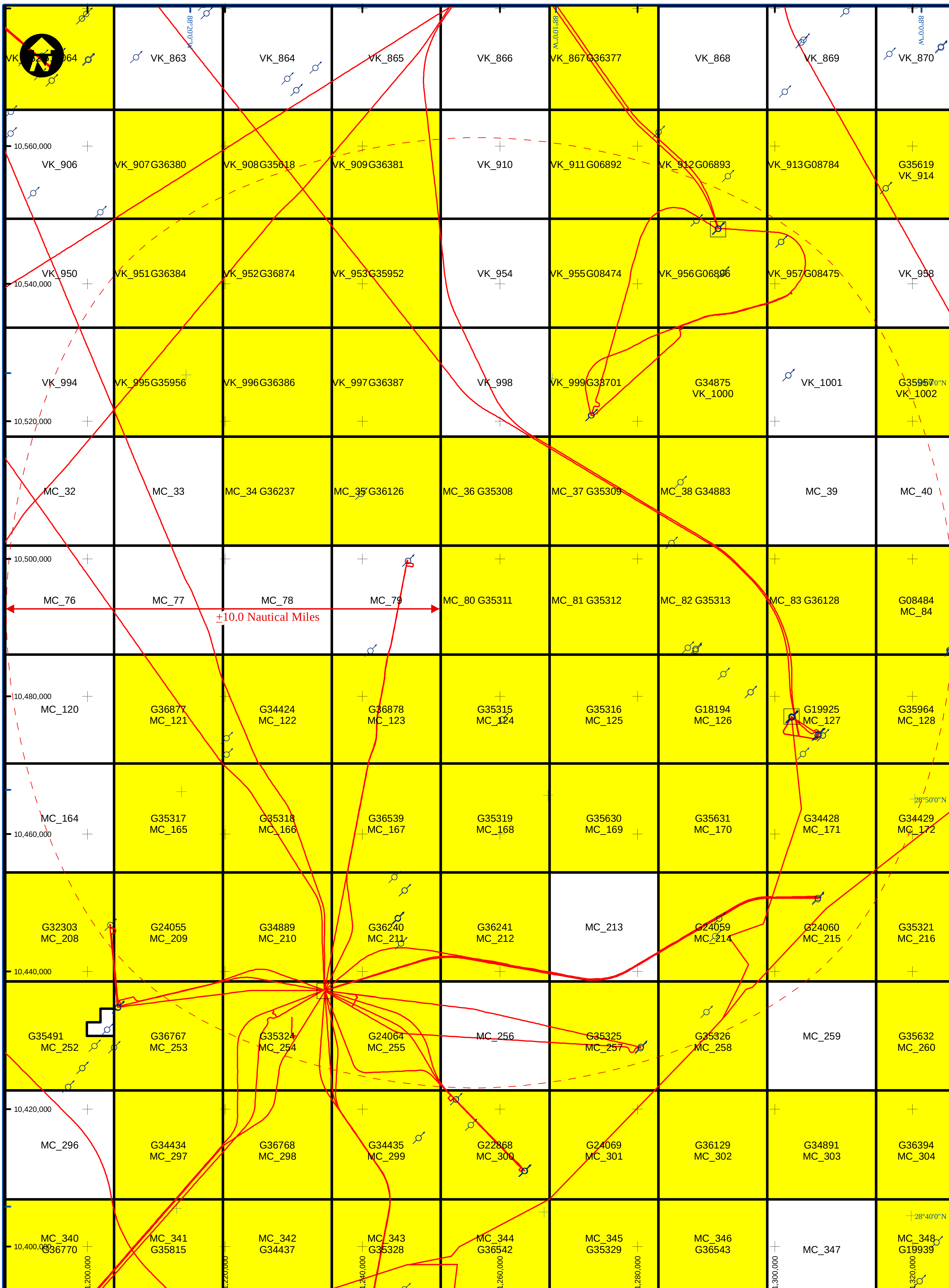
Well Location Plat - Public Information

Figure 12

Vicinity Map - Mississippi Canyon Block 80

Figure 13





Legend

- Seabed Well
- Platform
- Not Leased
- Leased
- Pipeline

10 MILE RADIUS SEABED INFRASTRUCTURE
MISSISSIPPI CANYON - BLOCK 80

0 5 10 Miles

1 inch = 2.5 miles

Ocean Geo Solutions

Anadarko Petroleum Corporation

Figure 14

APPENDIX A – PUBLIC SHALLOW HAZARDS STATEMENT

Public Shallow Hazards Statement – Proposed MC80_P-M Well Location

September 09, 2020

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

Reference: Shallow Hazards Analysis
Mississippi Canyon Block 80
(OCS-G 35311)

Ladies/Gentlemen:

Anadarko Exploration Company contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC80_P-M well location in Block 80, Mississippi Canyon Area (OCS-G-35311). This letter addresses seabed and shallow geologic conditions that may impact exploratory drilling operations within 2,000ft of the proposed well site. The depth limit of this site clearance assessment is 1.949 seconds two-way time (TWT), -4,931ft below sea surface (1,208ft below seabed).

Seabed Hazards. The seabed at the proposed well is smooth to slightly-undulatory, with a gradient of 1.1° to the southeast. The proposed well is in the east-central of the salt diapiric uplift, with no problems anticipated. No seabed faults were identified within 2,000ft of the proposed well.

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

No seabed infrastructure occurs within a 2,000ft radius.

Sub-Seabed Hazards. Identified amplitude anomalies indicative of shallow gas do not occur within the 2,000ft radius. The vertical borehole will not penetrate any identified risk of gas anomalies. The well-path will penetrate two faults within Unit C, and a fault within Unit D. The faults may cause minor drilling fluid circulation and wellbore stability problems.

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

Proposed MC80_P-M Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54’	28.156”	North	Easting	1,265,650	US ft E
Longitude	88°	10’	18.046”	West	Northing	10,492,637	US ft N
Latitude Decimal			28.9078212				
Longitude Decimal			-88.1716794				
FEL Mississippi Canyon 80			1,550ft	US ft	Inline	12665	
FSL Mississippi Canyon 80			6,557ft	US ft	Crossline	17337	
Water Depth: -3,723ft			Slope: 1.1° SE				
Nearest Shoreline			49 Nautical Miles @ 289°				
Port of Operation			Fourchon		109 Nautical Miles @ 276°		
Nearest Manned Platform			Horn Mountain in MC127		7.55 Miles @ 113°		

Proposed MC80_P-MM Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54’	28.161”	North	Easting	1,265,700	US ft E
Longitude	88°	10’	17.483”	West	Northing	10,492,637	US ft N
Latitude Decimal			28.9078225				
Longitude Decimal			-88.1715231				
FEL Mississippi Canyon 80			1,500ft	US ft	Inline	12665	
FSL Mississippi Canyon 80			6,557ft	US ft	Crossline	17337	
Water Depth: -3,722ft			Slope: 1.1° SE				
Nearest Shoreline			49 Nautical Miles @ 289°				
Port of Operation			Fourchon		109 Nautical Miles @ 276°		
Nearest Manned Platform			Horn Mountain in MC127		7.55 Miles @ 113°		

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

No risk of gas is interpreted. A **Slight Shallow Water Flow Risk** is assigned to a sand-rich interval in Unit B and Unit D.

Wellbore stability & drilling fluid circulation problems may occur at the faults intersecting the proposed well.

Sincerely,

Anadarko Petroleum Corporation

APPENDIX B – SENSITIVE SESSILE BENTHIC COMMUNITY STATEMENT

Sensitive Sessile Benthic Communities Statement – Proposed MC80_P-M Well Location

Anadarko Petroleum Corporation

September 09, 2020

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

Reference: Sensitive Sessile Benthic Community Summary
Proposed MC80_P-M Well Location in Mississippi Canyon MC80(OCS-G 35311)

Ladies/Gentlemen:
Anadarko Petroleum Corporation contracted Ocean Geo Solutions Inc. to prepare a Well Clearance Letter for the Proposed MC80_P-M well location in Block 80, Mississippi Canyon Area (OCS-G-35311). This letter addresses location proximity to potential sensitive sessile benthic community sites. This well will be drilled from a dynamically-positioned drilling module; therefore, an anchoring assessment is not required.

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

Potential Sensitive Sessile Benthic Communities
Features or areas that could support high-density sensitive sessile benthic communities are ***not*** located within 2,000 feet of any proposed mud and cuttings discharge location. The nearest site with fluid venting at the seabed and the potential for benthic communities is located 9,704ft to the NW.

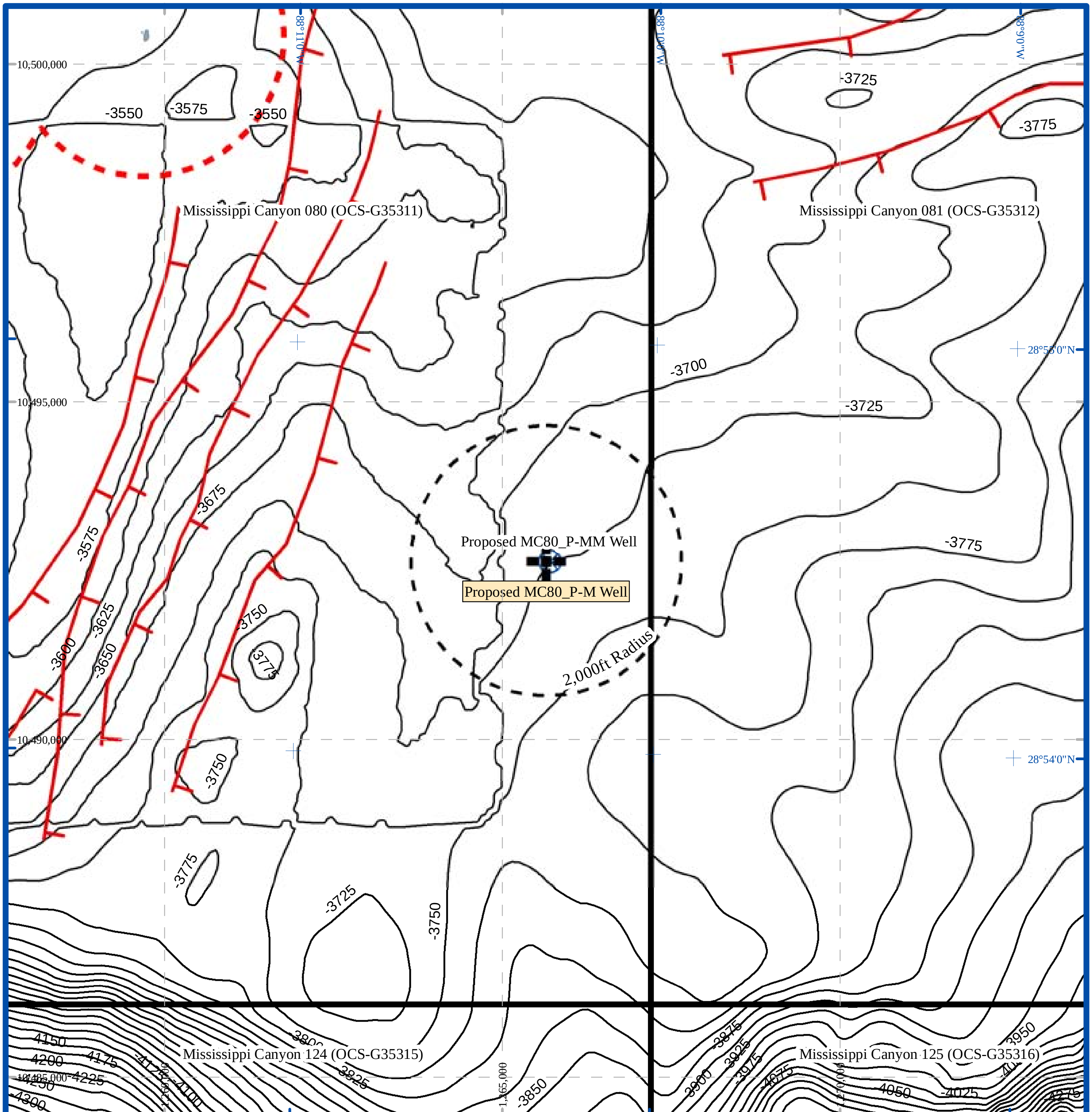
Proposed MC80_P-M Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54’	28.156”	North	Easting	1,265,650	US ft E
Longitude	88°	10’	18.046”	West	Northing	10,492,637	US ft N
Latitude Decimal			28.9078212				
Longitude Decimal			-88.1716794				
FEL Mississippi Canyon 80			1,550ft	US ft	Inline	12665	
FSL Mississippi Canyon 80			6,557ft	US ft	Crossline	17337	
Water Depth: -3,723ft			Slope: 1.1° SE				
Nearest Shoreline			49 Nautical Miles @ 289°				
Port of Operation			Fourchon		109 Nautical Miles @ 276°		
Nearest Manned Platform			Horn Mountain in MC127		7.55 Miles @ 113°		

Proposed MC80_P-MM Location (Surface Location)							
Location Coordinates							
NAD 27 Datum - Clarke 1866 Ellipsoid					UTM Zone 16 - CM 87° West		
Latitude	28°	54’	28.161”	North	Easting	1,265,700	US ft E
Longitude	88°	10’	17.483”	West	Northing	10,492,637	US ft N
Latitude Decimal			28.9078225				
Longitude Decimal			-88.1715231				
FEL Mississippi Canyon 80			1,500ft	US ft	Inline	12665	
FSL Mississippi Canyon 80			6,557ft	US ft	Crossline	17337	
Water Depth: -3,722ft			Slope: 1.1° SE				
Nearest Shoreline			49 Nautical Miles @ 289°				
Port of Operation			Fourchon		109 Nautical Miles @ 276°		
Nearest Manned Platform			Horn Mountain in MC127		7.55 Miles @ 113°		

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

Conclusions and Recommendations: The proposed MC80_P-M and proposed MC80_P-MM well locations will not impact any sites favorable for development of sensitive sessile benthic communities.

Sincerely,
Anadarko Petroleum Corporation



-3723 Depth in feet below sea surface to seabed,contoured at 25ft intervals

Proposed MC80_P-M Well Location (1,265,650ft E / 10,492,637ft N)

Proposed MC80_P-MM Well Location

Block boundaries

Seafloor faults intersection. Tick doenotes downthrown block

2,000ft exclusion zone around possible biologically favorable sites, based on hard ground mapping from side scan sonar

Hardgrounds exposures at seabed mapped from side scan sonar data

Chart scale 1" = 2,000'

0 500 1,000 2,000 Feet

0 125 250 500 Meters

Biological, Physical & Soci-Economic Plat

SECTION D
HYDROGEN SULFIDE INFORMATION

MC 36, 37 and 80:

Discussions regarding geologic information are considered proprietary and have been omitted from this public copy of the Initial EP.

Classification

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

H_2S Contingency Plan

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

Modeling Report

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

SECTION E
BIOLOGICAL, PHYSICAL, AND SOCIOECONOMIC INFORMATION

(a) Chemosynthetic Communities Report

The seafloor disturbing activities proposed in this Initial EP are in approximately 3,473'-4,187' of water. The wells will be drilled with a DP drillship or DP semi-submersible drilling unit.

Maps

Maps prepared using 3-D seismic data to depict bathymetry, seafloor and shallow geological features, and surface location of the proposed wells are included in **Sections A and C.**

Analysis

Features or areas that could support high-density chemosynthetic communities are not located within 2,000' of each proposed muds and cuttings discharge location.

Features or areas that could support high-density chemosynthetic communities are not located within 250' of any seafloor disturbances. Please refer to site clearance letters included in **Section C** for summary statements for each well.

(b) Topographic Features Map

The proposed activities are not within 1,000' of a no-activity zone or within the 3-mile radius zone of an identified topographic feature. Therefore, no map is required per NTL No. 2008-G04.

(c) Topographic Features Statement (Shunting)

Anadarko does not plan to drill more than two wells from the same surface location within the Protective Zone of an identified topographic feature. Therefore, the topographic features statement required by NTL No. 2008-G04 is not applicable.

(d) Live Bottoms (Pinnacle Trend) Map

The activities proposed in this Initial EP are not within 200' of any pinnacle trend feature with vertical relief equal to or greater than 8'. Therefore, no map is required per NTL No. 2008-G04.

(e) Live Bottoms (Low Relief) Map

The activities proposed in this Initial EP are not within 100' of any live bottom low relief features. Therefore, no map is required per NTL No. 2008-G04.

(f) Potentially Sensitive Biological Features

The activities proposed in this Initial EP are not within 200' of any potentially sensitive biological features. Therefore, no map is required per NTL No. 2008-G04.

(g) Threatened and Endangered Species Information

Under Section 7 of the Endangered Species Act (ESA) all federal agencies must ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species, or destroy or adversely modify its designated critical habitat.

In accordance with the 30 CFR 250, Subpart B, effective May 14, 2007, and further outlined in Notice to Lessees (NTL) 2008-G04, lessees/operators are required to address site-specific information on the presence of federally listed threatened or endangered species and critical habitat designated under the ESA and marine mammals protected under the Marine Mammal Protection Act (MMPA) in the area of proposes activities under this Initial EP.

Currently there are no designated critical habitats for the listed species in the Gulf of Mexico Outer Continental Shelf; however, it is possible that one or more of these species could be seen in the area of our operations. The following table reflects the Federally-listed endangered and threatened species in the lease area and along the northern Gulf coast:

The Environmental Impact Analysis (EIA) in **Section N** of this Initial EP further discusses potential impacts and mitigation measures related to threatened and endangered species.

Endangered or Threatened species that may occur in the project area and/or along the northern Gulf Coast are listed in Table 6. The table also indicates the location of critical habitat (if designated in the Gulf of Mexico). Critical habitat is defined as (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. The National Marine Fisheries Service (NMFS) has jurisdiction for ESA-listed marine mammals (cetaceans), sea turtles, and fishes in the Gulf of Mexico. The USFWS has jurisdiction for ESA-listed birds, the West Indian manatee (Trichechus manatus), and sea turtles while on their nesting beaches.

Table. Federally listed Endangered and Threatened species potentially occurring in the project area and along the northern Gulf Coast.

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Marine Mammals					
Bryde's whale	*Balaenoptera edeni*	E	X	--	None
Sperm whale	*Physeter macrocephalus*	E	X	--	None
West Indian manatee	*Trichechus manatus*[1]	T	--	X	Florida (Peninsular)
Sea Turtles					
Loggerhead turtle	*Caretta caretta*	T,E[2]	X	X	Nesting beaches and nearshore reproductive habitat in Mississippi, Alabama, and Florida (Panhandle); *Sargassum* habitat including most of the central & western Gulf of Mexico.
Green turtle	*Chelonia mydas*	T	X	X	None
Leatherback turtle	*Dermochelys coriacea*	E	X	X	None
Hawksbill turtle	*Eretmochelys imbricata*	E	X	X	None
Kemp's ridley turtle	*Lepidochelys kempii*	E	X	X	None
Birds					
Piping Plover	*Charadrius melodus*	T	--	X	Coastal Texas, Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Whooping Crane	*Grus americana*	E	--	X	Coastal Texas (Aransas National Wildlife Refuge)
Fishes					
Oceanic whitetip shark	*Carcharhinus longimanus*	T	X	--	None
Giant manta ray	*Mobula birostris*	T	X	X	None
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T	--	X	Coastal Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Nassau grouper	*Epinephelus striatus*	T	--	X	None
Smalltooth sawfish	*Pristis pectinata*	E	--	X	Southwest Florida
Invertebrates					
Elkhorn coral	*Acropora palmata*	T	--	X	Florida Keys and the Dry Tortugas
Staghorn coral	*Acropora cervicornis*	T	--	X	Florida Keys and the Dry Tortugas
Pillar coral	*Dendrogyra cylindrus*	T	--	X	None
Rough cactus coral	*Mycetophyllia ferox*	T	--	X	None
Lobed star coral	*Orbicella annularis*	T	--	X	None
Mountainous star coral	*Orbicella faveolata*	T	--	X	None
Boulder star coral	*Orbicella franksi*	T	--	X	None
Terrestrial Mammals					
Beach mice (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus*	E	--	X	Alabama and Florida (Panhandle) beaches
Florida salt marsh vole	*Microtus pennsylvanicus dukecampbelli*	E	--	X	None

E = endangered; T = threatened; X = potentially present; -- = not present.

1 There are two subspecies of West Indian manatee: the Florida manatee (*T. m. latirostris*), which ranges from the northern Gulf of Mexico to Virginia, and the Antillean manatee (*T. m. manatus*), which ranges from northern Mexico to eastern Brazil. Only the Florida manatee subspecies is likely to be found in the northern Gulf of Mexico. On 30 March 2017, the USFWS announced the West Indian manatee, including the Florida manatee subspecies, was reclassified as threatened.

2 The loggerhead turtle is composed of nine distinct population segments (DPS). The only DPS that may occur in the project area (Northwest Atlantic DPS) is listed as threatened (76 *Federal Register* [FR] 58868; 22 September 2011).

(h) Archaeological Report

MC 36, 37 and 80 have been determined to be in an area where historic shipwrecks may exist. In accordance with NTL No. 2005-G07, "Archaeological Resource Surveys and Reports," and NTL No. 2011-JOINT-G01, "Revisions to the List of OCS Lease Blocks Requiring Archaeological Resource Surveys and Reports," two archaeological resource survey reports, both prepared by C&C Technologies Survey Services, covering the proposed MC 36, 37, and 80 well locations and surrounding areas were submitted with Initial EP, Plan Control No: N-10029.

- *C&C Technologies, August 2013 - Archeological report for blocks MC 82, MC 126, and MC 127 for Plains Exploration*
- *C&C Technologies, December 2014 - Archeological for blocks VK 1000 & 1001, MC 36-38, MC 81, MC 124-125, and MC 168 for Freeport McMoran Oil & Gas*

(i) Air and Water Quality Information

This Initial EP does not propose activities for which the State of Florida is an affected State. Therefore, the discussion required per NTL 2008-G04 is not applicable to this Initial EP.

(j) Socioeconomic Information

The activities proposed in this Initial EP are not located offshore Florida. Therefore, socioeconomic information required per NTL 2008-G04 is not applicable to this Initial EP.

SECTION F
WASTE AND DISCHARGE INFORMATION

The following estimates were prepared utilizing Anadarko's experience with similar drilling operations. Estimated maximum discharge rates are reflected below. Projected amounts may vary during the course of drilling and/or completion operations.

Total amount assumes drilling and completing 52 wells with 3,900 total number of days (75 days to drill and complete each well).

(a) Projected Generated Wastes

Type of Waste	Composition	Projected Amount	Treatment/Storage/Disposal
Synthetic-based drilling fluids	Synthetic-based drilling muds	300 bbls/well	Transport to shore in DOT approved containers to an approved waste disposal facility. If recycled or reused, returned to vendor (Bariod or MI Swaco).
Cuttings wetted with synthetic-based fluids	Cuttings coated with synthetic drilling muds/fluids, including drilled out cement	1,700 bbls/well	Treated and discharge overboard **Note, an estimated 5-10% of cuttings may be transported to shore in DOT approved containers for disposal.*
Water-based drilling fluids	Water based drilling muds (NaCl saturated, seawater, freshwater, barite)	36,000 bbls/well**	Discharge overboard or at seafloor
Cuttings wetted with water-based fluids	Cuttings coated with water-based drilling muds/fluids	3,900 bbls/well	Discharge overboard
Well treatment fluids	Ethylene glycol Methanol	13,000 bbls total 3,250 bbls total	Transport to shore in DOT approved containers to an approved waste disposal facility.
Used - Completion/ Workover/ Stimulation Fluids	Brine, acid, prop sand, debris, gelled fluids, dead oil	3,000 bbls/well	Transport to shore in DOT approved containers to an approved waste disposal facility.
Non-pollutant completion fluids	Low density uninhibited completion brines	5,000 bbls/well	Discharge overboard
Unused – Completion/ Workover/ Stimulation fluids	Brine, acid, prop sand, debris, gelled fluids, dead oil	3,000 bbls/well	Transport to shore in DOT approved containers for reuse or to an approved waste disposal facility.
Trash and debris	Refuse generated during operations	6,500 bbls total	Transport to shore in DOT approved containers for disposal.
Sanitary Wastes*	Treated human body waste	19,500,000 gals total	Chlorinate and discharge overboard
Domestic Waste*	Gray water	19,500,000 gals total	Chlorinate and discharge overboard
Deck drainage	Platform washings and rainwater	13,650,000 bbls total	Treat for oil and grease and discharge overboard
Produced water	N/A	N/A	N/A
Desalinization Unit	Seawater	1,365,000 bbls total	Discharge overboard
Wash water	Drill water (fresh)	195,000 bbls total	Discharge overboard
Blowout preventer fluid	Blend (3% Stack Magic & Filtered Fresh Water)	515,357 gals total	Discharge at seafloor
Ballast water	Seawater	47,650 m3/year	Discharge overboard
Bilge water	Seawater	1,236,300 bbls total	Discharge overboard through 15 ppm equipment

Type of Waste	Composition	Projected Amount	Treatment/Storage/Disposal
Excess cement at the seafloor	Nitrified cement slurry	100 bbls/well	Discharge at seafloor
Fire water	Seawater	137,142 bbls/day/well	Discharge overboard
Cooling water	Seawater	137,142 bbls/day/well	Discharge overboard
Produced Sand	N/A	N/A	N/A
Used oil	Excess oil from engines	13,975 bbls total	Transport in DOT approved containers to shore for recycling

** The rig is designed for maximum personnel capacity of 200 people. The discharge rates are based off of maximum personnel capacity but will generally not have this many personnel onboard during drilling and/or completion operations.*
***The actual volume ordered out will be an estimated 20,000 bbls/well of water-based mud. Once on location this volume will be cut back and mixed with seawater to different desired mud weights which will increase the volume that is discharged at the seafloor. The estimated volume that will be discharged at the seafloor will be approximately 36,000 bbls/well (Note: There will be 52 potential wells drilled for a total of 1,872,000 bbls).*

(b) Projected Ocean Discharges

Type of Waste	Total Amount to be Discharged	Discharge Rate	Discharge Method
Sanitary Wastes*	19,500,000 gals total	25 gals per person daily	Chlorinate and discharge overboard
Domestic waste*	19,500,000 gals total	25 gals per person daily	Chlorinate and discharge overboard
Deck drainage	13,650,000 bbls total	3,500 bbls/day	Treat for oil and grease and discharge overboard
Desalinization Unit	1,365,000 bbls total	350 bbls/day	Discharge overboard
Wash water	195,000 bbls total	50 bbls/day	Discharge overboard
Blowout preventer fluid	515,357 gals total	925 gals/week/well; Vents on a weekly basis	Discharge at seafloor
Ballast water	47,650 m3/year	Not continuous	Discharge overboard
Bilge water	1,236,300 bbls total	317 bbls/day	Discharge overboard through 15 ppm equipment
Excess cement at the seafloor	5,200 bbls total	20 bbls/min	Discharge at seafloor
Fire water	534,853,800 bbls total	137,142 bbls/day	Discharge overboard
Cooling water	534,853,800 bbls total	137,142 bbls/day	Discharge overboard
Cuttings wetted with Water-based fluids	202,800 bbls total	1,000 bbls/hr max	Discharge overboard
Water-based drilling fluids**	1,872,000 bbls total**	1,000 bbls/hr max	Discharge at seafloor or overboard
Cuttings wetted with Synthetic-based fluids	88,400 bbls total	1,000 bbls/hr max	Treated and discharge overboard **Note, an estimated 5-10% of cuttings may be transported to shore in tanks and/or cutting boxes and on to the base/transfer station if oil still remains.*
Non-pollutant completion fluids	260,000 bbls total	100 bbl/hour	Discharge overboard

**The rig is designed for maximum personnel capacity of 200 people. The discharge rates are based off of maximum personnel capacity but will generally not have this many personnel onboard during drilling and/or completion operations.*
***The actual volume ordered out will be an estimated 20,000 bbls/well of water-based mud. Once on location this volume will be cut back and mixed with seawater to different desired mud weights which will increase the volume that is discharged at the seafloor. The estimated volume that will be discharged at the seafloor will be approximately 36,000 bbls/well (Note: There will be 52 potential wells drilled for a total of 1,872,000 bbls).*

(c) Modeling Report

The proposed activities under this Initial EP do not meet the U.S. Environmental Protection Agency requirements for an individual NPDES permit. Therefore, modeling report requirements per NTL No. 2020-G02 is not applicable to this Initial EP.

SECTION G
AIR EMISSIONS INFORMATION

(a) Screening Questions

Screening Questions for EP's	Yes	No
Is any calculated Complex Total (CT) Emission amount (in tons) associated with your proposed exploration activities more than 90% of the amounts calculated using the following formulas: CT = $3400D^{2/3}$ for CO, and CT = 33.3D for the other air pollutants (where D = distance to shore in miles)?		No
Do your emission calculations include any emission reduction measures or modified emission factors?	Yes	
Are your proposed exploration activities located east of 87.5 W longitude?		No
Do you expect to encounter H_2S at concentrations greater than 20 parts per million (ppm)?		No
Do you propose to flare or vent natural gas for more than 48 continuous hours from any proposed well?		No
Do you propose to burn produced hydrocarbon liquids?		No

(b) Emissions Worksheets

Air emission worksheets have been prepared utilizing the maximum horsepower rating from an Anadarko contracted DP drillship, the *Diamond Ocean BlackHawk.* The *Diamond Ocean BlackHawk* has eight main engines. The average number of engines on-line at once will be four engines. Rigs typically do not operate at maximum horsepower capacity or engine load; therefore, Anadarko has opted to calculate some of the plan emission amounts based on the average daily fuel use for MC 36 (2021-2032), MC 37 (2021-2028) and MC 80 (2021-2026). Note that development locations (from Plan Control No.: N-10117) and exploration locations covered under this Initial EP are denoted for MC 80. It is unlikely development and exploration operations will occur during the same calendar year (and will not be at the same time); however, for air emissions purposes a maximum number of days was calculated for reference. A different rig may be utilized (DP drillship or DP semi-submersible); but the horsepower rating, average daily fuel use, and air emissions will be equal to, or less than, the calculated plan emission amounts shown on the following pages. Air emission worksheets are enclosed as **Attachment G-1.**

(c) Summary Information

The following tables summarize information regarding the peak year emissions generated from the Plan Emissions and Complex Total Emissions:

MC 36

If drilled with a DP Drillship or DP Semi (equal to or less than the Diamond Ocean BlackHawk):

Air Pollutant		Plan Emission Amounts[1] (tons)	Calculated Exemption Amounts[2] (tons)	Calculated Complex Total Emission Amounts[3] (tons)
Total suspended particulates (TSP)		61.33	1,718,28	N/A
Particulate matter 10 (PM_{10})		37.01	--	N/A
Particulate matter 2.5 ($PM_{2.5}$)		35.90	--	N/A
Sulphur dioxide (SO_2)		0.90	1,718,28	N/A
Nitrogen oxides (NO_x)		1,469.72	1,718,28	N/A
Volatile organic compounds (VOC)		42.60	1,718,28	N/A
Carbon monoxide (CO)		233.67	47,124.35	N/A

MC 37

If drilled with a DP Drillship or DP Semi (equal to or less than the Diamond Ocean BlackHawk):

Air Pollutant		Plan Emission Amounts[1] (tons)	Calculated Exemption Amounts[2] (tons)	Calculated Complex Total Emission Amounts[3] (tons)*
Total suspended particulates (TSP)		61.33	1,718,28	N/A
Particulate matter 10 (PM_{10})		37.01	--	N/A
Particulate matter 2.5 ($PM_{2.5}$)		35.90	--	N/A
Sulphur dioxide (SO_2)		0.90	1,718,28	N/A
Nitrogen oxides (NO_x)		1,469.72	1,718,28	N/A
Volatile organic compounds (VOC)		42.60	1,718,28	N/A
Carbon monoxide (CO)		233.67	47,124.35	N/A

MC 80

If drilled with a DP Drillship or DP Semi (equal to or less than the Diamond Ocean BlackHawk):

Air Pollutant		Plan Emission Amounts[1] (tons)	Calculated Exemption Amounts[2] (tons)	Calculated Complex Total Emission Amounts[3] (tons)
Total suspended particulates (TSP)		19.17	1,764.90	62.62
Particulate matter 10 (PM_{10})		11.57	--	37.79
Particulate matter 2.5 ($PM_{2.5}$)		11.22	--	36.66
Sulphur dioxide (SO_2)		0.28	1,764.90	0.92
Nitrogen oxides (NO_x)		459.42	1,764.90	1,500.58
Volatile organic compounds (VOC)		13.38	1,764.90	43.66
Carbon monoxide (CO)		73.63	47,972.92	240.09

**Refer to 2021-2026 for complex totals. Includes surface locations from this Initial EP, and surface locations referenced from Plan Control No.: N-10117.*

Surface Location MC 80	Start Date	End Date	No. of Days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-I	4/1/2021	6/15/2021	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-II	4/1/2022	6/15/2022	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-J	4/1/2023	6/15/2023	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-JJ	4/1/2024	6/15/2024	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-K	4/1/2025	6/15/2025	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-KK	4/1/2026	6/15/2026	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-L	4/1/2027	6/15/2027	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-LL	4/1/2028	6/15/2028	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-M	4/1/2029	6/15/2029	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-MM	4/1/2030	6/15/2030	75 days

Locations below were approved under Plan Control No.: N-10117. No changes are being proposed to the activity schedule. Denoting for MC 80 complex total reference only.

Proposed Activity	Start Date	End Date	No. of Days
Surface Location MC 80			
Drill, Complete, & Conduct Flowtest Well Location MC 80 A	1/1/2021	3/27/2021	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 AA	7/1/2021	9/24/2021	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 B	1/1/2022	3/27/2022	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 BB	7/1/2022	9/24/2022	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 C	1/1/2023	3/27/2023	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 CC	7/1/2023	9/24/2023	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 E	1/1/2024	3/26/2024	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 EE	7/1/2024	9/24/2024	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 81 H	1/1/2025	3/27/2025	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 81 HH	7/1/2025	9/24/2025	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 81 J	1/1/2026	3/27/2026	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 81 JJ	7/1/2026	9/24/2026	85 days

The air emission calculations were calculated by:

Bridget O’Farrell
832-636-1694 office
Bridget_OFarrell-Villarreal@oxy.com

Attachment G-1
MC 36 Surface Locations

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

COMPANY	Anadarko Petroleum Corporation
AREA	Mississippi Canyon (MC)
BLOCK	36 (surface locations)
LEASE	OCS-G35308
FACILITY	
WELL	MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH
COMPANY CONTACT	Bridget O'Farrell
TELEPHONE NO.	832-636-1694
REMARKS	MC 36: 24 surface locations

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

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

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

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

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

MC 36-No emissions for 2020

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		36 (surface locations)	OCS-G35308		MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH	Bridget O'Farrell	832-636-1694	MC 36: 27 surface locations

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
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW			HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2020 Facility Total Emissions								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**0.00**			**0.00**	**0.00**	**0.00**		**0.00**	
	0.0																								
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 - 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
	VESSELS - Tugs Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																						
	VESSELS		kW			HR/D	D/YR																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2020 Non-Facility Total Emissions								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

AIR EMISSIONS CALCULATIONS - 2ND YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		36 (surface locations)		OCS-G35308		MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH	Bridget O'Farrell	832-636-1694	MC 36: 27 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	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**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
	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
	VESSELS - Supply (2) Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2021	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 3RD YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		36 (surface locations)		OCS-G35308		MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH	Bridget O'Farrell	832-636-1694	MC 36: 27 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**				**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2022	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
	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
	VESSELS - Supply (2) Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2022	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 4TH YEAR

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)	36 (surface locations)	OCS-G35308		MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH	Bridget O'Farrell	832-636-1694	MC 36: 27 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW				HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2023	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
	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
	VESSELS - Supply (2) Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2023	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 5TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		36 (surface locations)		OCS-G35308		MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH					Bridget O'Farrell		832-636-1694		MC 36: 27 surface locations										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**Average Daily Fuel Use (%)**	**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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**				**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2024	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
	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
	VESSELS - Supply (2) Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2024	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 6TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL						CONTACT		PHONE		REMARKS									
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		36 (surface locations)		OCS-G35308		MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH						Bridget O'Farrell		832-636-1694		MC 36: 27 surface locations									
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**Average Daily Fuel Use (%)**	**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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**				**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2025	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
	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
	VESSELS - Supply (2) Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2025	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 7TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		36 (surface locations)		OCS-G35308		MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH	Bridget O'Farrell	832-636-1694	MC 36: 27 surface locations
COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		36 (surface locations)		OCS-G35308		MC 36 C-A, C-AA, C-B, C-BB, C-C, C-CC, C-D, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B,	Bridget O'Farrell	832-636-1694	MC 36: 27 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW				HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2026	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
	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
	VESSELS - Supply (2) Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2026	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 8TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		36 (surface locations)		OCS-G35308		MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH	Bridget O'Farrell	832-636-1694	MC 36: 27 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW				HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2027	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
	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
	VESSELS - Supply (2) Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2027	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 9TH YEAR

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)	36 (surface locations)	OCS-G35308		MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH	Bridget O'Farrell	832-636-1694	MC 36: 27 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**				**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2028	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
	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
	VESSELS - Supply (2) Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2028	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 10TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		36 (surface locations)		OCS-G35308		MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH	Bridget O'Farrell	832-636-1694	MC 36: 27 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**				**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2029 Facility Total Emissions									**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
	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
	VESSELS - Supply (2) Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2029 Non-Facility Total Emissions									**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 11TH YEAR

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)	36 (surface locations)	OCS-G35308		MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH	Bridget O'Farrell	832-636-1694	MC 36: 27 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.971888	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW				HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2030	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.8067468	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.0268989	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
	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
	VESSELS - Supply (2) Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2030	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 12TH YEAR

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)	36 (surface locations)	OCS-G35308		MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH	Bridget O'Farrell	832-636-1694	MC 36: 27 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR									ESTIMATED TONS								
	Diesel Engines		HP	Daily	GAL/HR	GAL/D																				
	Nat. Gas Engines		HP	Fuel Use	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		60354	80%	3104.9719	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW				HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2031	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.80675	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.0269	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.4049	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
	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
	VESSELS - Supply (2) Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2031	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 13TH YEAR

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)	36 (surface locations)	OCS-G35308		MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH	Bridget O'Farrell	832-636-1694	MC 36: 27 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR									ESTIMATED TONS								
	Diesel Engines		HP	Daily	GAL/HR	GAL/D																				
	Nat. Gas Engines		HP	Fuel Use	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		60354	80%	3104.971888	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	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
2032	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.8067468	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.0268989	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
	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
	VESSELS - Supply (2) Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per da		**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
2032	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL			
Anadarko Petroleum Corporation	36 (surface locations)	OCS-G35308			MC 36 C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE; P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, P-HH			

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2021	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2022	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2023	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2024	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2025	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2026	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2027	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2028	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2029	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2030	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2031	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2032	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Allowable	1,718.28			1718.28	1718.28	1718.28		47124.35	

Attachment G-1
MC 37 Surface Locations

EP - AIR QUALITY

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

COMPANY	Anadarko Petroleum Corporation
AREA	Mississippi Canyon (MC)
BLOCK	37 (surface locations)
LEASE	OCS-G35309
FACILITY	
WELL	MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J, C-JJ; MC 36 C-A, C-AA, C-DD **MC 37 surface*
COMPANY CONTACT	Bridget O'Farrell
TELEPHONE NO.	832-636-1694
REMARKS	MC 37: 18 surface locations

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

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

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

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

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

MC 37-No emissions for 2020

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		37 (surface locations)	OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J, C-JJ: MC 36 C-A, C-AA, C-D (MC 37 surface)	Bridget O'Farrell	832-636-1694	MC 37: 15 surface locations

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
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	2020 Facility Total Emissions							**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**0.00**			**0.00**	**0.00**	**0.00**		**0.00**	
	0.0																								
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 - 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
	VESSELS - Tugs Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020 Non-Facility Total Emissions							**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

AIR EMISSIONS CALCULATIONS - 2ND YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		37 (surface locations)	OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J, C-JJ; MC 36 C-A, C-AA, C-D (MC 37 surface)	Bridget O'Farrell	832-636-1694	MC 37: 15 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	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**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2021	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 3RD YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		37 (surface locations)	OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J, C-JJ: MC 36 C-A, C-AA, C-D (MC 37 surface)	Bridget O'Farrell	832-636-1694	MC 37: 15 surface locations

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		37 (surface locations)		OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J	Bridget O'Farrell	832-636-1694	MC 37: 15 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW				HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2022	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2022	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 4TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		37 (surface locations)		OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-					Bridget O'Farrell		832-636-1694		MC 37: 15 surface locations										
OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	MAX. FUEL	ACT. FUEL	RUN TIME		MC 36 C-A, C-AA, C-D (MC 37 surface) 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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW				HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2023	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2023	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 5TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		37 (surface locations)	OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J, C-JJ; MC 36 C-A, C-AA, C-D (MC 37 surface)	Bridget O'Farrell	832-636-1694	MC 37: 15 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**				**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2024	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2024	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 6TH YEAR

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)	37 (surface locations)	OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J, C-JJ; MC 36 C-A, C-AA, C-D (MC 37 surface)	Bridget O'Farrell	832-636-1694	MC 37: 15 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.97189	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW				HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2025 Facility Total Emissions									**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2025 Non-Facility Total Emissions									**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 7TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		37 (surface locations)	OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J, C-JJ: MC 36 C-A, C-AA, C-DD *MC 37 surface	Bridget O'Farrell	832-636-1694	MC 37: 18 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.972	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW				HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2026 Facility Total Emissions									**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.8067	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.0269	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.405	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2026 Non-Facility Total Emissions									**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 8TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		37 (surface locations)	OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J, C-JJ: MC 36 C-A, C-AA, C-DD *MC 37 surface	Bridget O'Farrell	832-636-1694	MC 37: 18 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.972	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**				**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2027	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.8067	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.0269	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.405	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2027	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 9TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		37 (surface locations)	OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J, C-JJ: MC 36 C-A, C-AA, C-DD *MC 37 surface	Bridget O'Farrell	832-636-1694	MC 37: 18 surface locations

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	80%	3104.972	59615.46	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	61.31	36.99	35.88	0.89	1469.01	42.24	0.00	230.41	0.43
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW				HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2028	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**61.33**	**37.01**	**35.90**	**0.90**	**1,469.72**	**42.60**	**0.00**	**233.67**	**0.43**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																									
DRILLING	VESSELS- Crew Diesel		10551		542.8067	13027.36	24	75	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	6.70	4.04	3.92	0.10	160.51	4.61	0.00	25.18	0.05
	VESSELS - Supply Diesel		12363		636.0269	15264.65	24	95	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	9.94	6.00	5.82	0.14	238.22	6.85	0.00	37.36	0.07
	VESSELS - Supply (2) Diesel		27493		1414.405	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2028	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**18.04**	**10.88**	**10.56**	**0.26**	**432.19**	**12.43**	**0.00**	**67.79**	**0.13**

AIR EMISSIONS CALCULATIONS - 10TH YEAR

Anadarko Petroleum Corporation	Mississippi Canyon (MC)		37 (surface locations)	OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J, C-JJ; MC 36 C-A, C-AA, C-D (MC 37 surface)					Bridget O'Farrell		832-636-1694		MC 37: 15 surface locations										
COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		37 (surface locations)	OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-					Bridget O'Farrell		832-636-1694		MC 37: 15 surface locations										
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		60354	3104.97189	74519.33	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	38.32	23.12	22.43	0.56	918.13	26.40	0.00	144.01	0.27
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW			HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2029	**Facility Total Emissions**							**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**38.33**	**23.13**	**22.44**	**0.56**	**918.49**	**26.58**	**0.00**	**145.63**	**0.27**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																								
DRILLING	VESSELS- Crew Diesel		10551	542.806747	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363	636.026899	15264.65	24	48	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	5.02	3.03	2.94	0.07	120.37	3.46	0.00	18.88	0.04
	VESSELS - Supply (2) Diesel		27493	1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																						
	VESSELS		kW			HR/D	D/YR																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2029	**Non-Facility Total Emissions**							**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**9.12**	**5.50**	**5.34**	**0.13**	**218.42**	**6.28**	**0.00**	**34.26**	**0.06**

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		37 (surface locations	OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J, C-JJ; MC 36 C-A, C-AA, C-D (MC 37 surface)	Bridget O'Farrell	832-636-1694	MC 37: 15 surface locations

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		60354	3104.971888	74519.33	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	38.32	23.12	22.43	0.56	918.13	26.40	0.00	144.01	0.27
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2030	**Facility Total Emissions**							**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**38.33**	**23.13**	**22.44**	**0.56**	**918.49**	**26.58**	**0.00**	**145.63**	**0.27**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,718.28**			**1,718.28**	**1,718.28**	**1,718.28**		**47,124.35**	
	51.6																								
DRILLING	VESSELS- Crew Diesel		10551	542.8067468	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363	636.0268989	15264.65	24	48	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	5.02	3.03	2.94	0.07	120.37	3.46	0.00	18.88	0.04
	VESSELS - Supply (2) Diesel		27493	1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2030	**Non-Facility Total Emissions**							**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**9.12**	**5.50**	**5.34**	**0.13**	**218.42**	**6.28**	**0.00**	**34.26**	**0.06**

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL			
Anadarko Petroleum Corporation	37 (surface locations)	OCS-G35309		MC 37 C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J, C-JJ; MC 36 C-A, C-AA, C-DD *MC 37 surface				

Year	Facility Emitted Substance							
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2021	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2022	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2023	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2024	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2025	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2026	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2027	61.33	37.01	35.90	0.90	1469.72	42.60	0.00	233.67	0.43
2028	61.33	37.01	35.90	0.00	1469.72	42.60	0.00	233.67	0.43
2029	38.33	23.13	22.44	0.56	918.49	26.58	0.00	145.63	0.27
2030	38.33	23.13	22.44	0.56	918.49	26.58	0.00	145.63	0.27
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Allowable	1718.28			1718.28	1718.28	1718.28		47124.35	

EP - AIR QUALITY

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

COMPANY	Anadarko Petroleum Corporation
AREA	Mississippi Canyon (MC)
BLOCK	80 (surface locations)
LEASE	OCS-G35311
FACILITY	
WELL	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM
COMPANY CONTACT	Bridget O'Farrell
TELEPHONE NO.	832-636-1694
REMARKS	MC 80: 10 surface locations

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

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

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

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

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

MC 80-No air emissions in 2020

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		80 (surface locations)	OCS-G35311		MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM						Bridget O'Farrell	832-636-1694

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
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW			HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	2020 Facility Total Emissions							**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**0.00**			**0.00**	**0.00**	**0.00**		**0.00**	
	0.0																								
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 - 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
	VESSELS - Tugs Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																						
	VESSELS		kW			HR/D	D/YR																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020 Non-Facility Total Emissions							**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

AIR EMISSIONS CALCULATIONS - 2ND YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL					SOx		VOC		CO										
												CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		80 (surface locations)		OCS-G35311		MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM					#REF!		Bridget O'Farrell		832-636-1694										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**Average Daily Fuel Use (%)**	**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		60354	50%	3104.97189	37259.66	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	19.16	11.56	11.21	0.28	459.07	13.20	0.00	72.00	0.13
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	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**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**19.17**	**11.57**	**11.22**	**0.28**	**459.42**	**13.38**	**0.00**	**73.63**	**0.13**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2021	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS - 3RD YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL					CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		80 (surface locations)		OCS-G35311		MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM						Bridget O'Farrell	832-636-1694

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	50%	3104.97189	37259.66	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	19.16	11.56	11.21	0.28	459.07	13.20	0.00	72.00	0.13
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW				HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2022	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**19.17**	**11.57**	**11.22**	**0.28**	**459.42**	**13.38**	**0.00**	**73.63**	**0.13**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Tugs Diesel		27493		1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2022	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS - 4TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		80 (surface locations)		OCS-G35311		MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM							Bridget O'Farrell		832-636-1694										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**Average Daily Fuel Use (%)**	**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		60354	50%	3104.97189	37259.66	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	19.16	11.56	11.21	0.28	459.07	13.20	0.00	72.00	0.13
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**				**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2023	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**19.17**	**11.57**	**11.22**	**0.28**	**459.42**	**13.38**	**0.00**	**73.63**	**0.13**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Tugs Diesel		27493		1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2023	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS - 5TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		80 (surface locations)		OCS-G35311		MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM							Bridget O'Farrell		832-636-1694										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**Average Daily Fuel Use (%)**	**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		60354	50%	3104.97189	37259.66	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	19.16	11.56	11.21	0.28	459.07	13.20	0.00	72.00	0.13
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**				**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2024 Facility Total Emissions									**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**19.17**	**11.57**	**11.22**	**0.28**	**459.42**	**13.38**	**0.00**	**73.63**	**0.13**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Tugs Diesel		27493		1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2024 Non-Facility Total Emissions									**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS - 6TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		80 (surface locations)		OCS-G35311		MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM					#REF!		Bridget O'Farrell		832-636-1694										
OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING		MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR									ESTIMATED TONS								
	Diesel Engines		HP	Average Daily Fuel Use (%)	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		60354	50%	3104.97189	37259.66	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	19.16	11.56	11.21	0.28	459.07	13.20	0.00	72.00	0.13
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW				HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2025 Facility Total Emissions									**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**19.17**	**11.57**	**11.22**	**0.28**	**459.42**	**13.38**	**0.00**	**73.63**	**0.13**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2025 Non-Facility Total Emissions									**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS - 7TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		80 (surface locations)		OCS-G35311		MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM							Bridget O'Farrell		832-636-1694										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**		**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**Average Daily Fuel Use (%)**	**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		60354	50%	3104.97189	37259.66	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	19.16	11.56	11.21	0.28	459.07	13.20	0.00	72.00	0.13
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**				**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2026	**Facility Total Emissions**								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**19.17**	**11.57**	**11.22**	**0.28**	**459.42**	**13.38**	**0.00**	**73.63**	**0.13**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Tugs Diesel		27493		1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2026	**Non-Facility Total Emissions**								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS - 8TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		80 (surface locations)	OCS-G35311		MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM		Bridget O'Farrell	832-636-1694

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		60354	3104.97189	74519.33	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	38.32	23.12	22.43	0.56	918.13	26.40	0.00	144.01	0.27
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW			HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2027	**Facility Total Emissions**							**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**38.33**	**23.13**	**22.44**	**0.56**	**918.49**	**26.58**	**0.00**	**145.63**	**0.27**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																								
DRILLING	VESSELS- Crew Diesel		10551	542.806747	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363	636.026899	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Tugs Diesel		27493	1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																						
	VESSELS		kW			HR/D	D/YR																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2027	**Non-Facility Total Emissions**							**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS - 9TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL				CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		80 (surface locations)	OCS-G35311		MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM					Bridget O'Farrell	832-636-1694

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		60354	3104.97189	74519.33	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	38.32	23.12	22.43	0.56	918.13	26.40	0.00	144.01	0.27
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2028	**Facility Total Emissions**							**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**38.33**	**23.13**	**22.44**	**0.56**	**918.49**	**26.58**	**0.00**	**145.63**	**0.27**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																								
DRILLING	VESSELS- Crew Diesel		10551	542.806747	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363	636.026899	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Tugs Diesel		27493	1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2028	**Non-Facility Total Emissions**							**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS - 10TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL						CONTACT		PHONE		REMARKS									
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		80 (surface locations)	OCS-G35311		MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM								Bridget O'Farrell		832-636-1694									
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		60354	3104.97189	74519.33	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	38.32	23.12	22.43	0.56	918.13	26.40	0.00	144.01	0.27
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2029 Facility Total Emissions								**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**38.33**	**23.13**	**22.44**	**0.56**	**918.49**	**26.58**	**0.00**	**145.63**	**0.27**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																								
DRILLING	VESSELS- Crew Diesel		10551	542.806747	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363	636.026899	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Tugs Diesel		27493	1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2029 Non-Facility Total Emissions								**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS - 11TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon (MC)		80 (surface locations)	OCS-G35311		MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM					#REF!		Bridget O'Farrell		832-636-1694										
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		60354	3104.97189	74519.33	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	38.32	23.12	22.43	0.56	918.13	26.40	0.00	144.01	0.27
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2030	**Facility Total Emissions**							**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**38.33**	**23.13**	**22.44**	**0.56**	**918.49**	**26.58**	**0.00**	**145.63**	**0.27**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																								
DRILLING	VESSELS- Crew Diesel		10551	542.806747	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363	636.026899	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Tugs Diesel		27493	1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2030	**Non-Facility Total Emissions**							**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	
Anadarko Petroleum Corporation	80 (surface locations)	OCS-G35311		MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM		

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2021	19.17	11.57	11.22	0.28	459.42	13.38	0.00	73.63	0.13
2022	19.17	11.57	11.22	0.28	459.42	13.38	0.00	73.63	0.13
2023	19.17	11.57	11.22	0.28	459.42	13.38	0.00	73.63	0.13
2024	19.17	11.57	11.22	0.28	459.42	13.38	0.00	73.63	0.13
2025	19.17	11.57	11.22	0.28	459.42	13.38	0.00	73.63	0.13
2026	19.17	11.57	11.22	0.28	459.42	13.38	0.00	73.63	0.13
2027	38.33	23.13	22.44	0.56	918.49	26.58	0.00	145.63	0.27
2028	38.33	23.13	22.44	0.56	918.49	26.58	0.00	145.63	0.27
2029	38.33	23.13	22.44	0.56	918.49	26.58	0.00	145.63	0.27
2030	38.33	23.13	22.44	0.56	918.49	26.58	0.00	145.63	0.27
Allowable	1764.90			1764.90	1764.90	1764.90		47972.92	

COMPANY	Anadarko Petroleum Corporation
AREA	Mississippi Canyon
BLOCK	MC 80 (Surface Locations Only)
LEASE	OCS-G 35311 (Surface Locations Only)
FACILITY	N/A
WELL	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM
COMPANY CONTACT	Bridget O'Farrell
TELEPHONE NO.	832-636-1694
REMARKS	MC 80: 10 surface locations; 12 surface locations from N-10117 (Complex Totals)

Surface Location MC 80	Start Date	End Date	No. of Days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-I	4/1/2021	6/15/2021	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-II	4/1/2022	6/15/2022	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-J	4/1/2023	6/15/2023	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-JJ	4/1/2024	6/15/2024	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-K	4/1/2025	6/15/2025	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-KK	4/1/2026	6/15/2026	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-L	4/1/2027	6/15/2027	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-LL	4/1/2028	6/15/2028	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-M	4/1/2029	6/15/2029	75 days
Drill, Complete & Conduct Flowtest Well Location MC 80 P-MM	4/1/2030	6/15/2030	75 days

Locations below approved under Plan Control No.: N-10117. No changes are being proposed to the activity schedule. Denoting for complex total reference only.

Proposed Activity	Start Date	End Date	No. of Days
Surface Location MC 80			
Drill, Complete, & Conduct Flowtest Well Location MC 80 A	1/1/2021	3/27/2021	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 AA	7/1/2021	9/24/2021	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 B	1/1/2022	3/27/2022	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 BB	7/1/2022	9/24/2022	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 C	1/1/2023	3/27/2023	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 CC	7/1/2023	9/24/2023	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 E	1/1/2024	3/26/2024	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 80 EE	7/1/2024	9/24/2024	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 81 H	1/1/2025	3/27/2025	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 81 HH	7/1/2025	9/24/2025	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 81 J	1/1/2026	3/27/2026	85 days
Drill, Complete, & Conduct Flowtest Well Location MC 81 JJ	7/1/2026	9/24/2026	85 days

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

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

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

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

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

MC 80-No air emissions in 2020

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon		MC 80 (Surface Locations Only)	OCS-G 35311	N/A	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM							Bridget O'Farrell		832-636-1694										
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
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2020	**Facility Total Emissions**							**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**0.00**			**0.00**	**0.00**	**0.00**		**0.00**	
	0.0																								
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 - 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
	VESSELS - Tugs Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2020	**Non-Facility Total Emissions**							**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

AIR EMISSIONS CALCULATIONS - 2ND YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon		MC 80 (Surface Locations Only)		OCS-G 35311 (Surface	N/A	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM		Bridget O'Farrell	832-636-1694

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	50%	3104.971888	37259.66	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	19.16	11.56	11.21	0.28	459.07	13.20	0.00	72.00	0.13
	VESSELS- Drilling - Propulsion Engine - Diesel (N-10117)		60354	50%	3104.971888	37259.66	24	170	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	43.43	26.20	25.42	0.63	1040.55	29.92	0.00	163.21	0.30
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - light smoke (N-10117)				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	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**								**86.03**	**52.25**	**50.71**	**1.48**	**2,070.04**	**73.63**	**0.01**	**455.64**	**0.60**	**62.62**	**37.79**	**36.66**	**0.92**	**1,500.68**	**43.66**	**0.00**	**240.09**	**0.44**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																									
DRILLING	VESSELS- Crew Diesel		10551		542.8067468	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363		636.0268989	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
	VESSELS- Crew Diesel (N-10117)		10551		542.8067468	13027.36	24	85	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	7.59	4.58	4.44	0.11	181.91	5.23	0.00	28.53	0.05
	VESSELS - Supply Diesel (N-10117)		12363		636.0268989	15264.65	24	125	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	13.08	7.89	7.66	0.19	313.45	9.01	0.00	49.16	0.09
	VESSELS - Supply (2) Diesel (N-10117)		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2021	**Non-Facility Total Emissions**								**71.12**	**42.91**	**41.62**	**1.04**	**1,704.03**	**48.99**	**0.00**	**267.27**	**0.50**	**32.23**	**19.45**	**18.86**	**0.47**	**772.31**	**22.21**	**0.00**	**121.14**	**0.23**

AIR EMISSIONS CALCULATIONS - 3RD YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL		CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon		MC 80 (Surface Locations Only)		OCS-G 35311 (S	N/A	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM			Bridget O'Farrell	832-636-1694

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	50%	3104.971888	37259.66	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	19.16	11.56	11.21	0.28	459.07	13.20	0.00	72.00	0.13
	VESSELS- Drilling - Propulsion Engine - Diesel (N-10117)		60354	50%	3104.971888	37259.66	24	170	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	43.43	26.20	25.42	0.63	1040.55	29.92	0.00	163.21	0.30
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - light smoke (N-10117)				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	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									**86.03**	**52.25**	**50.71**	**1.48**	**2,070.04**	**73.63**	**0.01**	**455.64**	**0.60**	**62.62**	**37.79**	**36.66**	**0.92**	**1,500.68**	**43.66**	**0.00**	**240.09**	**0.44**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																									
DRILLING	VESSELS- Crew Diesel		10551		542.8067468	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363		636.0268989	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS- Crew Diesel (N-10117)		10551		542.8067468	13027.36	24	85	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	7.59	4.58	4.44	0.11	181.91	5.23	0.00	28.53	0.05
INSTALLATION	VESSELS - Supply Diesel (N-10117)		12363		636.0268989	15264.65	24	125	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	13.08	7.89	7.66	0.19	313.45	9.01	0.00	49.16	0.09
	VESSELS - Supply (2) Diesel (N-10117)		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2022 Non-Facility Total Emissions									**71.12**	**42.91**	**41.62**	**1.04**	**1,704.03**	**48.99**	**0.00**	**267.27**	**0.50**	**32.23**	**19.45**	**18.86**	**0.47**	**772.31**	**22.21**	**0.00**	**121.14**	**0.23**

AIR EMISSIONS CALCULATIONS - 4TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon		MC 80 (Surface Locations Only)		OCS-G 35311 ($	N/A	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM							Bridget O'Farrell		832-636-1694										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**Average Daily Fuel Use (%)**	**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		60354	50%	3104.97189	37259.66	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	19.16	11.56	11.21	0.28	459.07	13.20	0.00	72.00	0.13
	VESSELS- Drilling - Propulsion Engine - Diesel (N-10117)		60354	50%	3104.97189	37259.66	24	170	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	43.43	26.20	25.42	0.63	1040.55	29.92	0.00	163.21	0.30
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - light smoke (N-10117)				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	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**								**86.03**	**52.25**	**50.71**	**1.48**	**2,070.04**	**73.63**	**0.01**	**455.64**	**0.60**	**62.62**	**37.79**	**36.66**	**0.92**	**1,500.68**	**43.66**	**0.00**	**240.09**	**0.44**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																									
DRILLING	VESSELS- Crew Diesel		10551		542.806747	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363		636.026899	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS- Crew Diesel (N-10117)		10551		542.806747	13027.36	24	85	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	7.59	4.58	4.44	0.11	181.91	5.23	0.00	28.53	0.05
INSTALLATION	VESSELS - Supply Diesel (N-10117)		12363		636.026899	15264.65	24	125	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	13.08	7.89	7.66	0.19	313.45	9.01	0.00	49.16	0.09
	VESSELS - Supply (2) Diesel (N-10117)		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2023	**Non-Facility Total Emissions**								**71.12**	**42.91**	**41.62**	**1.04**	**1,704.03**	**48.99**	**0.00**	**267.27**	**0.50**	**32.23**	**19.45**	**18.86**	**0.47**	**772.31**	**22.21**	**0.00**	**121.14**	**0.23**

AIR EMISSIONS CALCULATIONS - 5TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon		MC 80 (Surface Locations Only)		OCS-G 35311 (Surface I	N/A	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM							Bridget O'Farrell		832-636-1694										
OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	50%	3104.971888	37259.66	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	19.16	11.56	11.21	0.28	459.07	13.20	0.00	72.00	0.13
	VESSELS- Drilling - Propulsion Engine - Diesel (N-10117)		60354	50%	3104.971888	37259.66	24	170	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	43.43	26.20	25.42	0.63	1040.55	29.92	0.00	163.21	0.30
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - light smoke (N-10117)				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	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**								**86.03**	**52.25**	**50.71**	**1.48**	**2,070.04**	**73.63**	**0.01**	**455.64**	**0.60**	**62.62**	**37.79**	**36.66**	**0.92**	**1,500.68**	**43.66**	**0.00**	**240.09**	**0.44**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																									
DRILLING	VESSELS- Crew Diesel		10551		542.8067468	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363		636.0268989	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS- Crew Diesel (N-10117)		10551		542.8067468	13027.36	24	85	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	7.59	4.58	4.44	0.11	181.91	5.23	0.00	28.53	0.05
INSTALLATION	VESSELS - Supply Diesel (N-10117)		12363		636.0268989	15264.65	24	125	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	13.08	7.89	7.66	0.19	313.45	9.01	0.00	49.16	0.09
	VESSELS - Supply (2) Diesel (N-10117)		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																							
	VESSELS		kW				HR/D	D/YR																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2024	**Non-Facility Total Emissions**								**71.12**	**42.91**	**41.62**	**1.04**	**1,704.03**	**48.99**	**0.00**	**267.27**	**0.50**	**32.23**	**19.45**	**18.86**	**0.47**	**772.31**	**22.21**	**0.00**	**121.14**	**0.23**

AIR EMISSIONS CALCULATIONS - 6TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL						CONTACT		PHONE		REMARKS									
Anadarko Petroleum Corporation	Mississippi Canyon		MC 80 (Surface Locations Only)		OCS-G 35311 (Surface L	N/A	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM								Bridget O'Farrell		832-636-1694									
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**Average Daily Fuel Use (%)**	**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		60354	50%	3104.971888	37259.66	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	19.16	11.56	11.21	0.28	459.07	13.20	0.00	72.00	0.13
	VESSELS- Drilling - Propulsion Engine - Diesel (N-10117)		60354	50%	3104.971888	37259.66	24	170	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	43.43	26.20	25.42	0.63	1040.55	29.92	0.00	163.21	0.30
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - light smoke (N-10117)				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	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**								**86.03**	**52.25**	**50.71**	**1.48**	**2,070.04**	**73.63**	**0.01**	**455.64**	**0.60**	**62.62**	**37.79**	**36.66**	**0.92**	**1,500.68**	**43.66**	**0.00**	**240.09**	**0.44**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																									
DRILLING	VESSELS- Crew Diesel		10551		542.8067468	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363		636.0268989	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS- Crew Diesel (N-10117)		10551		542.8067468	13027.36	24	85	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	7.59	4.58	4.44	0.11	181.91	5.23	0.00	28.53	0.05
INSTALLATION	VESSELS - Supply Diesel (N-10117)		12363		636.0268989	15264.65	24	125	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	13.08	7.89	7.66	0.19	313.45	9.01	0.00	49.16	0.09
	VESSELS - Supply (2) Diesel (N-10117)		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2025	**Non-Facility Total Emissions**								**71.12**	**42.91**	**41.62**	**1.04**	**1,704.03**	**48.99**	**0.00**	**267.27**	**0.50**	**32.23**	**19.45**	**18.86**	**0.47**	**772.31**	**22.21**	**0.00**	**121.14**	**0.23**

AIR EMISSIONS CALCULATIONS - 7TH YEAR

COMPANY	AREA		BLOCK		LEASE	FACILITY	WELL				CONTACT	PHONE	REMARKS
Anadarko Petroleum Corporation	Mississippi Canyon		MC 80 (Surface Locations Only)		OCS-G 35311 (Surface	N/A	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM					Bridget O'Farrell	832-636-1694

OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	Average Daily Fuel Use (%)	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		60354	50%	3104.971888	37259.66	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	19.16	11.56	11.21	0.28	459.07	13.20	0.00	72.00	0.13
	VESSELS- Drilling - Propulsion Engine - Diesel (N-10117)		60354	50%	3104.971888	37259.66	24	170	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	43.43	26.20	25.42	0.63	1040.55	29.92	0.00	163.21	0.30
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																							
DRILLING	Liquid Flaring		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke				0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke				208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - light smoke (N-10117)				208333		24	4	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.02	0.02	0.02	0.01	0.71	0.36	--	3.25	--
	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**								**86.03**	**52.25**	**50.71**	**1.48**	**2,070.04**	**73.63**	**0.01**	**455.64**	**0.60**	**62.62**	**37.79**	**36.66**	**0.92**	**1,500.68**	**43.66**	**0.00**	**240.09**	**0.44**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																	**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																									
DRILLING	VESSELS- Crew Diesel		10551		542.8067468	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363		636.0268989	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Supply (2) Diesel		27493		1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS- Crew Diesel (N-10117)		10551		542.8067468	13027.36	24	85	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	7.59	4.58	4.44	0.11	181.91	5.23	0.00	28.53	0.05
INSTALLATION	VESSELS - Supply Diesel (N-10117)		12363		636.0268989	15264.65	24	125	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	13.08	7.89	7.66	0.19	313.45	9.01	0.00	49.16	0.09
	VESSELS - Supply (2) Diesel (N-10117)		27493		1414.40488	33945.72	24	6	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	1.40	0.84	0.82	0.02	33.46	0.96	0.00	5.25	0.01
PRODUCTION	VESSELS - Support Diesel		0		0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**				**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																							
	VESSELS		**kW**				**HR/D**	**D/YR**																		
	On-Ice – Loader				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)				0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2026	**Non-Facility Total Emissions**								**71.12**	**42.91**	**41.62**	**1.04**	**1,704.03**	**48.99**	**0.00**	**267.27**	**0.50**	**32.23**	**19.45**	**18.86**	**0.47**	**772.31**	**22.21**	**0.00**	**121.14**	**0.23**

AIR EMISSIONS CALCULATIONS - 8TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon		MC 80 (Surface Locations Only)	OCS-G 35311 (Surface l	N/A	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM							Bridget O'Farrell		832-636-1694										
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		60354	3104.971888	74519.33	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	38.32	23.12	22.43	0.56	918.13	26.40	0.00	144.01	0.27
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2027	**Facility Total Emissions**							**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**38.33**	**23.13**	**22.44**	**0.56**	**918.49**	**26.58**	**0.00**	**145.63**	**0.27**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																								
DRILLING	VESSELS- Crew Diesel		10551	542.8067468	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363	636.0268989	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Tugs Diesel		27493	1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2027	**Non-Facility Total Emissions**							**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS - 9TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon		MC 80 (Surface Locations Only)	OCS-G 35311 (Surface	N/A	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM							Bridget O'Farrell		832-636-1694										
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		60354	3104.971888	74519.33	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	38.32	23.12	22.43	0.56	918.13	26.40	0.00	144.01	0.27
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW			HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2028	**Facility Total Emissions**							**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**38.33**	**23.13**	**22.44**	**0.56**	**918.49**	**26.58**	**0.00**	**145.63**	**0.27**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																								
DRILLING	VESSELS- Crew Diesel		10551	542.8067468	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363	636.0268989	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Tugs Diesel		27493	1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																						
	VESSELS		kW			HR/D	D/YR																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2028	**Non-Facility Total Emissions**							**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS - 10TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Anadarko Petroleum Corporation	Mississippi Canyon		MC 80 (Surface Locations Only)	OCS-G 35311 (Surface	N/A	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM							Bridget O'Farrell		832-636-1694										
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		60354	3104.971888	74519.33	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	38.32	23.12	22.43	0.56	918.13	26.40	0.00	144.01	0.27
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2029	**Facility Total Emissions**							**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**38.33**	**23.13**	**22.44**	**0.56**	**918.49**	**26.58**	**0.00**	**145.63**	**0.27**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																								
DRILLING	VESSELS- Crew Diesel		10551	542.8067468	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363	636.0268989	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Tugs Diesel		27493	1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2029	**Non-Facility Total Emissions**							**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS - 11TH YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL						CONTACT		PHONE		REMARKS									
Anadarko Petroleum Corporation	Mississippi Canyon		MC 80 (Surface Locations Only)	OCS-G 35311 (Surface	N/A	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM								Bridget O'Farrell		832-636-1694									
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		60354	3104.971888	74519.33	24	75	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	38.32	23.12	22.43	0.56	918.13	26.40	0.00	144.01	0.27
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			208333		24	2	0.44	0.44	0.44	0.12	14.87	7.49	--	67.81	--	0.01	0.01	0.01	0.00	0.36	0.18	--	1.63	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		kW			HR/D	D/YR																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2030	**Facility Total Emissions**							**43.02**	**26.13**	**25.36**	**0.74**	**1,035.02**	**36.82**	**0.00**	**227.82**	**0.30**	**38.33**	**23.13**	**22.44**	**0.56**	**918.49**	**26.58**	**0.00**	**145.63**	**0.27**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**1,764.90**			**1,764.90**	**1,764.90**	**1,764.90**		**47,972.92**	
	53.0																								
DRILLING	VESSELS- Crew Diesel		10551	542.8067468	13027.36	24	38	7.44	4.49	4.36	0.11	178.34	5.13	0.00	27.97	0.05	3.39	2.05	1.99	0.05	81.32	2.34	0.00	12.76	0.02
	VESSELS - Supply Diesel		12363	636.0268989	15264.65	24	58	8.72	5.26	5.10	0.13	208.97	6.01	0.00	32.78	0.06	6.07	3.66	3.55	0.09	145.44	4.18	0.00	22.81	0.04
	VESSELS - Tugs Diesel		27493	1414.40488	33945.72	24	3	19.40	11.70	11.35	0.28	464.71	13.36	0.00	72.89	0.14	0.70	0.42	0.41	0.01	16.73	0.48	0.00	2.62	0.00
FACILITY	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INSTALLATION	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			GAL/HR	GAL/D																				
	Man Camp - Operation (maximum people per day)		PEOPLE/DAY																						
	VESSELS		kW			HR/D	D/YR																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2030	**Non-Facility Total Emissions**							**35.56**	**21.45**	**20.81**	**0.52**	**852.01**	**24.50**	**0.00**	**133.64**	**0.25**	**10.16**	**6.13**	**5.95**	**0.15**	**243.49**	**7.00**	**0.00**	**38.19**	**0.07**

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	
Anadarko Petroleum Corporation	MC 80 (Surface	OCS-G 35311 (Surface	N/A	MC 80 P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M, P-MM		

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2021	62.62	37.79	36.66	0.92	1500.68	43.66	0.00	240.09	0.44
2022	62.62	37.79	36.66	0.92	1500.68	43.66	0.00	240.09	0.44
2023	62.62	37.79	36.66	0.92	1500.68	43.66	0.00	240.09	0.44
2024	62.62	37.79	36.66	0.92	1500.68	43.66	0.00	240.09	0.44
2025	62.62	37.79	36.66	0.92	1500.68	43.66	0.00	240.09	0.44
2026	62.62	37.79	36.66	0.92	1500.68	43.66	0.00	240.09	0.44
2027	38.33	23.13	22.44	0.56	918.49	26.58	0.00	145.63	0.27
2028	38.33	23.13	22.44	0.56	918.49	26.58	0.00	145.63	0.27
2029	38.33	23.13	22.44	0.56	918.49	26.58	0.00	145.63	0.27
2030	38.33	23.13	22.44	0.56	918.49	26.58	0.00	145.63	0.27
Allowable	1764.90			1764.90	1764.90	1764.90		47972.92	

SECTION H
OIL SPILL INFORMATION

(a) Oil Spill Response Planning

(i) OSRP Information

All the proposed activities and facilities in this Initial EP are covered by the Regional Oil Spill Response Plan (OSRP) approved in August 2015 for Anadarko Petroleum Corporation and its subsidiary Anadarko US Offshore LLC. (Company Numbers 00981 and 02219 respectively) in accordance with 30 CFR Part 254. The June 2017 updates for the OSRP were acknowledged by BSEE in July 2017 and in compliance with 30 CFR 254.30(a). Non-regulatory required OSRP updates were submitted to BSEE in June 2018 and acknowledged as in compliance in July 2018. The OSRP biennial update was submitted June 30, 2019 and acknowledged as in compliance in September 2019.

(ii) Spill Response Sites

Primary Response Equipment Location(s)	Preplanned Staging Location(s)
Houma, Louisiana	Fourchon, Louisiana
Harvey, Louisiana	Harvey, Louisiana
Venice, Louisiana	Venice, Louisiana
Lake Charles, Louisiana	Cameron, Louisiana
Galveston, Texas	Galveston, Texas

(iii) OSRO Information

Anadarko maintains a contract with Clean Gulf Associates (CGA) for spill response equipment. Various equipment locations are staged throughout the Gulf of Mexico. CGA equipment can be referenced on their website: http://www.cleangulfassoc.com/. Personnel would be obtained from the Marine Spill Response Corporation's (MSRC) STARS network, including a supervisor to operate the equipment.

In addition, Anadarko has a contract with the Marine Spill Response Corporation (MSRC) for spill response equipment. MSRC stages equipment throughout the Gulf of Mexico and has recently completed a large expansion of its resources, with particular focus on deepwater. The expansion is known as "Deep Blue". MSRC capabilities and a complete equipment listing are available on-line at: http://www.msrc.org/.

Anadarko is also a member of the Marine Well Containment Company (MWCC), which provides access to containment response capabilities and includes subsea dispersant injection equipment.

(iv) Worst-Case Scenario Determination

Category	Regional OSRP (S-7623)	Initial EP (N-10029)	Initial EP (Cactus Bowl)	Initial EP (Cactus Bowl)	Initial EP (Peach Bowl)
Type of Activity	Exploratory	Exploratory	Exploratory	Exploratory	Exploratory
Facility Location (area/block)	GC 683	MC 126	MC 36	MC 37	MC 80
Facility Designation	GC 683 G*	MC 126 Y**	MC 36 C-BB	MC 37 C-GG	MC 80 P-M
Distance to Nearest Shoreline	120 miles	53 miles	51.6 miles	51.6 miles	53 miles
Storage Tanks (total)	N/A	N/A	N/A	N/A	N/A
Flowlines (on facility)	N/A	N/A	N/A	N/A	N/A
Pipelines	N/A	N/A	N/A	N/A	N/A
Uncontrolled	**403,608 bopd***	**371,735 bopd****	324,049 bopd	339,604 bopd	268,262 bopd
Type of Oil(s)	Oil	Oil	Oil	Oil	Oil
API Gravity	28.9°	33.1°	40.0°	40.0°	40.0°

**Approved under Plan Control No.: S-7623.*
***Approved under Plan Control No.: N-10029. Highest WCD for the area. Also referenced under Plan Control No.: N-10117.*

Anadarko has determined that the worst-case scenario from the activities proposed in this Initial EP does not supersede the worst-case scenario for Green Canyon 683.

Since Anadarko has the capability to respond to the worst-case spill scenario included in our Regional OSRP, and since the worst-case scenarios determined for the Initial EP does not replace the worst-case scenario in the Regional OSRP last approved in August 2015 (and updates accepted by BSEE September 2019), I hereby certify that Anadarko has the capability to respond, to the maximum extent practicable, to a worst-case discharge, or a substantial threat of such a discharge, resulting from the activities proposed in the Initial EP.

(b) Worst-Case Discharge (WCD) Volume Assumptions

WCD calculations and assumptions within this section utilized guidelines and requirements pursuant with NTL No. 2015-N01. Discussions regarding geologic information are considered proprietary and have been omitted from this public copy of the Initial EP.

Within this Initial EP, the WCD volumes for MC 36, 37 and 80 was determined to be less than 371,735 bopd as previously approved under Plan Control No.: N-10029. For the locations proposed under this Initial EP, the maximum hydrocarbon discharge was MC 37 C-GG at 339,604 bopd based on NTL No. 2015-N01 guidance. The highest WCD for MC 36 was calculated to be MC 36 C-BB at 324,049 bopd. The highest WCD calculated for MC 80 was P-M at 268,262 bopd.

The overall highest WCD for the area is MC 126 Y at 371,735 bopd as approved under Plan Control No.: N-10029 and also referenced in Plan Control No.: N-10117.

(c) Oil Spill Response Discussion

For the purpose of NEPA analysis, the largest spill volume originating from the proposed activity would be an uncontrolled blowout of the well during drilling operations at 371,735 bopd with an API gravity of 33.1°. A discussion of the blowout scenario is included in accordance with NTL No. 2015-N01.

Land Segment and Resource Identification Modeling

Trajectory of a spill and the probability of its impacting a land segment have been projected utilizing information in the Oil Spill Risk Analysis Model (OSRAM) for the Central Gulf of Mexico. Additional information may be referenced in the "Oil-Spill Risk Analysis: Contingency Planning Statistics for Gulf of Mexico OCS Activities" (OCS Report MMS 2004-026), using the average conditional probability for 3, 10, and 30 day impacts.

MC 81, 82 and 126 (and MC 36, 37, 80) are located within Launch Area C57. According to the BOEM OSRAM, the trajectory indicates a 21% probability of potential impact to the shoreline in Plaquemines Parish, Louisiana. The results are shown in Table H-2

Plaquemines Parish is identified as the most probable potential impacted parish or county within the Gulf of Mexico for this operation. 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

Anadarko will make every effort to respond to the WCD as effectively as possible. Response equipment available to respond to the WCD and the estimated time of a spill response from oil spill detection to equipment deployment on-site is included in **Table H-3.** The table estimates individual times needed for procurement, load out, travel time to the site and deployment. In the event of an actual incident equipment and times can vary.

For the purpose of response scenario discussion, an uncontrolled blowout of the well would be considered the largest potential spill volume at 371,735 bopd. An ADIOS weathering model was run based on a similar type of oil expected to be produced from this well. Based on this information, approximately 13% (48,326 bbls) of the initial volume would be evaporated/ dispersed within 24 hours.

If approved and appropriate, 4 sorties (8,000 gallons) from the Basler aircraft and 8 sorties (9,600 gallons) from two DC-3 aircrafts could disperse approximately 7,540 barrels of oil.

If the conditions are appropriate, and the necessary approvals and permits have been obtained, in-situ burning may be utilized. Based on in-situ burn operations during Deepwater Horizon, approximately 5% (18,587 bbls) of the total initial WCD could be burned.

Although unlikely in a spill lasting 30 days, potential shoreline impact in Plaquemines Parish, Louisiana could occur depending on environmental conditions (wind, currents and temperature) at the time of an incident. Nearshore response may include the use of shoreline boom on beach areas, or protection/sorbent boom on vegetated areas. Surveillance and real time trajectories would aide in determining the most appropriate strategies to respond to a spill.

Table H.3 provides an example of offshore and nearshore equipment, response times, and personnel to respond to a spill of 323,409 bbls, which is the estimated amount that would remain considering natural evaporation/dispersion at 24 hours. This amount could be further reduced through the application of aerial and subsea dispersants, and in-situ burning provided such applications/actions were approved.

Anadarko's contingency plan for dealing with this WCD would be to activate its Spill Management Team and equipment resources as described in its Gulf of Mexico Regional Oil Spill Response Plan (OSRP) and provide continuous support for the duration of the event. Response resources are activated and supplemented according to need. These resources would remain engaged in the response until the incident is deemed complete or until released by Unified Command.

Anadarko is also a member of the Marine Well Containment Company (MWCC), which provides access to containment response capabilities and includes subsea dispersant injection equipment.

In the event of a blowout, Anadarko may:

1. Evacuate personnel, if necessary. Deploy emergency responders in an effort to preserve human life, if necessary.

2. Assess the damage and attempt to stop the flow at the source, if safe to do so, to reduce the amount of oil discharged.

3. Notify agencies.

4. Assess the amount of oil that has been spilled and calculate additional potential of oil flow. A continuous aerial surveillance program would be used to assess the growth of the slick and the volume of oil on the water. Observations of the size of the slick on the water, combined with observations at the source, would be used to provide a constant update. Additional potential to release fuel from the remaining tanks onboard the dynamically positioned (DP) semi-submersible drilling rig would be determined by marine surveyors. Operations and Unified Command would continue to assess the adequacy of response equipment capacities based on this continually updated mass balance.

5. Convene the Spill Management Team (SMT). Organize Unified Command and establish objectives and priorities.

6. Monitor the oil spill with aerial surveillance and obtain trajectories. If oil is seaward bound, going away from land, discuss additional strategies with Unified Command.

7. If oil is moving in the direction of a shoreline and weather conditions are favorable, request approval to utilize dispersants.

    a. Prior to commencing application operations, conduct an on-site survey in consultation with natural resource specialists to determine if any threatened or endangered species are present in the projected application area or otherwise at risk from dispersant application.

    b. Upon approval, mobilize one Basler aircraft and two DC-3 aircrafts from Houma, with surveillance aircraft and spotter. Mobilize MSRC contracted aircraft(s) if needed. Rotate aircraft, spraying the leading edge of the spill and working back to the source. Monitor/sample for effectiveness (USCG SMART Team). Truck additional dispersants from CGA/MSRC stockpile to Houma, if necessary.

    c. Dispersants are most effective when applied as soon after discharge as possible, since weathering of the oil decreases dispersant effectiveness. The estimated window of opportunity for most effective use of dispersants is within 48-72 hours post-release. The oil may still be dispersible after 72 hours on the water surface, but the effectiveness of dispersant use would likely be diminished after the oil has been on the water for more than three days. Ultimately, the USCG SMART monitoring protocol will be used to determine whether or not dispersant operations are effective.

    d. Once the CGA HOSS barge is on location and in the skimming mode, dispersants would only be used if required and approved.

8. Deploy offshore mechanical oil containment and recovery equipment. Attempt to recover as much oil at sea as possible, utilizing:

    a. The CGA HOSS barge, will be positioned in a stationary mode, will be situated down-wind and down-current from location for long-duration, high-volume skimming. Based on average travel times, the HOSS barge could be on location within approximately 31 hours of the release. The de-rated skimming capacity of the HOSS barge is 43,000 bbls per day. However, only the oil encountered by a skimmer can be recovered. In order to maximize oil encounter rate, boom will be deployed in a V-configuration in front of the HOSS barge to funnel oil to the skimmers. If necessary, temporary barges can be activated to support continuous skimming operations. (These barges arrive on-site at approximately the same time as the HOSS barge.) For an on-going release, multiple barges are deployed to provide for continuous off-loading of skimmer storage vessels and shuttling of recovered oil to an onshore waste handling facility. Sufficient barges are available to provide enough temporary storage for continuous recovery operations.

b. CGA's Fast Response Units (FRU) would arrive on-scene between approximately 17-25 hours of the initial release. These skimmers operate downstream of the HOSS barge and are used to recover pockets and streamers of oil that may move past the large stationary skimmer. Each FRU has 200 barrels of on-board storage. Approval will be requested to decant water after gravity separation, through a hose forward of the skimmer, to optimize temporary storage capacity. A 42" Boom will be utilized to concentrate oil so that it is thick enough to be skimmed.

9. Dispersants, Fast Response Units (FRU), Oil Spill Response Vessels (OSRV or R/V) would typically work daylight hours only. The HOSS barge can operate continuously, including night operations. Available technology will be considered such as remote sensing devices that will enable 24 hour surveillance, trajectories, and planning. All response vessels are designed to be able to remain offshore continuously throughout the response. Even if sea conditions prohibit effective skimming, these resources would remain offshore until skimming operations could be commenced again. Safety would remain the first priority.

10. Prepare Site-Specific Waste Management Plan, Site Safety Plan, Decontamination Plans, Communications and Medical Plans.

11. If oil becomes a threat to any shoreline, data from the aerial surveillance, weather reports, and trajectories would be used to direct onshore teams to deploy protection/containment boom with reference to Area Contingency Plans and in coordination with State and Federal On-Scene Coordinators.

    a. Implement pre-designated strategies.

    b. Identify resources at risk in spill vicinity.

    c. Develop/implement appropriate protection tactics.

12. Establish Site-Specific Wildlife Rescue and Rehabilitation Plan.

The following types of additional support may be required for a blowout lasting 120 days.

- Additional Oil Spill Removal Organization (OSRO) personnel to relieve equipment operators
- Vessels for supporting offshore operations
- Field safety personnel
- Continued surveillance and monitoring of oil movement
- Helicopter, video cameras
- Infra-red (nighttime spill tracking) capabilities, X-band radar
- Barge to transport recovered oil from offshore skimming system, and temporary storage barges to onshore disposal sites that are identified in Area Contingency Plans (ACP)
- Logistics needed to support equipment:

  - Staging areas
  - Parts, trailers, and mechanics to maintain skimmers and boom
  - Fueling facilities
  - Decontamination stations
  - Dispersant stockpile transported from Houston to Houma or other potential command post locations
  - Communications equipment and technicians
- Logistics needed to support responder personnel
  - Medical aid stations
  - Safety personnel
  - Food
  - Berthing
  - Additional clothing/safety supplies
  - Decontamination stations

Louisiana CZM Containment Response Information

Anadarko has the capability to respond and contain, to the maximum extent practicable as defined in 30 CFR 254.6 and 30 CFR 250.26(d)(1), to the estimated worst-case discharge (WCD) associated with the proposed activity within 30 days. Deployment time for surface containment equipment is subject to availability and location, weather conditions, potential security zones around the spill site, and site/well specific assessment data. Personnel safety is always first and foremost. Refer to further details on equipment and timing provided in **Section H–Oil Spill Information** and **Table H-3** of the Initial EP.

The potential WCD will be further evaluated during the Application for Permit to Drill (APD) process, including the Well Containment Screening Tool (WCST) and associated subsea containment plan for enhanced planning purposes.

There will be no new or unusual technology deployed that has not been previously deployed for Gulf of Mexico oil spill prevention, control, and/or cleanup.

Table H-1

Worst-Case Discharge Calculation
(Based on Blowout during Drilling Operations)

Calculations for Uncontrolled Blowout> 10 miles from shore:		**Blocks 81, 82 & 126 (and 36, 37, 80)**
i.	Type of Oil (crude, condensate, diesel)	Crude
ii.	API Gravity	33.1°
iii.	EP Location Used for NTL No. 2015-N01 WCD for MC 81, 82 & 126 (and 36, 37, 80)	MC 126 Y
iv.	Largest Anticipated WCD Rate during blowout	371,735 bopd*
v.	**WCD Total for Drilling Operations for MC 81, 82 & 126 (and 36, 37, 80 reference) > 10 miles from shore:**	371,735 bopd*

**As approved under Plan Control No.: N-10029. Highest WCD for the area. Also referenced under Plan Control No.: N-10117.*

Table H-2

Trajectory by Land Segment						
Following are the average conditional probabilities (expressed as percent chance) that an oil spill starting at a particular launch area will contact a land segment as included in the BOEM Oil Spill Risk Analysis Model (OSRAM) for the Central and Western Gulf of Mexico. This information can be found on the BOEM website using 3/10/30 day potential impact, as applicable. The results are listed below.						
Area/Block	OCS-G	Launch Area	Land Segment and/or Resource	Conditional Probability (%)		
				3 days	10 days	30 days
MC blocks:			Cameron, LA	--	--	1
			Vermilion, LA	--	--	1
81	35312	C57	Terrebonne, LA	--	1	2
82	35313		Lafourche, LA	--	1	2
126	18194	Central	**Plaquemines, LA**	**4**	**14**	**21**
		Planning	St. Bernard, LA	--	1	3
Drill, complete,		Area	Hancock & Harrison, MS	--	--	1
test, and install			Jackson, MS	--	--	1
subsea trees			Mobile, AL	--	--	1
(53 miles from			Baldwin, AL	--	--	1
shore)			Escambia, AL	--	--	1
			Okaloosa, FL	-	-	1
For reference:			Walton, FL	-	-	1
36	35308		Bay, FL	-	-	1
37	35309					
80	35311					

Table H-3

WCD Scenario Drilling Activities – Based on a single well uncontrolled blowout (53 miles from shore)
MC 81, 82, 126 (and for MC 36, 37, 80 reference)
371,735 bopd (initial volume)
323,409 bopd (after evaporation/dispersion)
API Gravity 33.1°

Offshore Equipment from Spill Detection to Equipment Deployment Response Time: MC 81, 82 126 (and MC 36, 37, 80)

Offshore Equipment				Owner/Location	Initial Staging	Hours to Staging Area	Time to Procure (1)	Time to Load Out (2)	Travel Time (Staging/ Spill) (3)	Time to Deploy (4)	Total Estimated Response Time
Type	Derated Capacity (bbls)	Storage (bbls)	No. of Units/ Persons								
Basler Spray Aircraft DC 3 Spray Aircraft Aero Commander	-- --	-- --	1 2 2	ASI/Houma	Houma	0 0 1	1	1	2	0	4
HOSS Barge Operators Tugs	43,000	4,000	1 8 3	CGA/Harvey STARS VOO	Harvey	1 2 4	4	0	36	1	41
Deep Blue Responder LFF 100 Brush + OSRV 6,600' 44" Sea Sentry Boom 660' 67" LAMOR	18,086	4,000	1 1 14 crew	MSRC/Fourchon	Fourchon	0 2 2	2	0	34	1	37
FRU Operators Utility Boat	4,251	200	1 6 1	CGA/Ingleside STARS VOO	Ingleside	0 2 2	1	2	23	1	27
FRU Operators Utility Boat	4,251	200	1 6 1	CGA/Galveston STARS VOO	Galveston	0 2 2	1	2	17	1	21
FRU Operators Utility Boat	4,251	200	1 6 1	CGA/Lake Charles STARS VOO	Cameron	.5 2 2	1	2	16.5	1	20.5
FRU Operators Utility Boat	4,251	200	1 6 1	CGA/Harvey STARS VOO	Harvey	.5 2 2	1	2	15	1	19
FRU Operators Utility Boat	8,502	400	2 12 2	CGA/Venice STARS VOO	Venice	0 2 2	1	2	14	1	18
FRU Operators Utility Boat	8,502	400	2 12 2	CGA/Leeville STARS VOO	Leeville	.5 2 2	1	2	12	1	16
Koseq Skimming Arms Operators Vessel w/ storage/hull	17,830	 2,000	1 set 6 1	CGA/Fourchon STARS VOO	Fourchon	0 2 2	1	12	12	1	26

Spill Team Area Responders (STARS) called out by Marine Spill Response Corporation (MSRC)
Vessel of Opportunity=VOO
EMS=Enterprise Marine Services (available through contract with CGA)
T&T=T&T Marine (available through contract with CGA)

Offshore Equipment, cont.				Owner/Location	Initial Staging	Hours to Staging Area	Time to Procure (1)	Time to Load Out (2)	Travel Time (Staging/ Spill) (3)	Time to Deploy (4)	Total Estimated Response Time
Type	Derated Capacity (bbls)	Storage (bbls)	No. of Units/ Persons								
MSRC 452 Offshore Barge Tugs 1 Crucial Disk 88/30 1,980' 44" Sea Sentry II Boom 660' 67" LAMOR	11,122	45,000	1 3 1 6 crew	MSRC/Fort Jackson VOO	Fort Jackson	1	2	0	37	1	40
CTCo 5001 Operators Tug	--	47,000	1 12 2	EMS/Amelia STARS VOO	Amelia	0 2 4	4	0	32	1	37
CTCo 2607 Operators Tug	--	23,000	1 6 1	EMS/Amelia STARS VOO	Amelia	0 2 4	4	0	32	1	37
CTCo 2608 Operators Tug	--	23,000	1 6 1	EMS/Amelia STARS VOO	Amelia	0 2 4	4	0	32	1	37
10,000' 42" Auto Boom VOO	--	--	40 20 crew	CGA/Harvey STARS	Harvey	.5 2	1	2	15	1	19
5,000' 42" Auto Boom VOO	--	--	20 10 crew	CGA/Lake Charles STARS	Cameron	.5 2	1	2	16.5	1	20.5
5,000' 42" Auto Boom VOO	--	--	20 10 crew	CGA/Galveston STARS	Galveston	0 2	1	2	17	1	21
2,500' 42" Auto Boom VOO	--	--	12 6 crew	CGA/Ingleside STARS	Ingleside	0 2	1	2	23	1	27
2,500' 42" Auto Boom VOO	--	--	12 6 crew	CGA/Pascagoula STARS	Pascagoula	0 2	1	2	20	1	24
6,679' 44" Sea Sentry II Boom VOO	--	--	20 10 crew	MSRC/Lake Charles STARS	Lake Charles	0 2	1	2	23	1	27
1,980' 44" Sea Sentry II Boom VOO	--	--	12 6 crew	MSRC/Fort Jackson STARS	Fort Jackson	0 2	1	2	23.5	1	27.5
22,400' 42" Boom VOO	--	--	80 25 crew	AMPOL/New Iberia	New Iberia	0 2	1	2	14	1	18
4,800' 42" Boom VOO	--	--	18 9 crew	AMPOL/Harvey	Harvey	0 2	1	2	15	1	19
Spotter Helo Surveillance Helo Handheld Radios	-- -- --	-- -- --	1 1 30	PHI/Fourchon PHI/Fourchon STARS	Spill Site Spill Site Fourchon	1 1 1.5	1 1 1.5	-- -- --	1.5 1.5 2	-- -- --	2.5 2.5 3.5
Total	124,046	149,600									

Nearshore Equipment from Spill Detection to Equipment Deployment Response Time: MC 81, 82 & 126 (and MC 36, 37, 80)

Nearshore Equipment*				Owner/Location	Initial Staging	Hours to Staging Area	Time to Procure (1)	Time to Load Out (2)	Travel Time (Staging/ Spill) (3)	Time to Deploy (4)	Total Estimated Response Time
Type	Derated Capacity (bbls)	Storage (bbls)	No. of Units/ Persons								
Basler Spray Aircraft DC 3 Spray Aircraft Aero Commander	--	--	1 2 2	ASI/Houma	Houma	0 0 1	1	1	1	0	3
Trinity SWS Operators	21,500	249	1 4	CGA/Leeville STARS	Fourchon	0 2	1	2	25	1	29
Trinity SWS Operators	21,500	249	1 4	CGA/Morgan City STARS	Morgan City	0 2	1	2	26	1	30
SWS Egmopol Operators	3,000	100	1 3	CGA/Galveston STARS	Galveston	0 2	1	2	35	0	38
SWS Egmopol Operators	3,000	100	1 3	CGA/Morgan City STARS	Morgan City	.5 2	1	2	32	0	35
SWS Marco Operators	3,588	34	1 3	CGA/Leeville STARS	Leeville	.5 2	1	2	20	0	23
SWS Marco Operators	3,588	20	1 3	CGA/Lake Charles STARS	Cameron	.5 2	1	2	30	0	33
R/V Grand Bay Operators	5,000	65	1 3	CGA/Venice STARS	Venice	.5 2	2	.5	9	0	11.5
R/V RW Armstrong Operators	5,000	65	1 3	CGA/Leeville STARS	Leeville	.5 2	2	.5	8	0	10.5
R/V Bastian Bay Operators	5,000	65	1 3	CGA/Lake Charles STARS	Cameron	.5 2	2	.5	10.5	0	13
R/V Timbalier Bay Operators	5,000	65	1 3	CGA/Galveston STARS	Galveston	0 2	2	.5	11	0	20
CTCo 2604 Operators Tugs	--	20,000	1 6 1	EMS/Amelia	Amelia	0 2 4	4	0	16	1	21
CTCo 2605 Operators Tugs	--	20,000	1 6 1	EMS/Amelia	Amelia	0 2 4	4	0	16	1	21
CTCo 2606 Operators Tugs	--	20,000	1 6 1	EMS/Amelia	Amelia	0 2 4	4	0	16	1	21
CTCo 2609 Operators Tugs	--	23,000	1 6 1	EMS/Amelia	Amelia	0 2 4	4	0	16	1	21
2,000' Beach Boom	--	--	6	CGA/Galveston	Galveston	0	1	2	17	2	22
1,000' Beach Boom	--	--	4	CGA/Ingleside	Ingleside	0	1	2	23	2	28
2,000' Beach Boom	--	--	6	CGA/Pascagoula	Pascagoula	0	1	2	20	2	25
10,000' 18" Boom VOO	--	--	10 4 crew	Oil Mop/New Iberia	New Iberia	0 2	1	1	15	3	20
10,000' 18" Boom VOO	--	--	10 4 crew	Oil Mop/Houston	Houston	1 2	1	1	10	3	15

Nearshore Equipment, cont.				Owner/Location	Initial Staging	Hours to Staging Area	Time to Procure (1)	Time to Load Out (2)	Travel Time (Staging/ Spill) (3)	Time to Deploy (4)	Total Estimated Response Time
Type	Derated Capacity (bbls)	Storage (bbls)	No. of Units/ Persons								
10,000' 18" Boom VOO	--	--	10 4 crew	Oil Mop/Port Arthur	Port Arthur	0 2	1	1	9.5	3	14.5
10,000' 18" Boom VOO	--	--	10 4 crew	Oil Mop/Houma	Fourchon	.5 2	1	1	12.5	3	17.5
10,000' 18" Boom VOO	--	--	10 4 crew	Oil Mop/Port Allen	Port Allen	0 2	1	1	16	3	21
20,000' 18" Boom VOO	--	--	20 8 crew	Oil Mop/Belle Chasse	Venice	.5 2	1	1	14	6	22
15,000' 18" Boom VOO	--	--	14 6 crew	Oil Mop/Gretna	Gretna	0 2	1	1	15	4	21
31,500' 18" Boom VOO	--	--	10 30 crew	AMPOL/New Iberia	New Iberia	0 2	0	.5	15	2	17.5
22,700' 18" Boom VOO	--	--	8 24 crew	AMPOL/Harvey	Harvey	0 2	0	1	15	2	18
Wildlife Support Trailer	--	--	1/ 2 crew	CGA/Harvey	Harvey	.5	1	2	6	3	12
Bird Scare Cannons	--	--	2	CGA/Venice	Venice	.5	1	2	4	2	9
Bird Scare Cannons	--	--	1	CGA/Galveston	Galveston	0	1	2	5	2	10
Bird Scare Cannons	--	--	1	CGA/Ingleside	Ingleside	0	1	2	6	2	11
Bird Scare Cannons	--	--	2	CGA/Harvey	Harvey	.5	1	2	4	2	9
Bird Scare Cannons	--	--	2	CGA/Lake Charles	Cameron	.5	1	2	4.5	2	9.5
Bird Scare Cannons	--	--	2	CGA/Pascagoula	Pascagoula	0	1	2	5.25	2	10.25
Spotter Helo Surveillance Helo Handheld Radios	-- -- --	-- -- --	1 1 30	PHI/Fourchon PHI/Fourchon STARS	Spill Site Spill Site Fourchon	1 1 1.5	1 1 1.5	-- -- --	.5 .5 2	-- -- --	1.5 1.5 3.5
Total	76,176	84,012									

**Some equipment may be used offshore up to approximately 25 miles from shore*

Operational Limitations of Response Equipment

- HOSS Barge–8 foot seas
- Fast Response Unit (FRU)–8 foot seas
- Oil Spill Response Vessel (OSRV and R/V)–4 foot seas
- Boom–3 foot seas, 20 knot winds
- Dispersants–winds more than 25 knots, visibility less than 3 nautical miles or ceiling less than 1,000 feet

SECTION I
Environmental Monitoring and Environmental Mitigation Measures

(a) Monitoring

If required, Anadarko will monitor loop currents per NTL 2018-G01.

Anadarko subscribes to Wilkins Weather Service which provides real-time weather conditions such as tropical depressions, storms and/or hurricanes entering the Gulf.

(b) Incidental Takes

Anadarko will utilize one a contracted rig to perform the operations proposed under this revised plan. The following information utilizes specs from the *Diamond Ocean BlackHawk* drillship that is currently under contract; however, a different rig (drillship or DP-semi) may be utilized during operations. There are no anchors, ropes, or chains associated with the operations proposed in this Initial EP. This includes the drillship, supply boats and crew boats.

Anadarko will not utilize any new or unusual technology during the operations proposed under this Initial EP.

The *Diamond Ocean BlackHawk* has a typical moon pool that is used in all deepwater Dynamic Positioned Drillships and Semi-submersibles. The moon pool is located in the center of the rig with a rectangular opening measuring 73' x 42'. The moon pool's purpose is to allow access to the water to drill, complete and workover wells. This also allows access to run the Blowout Preventer (BOP) to latch-up to the well for well control in the event of an emergency. There is no closing mechanism for the moon pool as it is always open to the sea. In normal operating mode, the draft of the vessel is 36'.

In the unlikely scenario that marine life becomes entrapped and/or entangled by equipment in the Moonpool, or by other rig equipment, the following mitigations will be exercised to protect marine life:

- Provide a dedicated crew member to survey the moonpool area for marine life while moving any equipment in or out of the moonpool area.
- Operations will cease, when safe to do so, if marine life that may be endangered is detected in the moonpool area and will not resume until the area is free and clear.
- Monitor video from the three cameras that is focused on the moonpool area.
- If endangered marine life is detected within a close proximity of the proposed operations, a live video feed can stream real-time footage for additional coverage.
- In most cases, if marine life is entrapped or entangled, someone can be safely lowered into the moonpool to free it.

Although marine mammals may be seen in the area, Anadarko does not believe that its operations proposed under this Initial EP will result in the harassment, capture, collection or killing of any mammals covered by the Marine Mammal Protection Act.

Anadarko will operate in accordance with applicable regulations, including:

- NTL No. 2016-G02 “Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program”
- BSEE NTL No. 2015-G03 “Marine Trash and Debris Awareness and Elimination”
- JOINT NTL No. 2016-G01 “Vessel Strike Avoidance and Injured/Dead Protected Species Reporting”, and
- National Marine Fisheries Service Biological Opinion 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

SECTION J
LEASE STIPULATIONS INFORMATION

MC 36, 37 and 80–Lease Sale # 231:

Lease Stipulation #8** - **Protected Species Stipulation:

This stipulation requires operators to collect and remove flotsam resulting from their activities; to post signs detailing why release of debris must be eliminated; watch for protected marine mammals and see turtles (includes speed and distance parameters if mammals or turtles are sited); reports sightings and locations of dead or injured marine mammals or turtles and if the operators activities are responsible remain available to assist in the recovery and comply with applicable mitigation measures when conducting seismic operations. It also requires operators to comply with applicable Notices to Lessees which contain further restrictions regarding protection of marine mammals and turtles. All activities will be conducted in accordance to NTL 2015-G03 "Marine Trash and Debris Awareness Training and Elimination" and NTL 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting".

SECTION K
Support Vessels and Aircraft Information

(a) General

Type	Max. Total Fuel Tank Storage Capacity	Max. No. in Area at any Time	Trip Frequency or Duration
Supply Vessel	336,227 gallons	1	2 trips/week
Helicopter	735.3 gallons	1	10 trips/week
Crew Vessel	70,000 gallons	1	3 trips/week
Support Vessel	450,698 gallons	1	3 days total/well
Tugboats	N/A	N/A	N/A

For vessel transit the most practical, direct route from each proposed shore base, as permitted by weather and traffic conditions, will be utilized. Anadarko does not anticipate that these routes will transit within the Byrde's whale core area for the operations covered under this Initial EP as designated by the March 13, 2020 National Marine Fisheries Service (NMFS) programmatic Biological Opinion (BiOp). In the event vessel routes change, BSEE/BOEM will be contacted 15 days in advance.

(b) Diesel Oil Supply Vessels

Fuel for the rig will be transported via a supply vessel as follows:

a. Size of fuel supply vessel:	230 feet
b. Carrying capacity of fuel supply vessel:	336,227 gallons
c. Frequency that fuel supply vessel will visit the facilities:	Twice per week
d. Routes the fuel supply vessel will use to travel between the onshore support base and proposed facility:	Shortest route from shore-base to block

(c) Vicinity Map

A vicinity map is included in this section as **Attachment K-1.**

(d) Produced Liquid Hydrocarbons Transportation Vessels

Produced liquid hydrocarbons from future flow tests on wells in MC 36, 37, 80 will be transported by a flowback vessel and/or flowback barge. Anadarko anticipates flaring a max volume of 10 mmscf/well total during the 48-hour flow test period.

Transport Method	Vessel Capacity (estimated)	Average Volume to be Loaded (per vessel)	No. of Transfers (Yearly Average)
Flowback/ Crew Vessel	3,000 – 10,000 bbls	6,000 bbls	1-2/well
Flowback Barge	50,000 – 130,000 bbls	6,000 bbls	1/well

(e) Summary of Method to Transfer Liquid Hydrocarbons to the Transporting Vessel

Production from the well will be routed through portable surface well test equipment and safety controls aboard the rig. Gas will be flared and liquids (oil and water) will be collected in U.S. Coast Guard approved tanks and a boat/barge. Each well will be produced/cleaned up and measured using various meters through portable surface well test equipment including a separator to a maximum rate of 10,000 bopd and 10,000 mcfpd. A three phase separator will be used to analyze water cut if present. All liquids (hydrocarbons and water) will then be transferred to a coast guard approved flowback vessel or barge via tested & approved petroleum transfer hose. A Safe Breakaway Coupling (KLAW) will be installed between the hoses connecting the barge-end and the rig-end. If this device parts the KLAW is designed to contain all fluids from both hoses.

(f) Solid and Liquid Wastes Transportation

Type of Waste	Composition	Total Projected Amount	Rate	Transport Method	Name/Location of Facility	Disposal Method
Synthetic-based drilling fluid or mud	Synthetic-based drilling muds	15,600 bbls	300 bbls/well	Transport to shore in DOT approved containers	1. Baroid or MI Swaco - Fourchon 2. R360 - Fourchon Transfer Station 3. EcoServ – Fourchon Transfer Station	1. Recycle or Reuse 2. Landfarm 3. Injection Well
Cuttings wetted with synthetic-based muds	Cuttings coated with synthetic drilling muds, including drilled out cement	3,900-7,800 bbls	75-150 bbls/well* **An estimated 5-10% of cuttings may be transported to shore*	Transport to shore in DOT approved containers	1. R360 - Fourchon Transfer Station	1. Landfarm

Well treatment fluids	Ethylene glycol Methanol	13,000 bbls 3,250 bbls	100 bbls/month 25 bbls/month	Transport to shore in DOT approved containers	1. LEI – Hammond, LA 2. Chemical Waste Managment - Lake Charles, LA	1. Landfill, reuse, solvent recovery, fuel blending, or incineration 2. Landfill, reuse, solvent recovery, fuel blending, or incineration
Used - Completion /Workover/ Stimulation Fluids	Brine, acid, prop sand, debris, gelled fluids, dead oil	156,000 bbls	3,000 bbls/well	Transport to shore in DOT approved containers	1. R360 - Fourchon Transfer Station 2. EcoServ – Fourchon transfer station	1. Landfarm 2. Injection well
Unused - Completion /Workover/ Stimulation Fluids	Brine, acid, prop sand, debris, gelled fluids, dead oil	156,000 bbls	3,000 bbls/well	Transport to shore in DOT approved containers	1. Anadarko Petroleum Corporation (PMF) – Fourchon 2. LEI – Hammond, LA 3. Chemical Waste Managment - Lake Charles, LA	1. Reuse 2. Landfill, reuse, solvent recovery, fuel blending, or incineration 3. Landfill, reuse, solvent recovery, fuel blending, or incineration
Trash and debris	Refuse generated during operations	6,500 bbls	50 bbls/month/well	Transport to shore in DOT approved containers	1. Republic Services – LaRose, LA 2. Total Waste Solutions – Golden Meadow, LA	1. Landfill 2. Landfill
Used oil	Excess oil from engines	13,975 bbls	430 bbls/120 days/well	Transport to shore in DOT approved containers	1. Breaux – Lockport, LA (Drilling Contractors Responsibility)	1. Recycled

Total amount assumes drilling & completing 52 wells with 3,900 Total No. of Days (75 days to drill & complete each well)

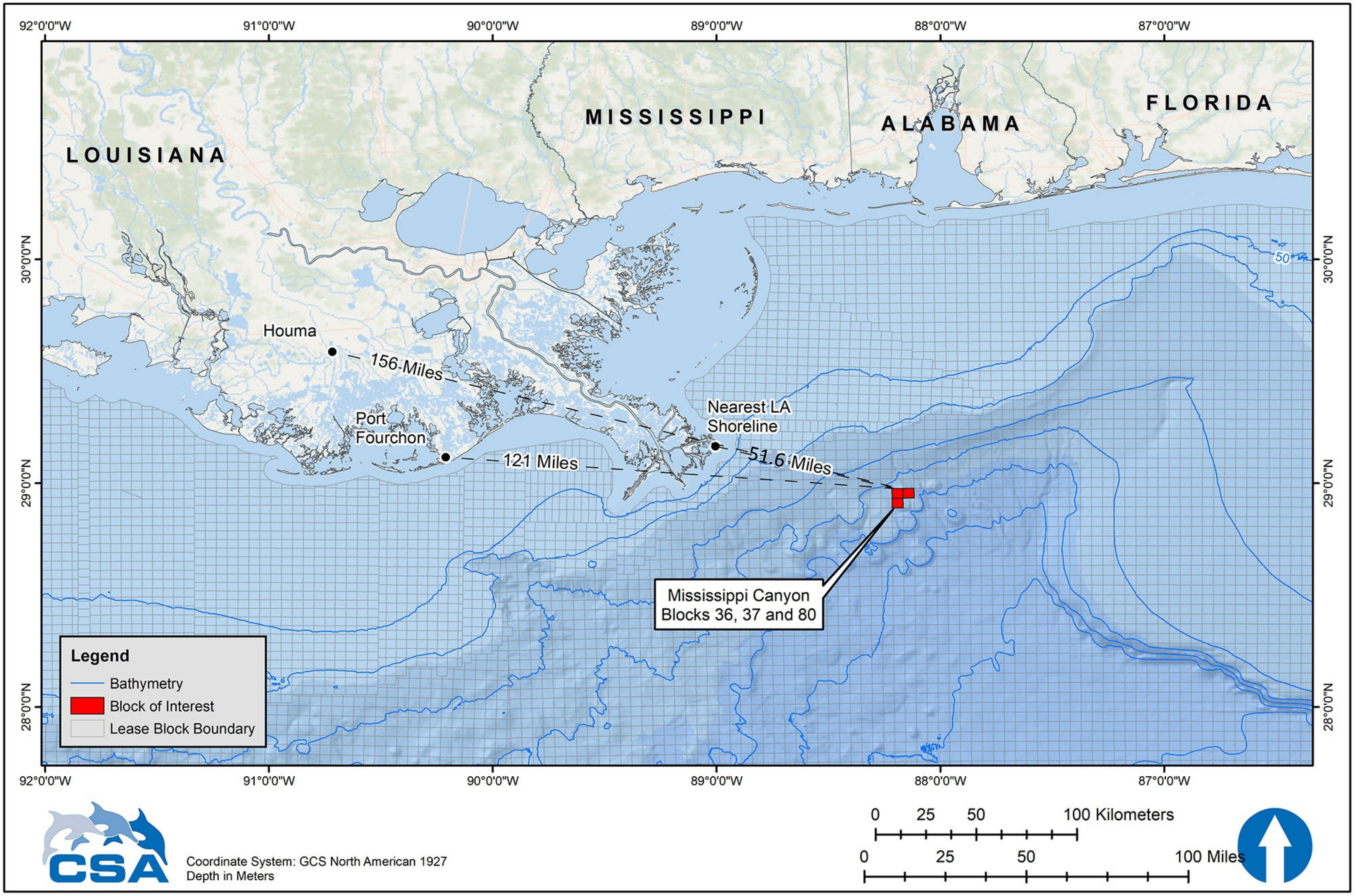


Figure 1. Location of Mississippi Canyon Blocks 36, 37, and 80.

SECTION L
ONSHORE SUPPORT FACILITIES INFORMATION

(a) General

Per NTL No. 2008-G04, the following tables reflect the onshore facilities Anadarko may utilize to provide supplies and service support for the activities proposed in this Initial EP.

Name	Primary Location(s)	Existing/New/Modified
Anadarko Service Base	Fourchon, Louisiana	Existing
Anadarko Service Base (equipment, parts)	Broussard, Louisiana	Existing
Anadarko Service Base (helicopter base)	Houma, LA**	Existing

Name	*Alternate Locations	Existing/New/Modified
Anadarko Service Base	Galveston, TX	Existing
Anadarko Service Base (helicopter base)	Lake Charles, LA**	Existing

**In the unlikely event Anadarko's primary service base cannot be utilized Anadarko will exercise the use of an alternate service base during drilling and/or completion operations.*
***Helicopter base*

(b) Support Base

No support base construction or expansion is planned for these activities.

(c) Waste Disposal

Disposed wastes describe those wastes generated by the proposed activity that are disposed of by means other than by release into the water of the GOM at the site where they are generated. These wastes can be disposed of by offsite release, injection, encapsulation, or placement at either onshore or offshore permitted locations for the purposes of returning them back to the environment.

Type of Waste	Composition	Total Projected Amount	Rate	Transport Method	Name/Location of Facility	Disposal Method
Synthetic-based drilling fluid or mud	Synthetic-based drilling muds	15,600 bbls	300 bbls/well	Transport to shore in DOT approved containers	1. Baroid or MI Swaco - Fourchon 2. R360 - Fourchon Transfer Station 3. EcoServ – Fourchon Transfer Station	1. Recycle or Reuse 2. Landfarm 3. Injection Well
Cuttings wetted with synthetic-based muds	Cuttings coated with synthetic drilling muds, including drilled out cement	3,900-7,800 bbls	75-150 bbls/well* **An estimated 5-10% of cuttings may be transported to shore*	Transport to shore in DOT approved containers	1. R360 - Fourchon Transfer Station	1. Landfarm

Type of Waste	Composition	Total Projected Amount	Rate	Transport Method	Name/Location of Facility	Disposal Method
Well treatment fluids	Ethylene glycol Methanol	13,000 bbls 3,250 bbls	100 bbls/month 25 bbls/month	Transport to shore in DOT approved containers	1. LEI – Hammond, LA 2. Chemical Waste Managment - Lake Charles, LA	1. Landfill, reuse, solvent recovery, fuel blending, or incineration 2. Landfill, reuse, solvent recovery, fuel blending, or incineration
Used - Completion /Workover/ Stimulation Fluids	Brine, acid, prop sand, debris, gelled fluids, dead oil	156,000 bbls	3,000 bbls/well	Transport to shore in DOT approved containers	1. R360 - Fourchon Transfer Station 2. EcoServ – Fourchon transfer station	1. Landfarm 2. Injection well
Unused - Completion /Workover/ Stimulation Fluids	Brine, acid, prop sand, debris, gelled fluids, dead oil	156,000 bbls	3,000 bbls/well	Transport to shore in DOT approved containers	1. Anadarko Petroleum Corporation (PMF) – Fourchon 2. LEI – Hammond, LA 3. Chemical Waste Managment - Lake Charles, LA	1. Reuse 2. Landfill, reuse, solvent recovery, fuel blending, or incineration 3. Landfill, reuse, solvent recovery, fuel blending, or incineration
Trash and debris	Refuse generated during operations	6,500 bbls	50 bbls /month/ well	Transport to shore in DOT approved containers	1. Anadarko Petroleum Corporation (PMF) – Fourchon 2. LEI – Hammond, LA 3. Chemical Waste Managment - Lake Charles, LA	1. Reuse 2. Landfill, reuse, solvent recovery, fuel blending, or incineration 3. Landfill, reuse, solvent recovery, fuel blending, or incineration
Used oil	Used oil from engines	13,975 bbls	430 bbls/120 days/well	Transport to shore in DOT approved containers	1. Republic Services – LaRose, LA 2. Total Waste Solutions – Golden Meadow, LA	1. Landfill 2. Landfill

Total amount assumes drilling & completing 52 wells with 3,900 Total No. of Days (75 days to drill & complete each well)

SECTION M
COASTAL ZONE MANAGEMENT ACT INFORMATION

Consistency reviews from the Alabama, Louisiana and Texas Coastal Zone Management Offices were previously conducted under the Initial EP, Plan Control No.: N-10117 for MC 80. However, consistency reviews for MC 36 and 37 have not been previously conducted, and therefore will be reviewed by these states with this Initial EP submittal.

STATE OF LOUISIANA

CONSISTENCY CERTIFICATION FOR

INITIAL EXPLORATION PLAN

MISSISSIPPI CANYON (MC) BLOCKS 36, 37
OCS-G35308, G35309

(Mississippi Canyon 80, G35311 consistency review previously completed under Plan Control No.: N-10117)

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

Anadarko Petroleum Corporation

Bridget O'Farrell

Bridget O'Farrell, Certifying Official
December 2020

ALABAMA COASTAL ZONE MANAGEMENT
CONSISTENCY CERTIFICATION
INITIAL EP – MISSISSIPPI CANYON BLOCKS 36, 37

The OCS related oil and gas development activities having potential impact on the Alabama Coastal Zone are based on the location of the proposed facilities, access to those sites, best practical techniques for operations and production equipment, guidelines for the prevention of adverse environmental effects, effective environmental protection, emergency plans and contingency plans. Alabama policies have been addressed below or are cross referenced to the appropriate sections of the plan:

Topic	Cross Reference	Comments
Coastal Resource Use Policies		
Coastal Development		Dock and port facilities in LA will be used. There will be no new construction, dredging, or filling in Alabama state waters. There will be no new commercial development or capital improvements in Alabama's coastal zone, nor will there be any employment effects.
Mineral Resource Exploration and Extraction		Proposed exploration operations will take place 83.8 miles from Alabama's shore.
Commercial Fishing	Section N	
Hazard Management	Section C	A Shallow Hazards Report has been prepared and previously submitted to BOEM in order to identify and assess the seafloor and shallow geologic conditions in this block(s).
Shoreline Erosion	Section N	Proposed exploration operations will take place 83.8 miles from Alabama's shore.
Recreation	Section N	
Transportation	Section K, L, N	
Natural Resource Protection Policies		
Biological Productivity	Section N	
Water Quality	Section N	
Water Resources	Section N	
Air Quality	Section N	
Wetlands and Submerged Grassbeds	Section N	
Beach and Dune Protection	Section N	
Wildlife Habitat Protection	Section N	
Endangered Species	Section N	
Cultural Resources Protection	Section N	Mississippi Canyon Blocks 36, 37, 80 are located in an area where historic shipwrecks may exist. The archaeological report covering Mississippi Canyon Blocks 36, 37, 80 are referenced with this Initial EP submittal. No areas in Mississippi Canyon Blocks 36, 37, 80 are recommended for investigation or avoidance on the basis of archaeological potential.

STATE OF ALABAMA

CONSISTENCY CERTIFICATION FOR

INITIAL EXPLORATION PLAN

MISSISSIPPI CANYON (MC) BLOCKS 36, 37
OCS-G35308, G35309

(Mississippi Canyon 80, G35311 consistency review previously completed under Plan Control No.: N-10117)

The proposed activities described in detail in this OCS Plan comply with Alabama's approved Coastal Zone Management Program(s) and will be conducted in a manner consistent with such Program(s).

Anadarko Petroleum Corporation

Bridget O'Farrell
Bridget O'Farrell, Certifying Official
December 2020

TEXAS COASTAL MANAGEMENT PROGRAM

The following is an evaluation that includes findings relating the coastal effects of the proposed activities and associated facilities to the relevant enforceable policies of the Texas' Coastal Management Program (TCMP), Title 31, Part 16, Chapter 501, Subchapter B:

(Category 2)
Construction, Operation & Maintenance of Oil & Gas Exploration & Production Facilities

No operations are proposed in or near any critical areas. The proposed activities are explorative in nature, so no facility construction is proposed. The proposed activities are located approximately 337.7 miles from the Texas shoreline; therefore we expect no adverse impacts to CNRAs or beach access and use rights of the public. All activities shall be conducted in a manner that minimizes significant impacts to coastal resources. No adverse effects to Texas' coastal area are expected in association with the proposed activities.

(Category 3)
Discharges of Wastewater and Disposal of Waste from Oil and Gas Exploration and Production Activities

No discharge of wastewater or disposal of waste from the proposed activities will occur in the Texas' coastal zone; therefore no impact to Texas' coastal waters is expected.

(Category 4)
Construction and Operation of Solid Waste Treatment, Storage, and Disposal Facilities

No construction of solid waste facilities or expansion of existing facilities in the coastal zone are proposed in the attached plan, therefore, no adverse effects on any features of Texas' coastal cone are expected.

(Category 5)
Prevention, Response, and Remediation of Oil Spills

The proposed activities will be covered under an approved Regional Oil Spill Response Plan. The plan is in place, practiced, and updated as necessary. The best practical techniques shall be utilized to prevent the release of pollutants or toxic substances into the environment. All involved vessels and facilities are designed to be capable of prompt response and adequate removal of accidental discharges of oil. In addition, the proposed activities are 337.7 miles from shore; therefore no damages to natural resources are expected as the result of an unauthorized discharge of oil into coastal waters.

(Category 6)
Discharge of Municipal and Industrial Waste Water to Coastal Waters

No discharges from the proposed activities will occur in coastal waters. The proposed activities are 337.7 miles from shore; therefore there will be no effect on coastal waters.

(Category 8)
Development in Critical Areas

None of the proposed activities will occur in a critical area; therefore no effects to Texas' coastal zone are expected. The activity will not jeopardize the continued existence of species listed as endangered or threatened and will not result in likelihood of the destruction or adverse modification of a habitat determined to be a critical habitat under the Endangered Species Act. The activity will not cause or contribute to violation of any applicable surface water quality standards. The activity will not violate any requirement imposed to protect a marine sanctuary.

(Category 9)
Construction of Waterfront Facilities and Other Structures on Submerged lands

No waterfront facilities or other structures are proposed on submerged lands in the Texas coastal zone; therefore, the proposed activities are not expected to have any adverse impacts on submerged lands.

(Category 10)
Dredging and Dredged Material Disposal and Placement

No dredging or disposal/placement of dredged material is proposed; therefore, no adverse effects to coastal waters, submerged lands, critical areas, coastal shore areas, or Gulf beaches are expected.

(Category 11)
Construction in the Beach / Dune System

The proposed activities do not include any construction projects in critical dune areas or areas adjacent to or on Gulf beaches, therefore, no impact to Texas' beach or dune systems are expected.

(Category 15)
Alteration of Coastal Historic Areas

The proposed activities do not include any alteration or disturbance of a coastal historic area; therefore, no impacts are expected to adversely affect any historical, architectural, or archaeological site in Texas' coastal zone.

(Category 16)
Transportation

The proposed activities do not include any transportation construction projects within the coastal zone; therefore, no impacts to Texas' coastal zone are expected.

(Category 17)
Emission of Air Pollutants

The proposed activities shall be carried out in conformance with applicable air quality laws, standards, and regulations. Emissions from the proposed activities are not expected to have significant impacts on onshore air quality because of the prevailing atmospheric conditions, emission heights, emission rates, and the distance of these emissions from the coastline. The proposed activities will occur approximately 337.7 miles from shore and will be within the exemption limits set by BOEM, therefore, no impacts to Texas' coastal zone is expected.

(Category 18)
Appropriations of Water

The proposed activities do not include the impoundment or diversion of state water, therefore, no impacts to Texas' coastal zone is expected.

(Category 20)
Marine Fishery Management

The proposed activities are located approximately 337.7 miles from shore and are not expected to have any effect on marine fishery management or fishery migratory patterns within waters in the coastal zone of Texas.

(Category 22)
Administrative Policies

The necessary information for applicable agencies to make an informed decision on the proposed activities has been provided. In conclusion, all activities shall be consistent with Texas' coastal management program and shall comply with all relevant rules and regulations. No activities are planned within any critical areas. Activities will be carried out avoiding unnecessary conflicts with other uses of the vicinity.

STATE OF TEXAS

CONSISTENCY CERTIFICATION FOR

INITIAL EXPLORATION PLAN

MISSISSIPPI CANYON (MC) BLOCKS 36, 37
OCS-G35308, G35309

(Mississippi Canyon 80, G35311 consistency review previously completed under Plan Control No.: N-10117)

The proposed activities described in detail in this OCS Plan comply with Texas' approved Coastal Zone Management Program(s) and will be conducted in a manner consistent with such Program(s).

Anadarko Petroleum Corporation

Bridget O'Farrell
Bridget O'Farrell, Certifying Official
December 2020

SECTION N
ENVIRONMENTAL IMPACT ANALYSIS

Environmental Impact Analysis

for an

INITIAL EXPLORATION PLAN
for
Mississippi Canyon Blocks 36, 37, and 80
(OCS-G-35308, OCS-G-35309, and OCS-G-35311)
Offshore Alabama

December 2020

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ENVIRONMENTAL IMPACT ANALYSIS FOR AN INITIAL EXPLORATION PLAN FOR MISSISSIPPI CANYON BLOCKS 36, 37, AND 80 (OCS-G-35308, OCS-G-35309, AND OCS-G-35311) OFFSHORE ALABAMA

DOCUMENT NO. CSA-ANADARKO-FL-20-3636-01-REP-01-FIN

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01	11/25/2020	Revised draft	J. Tiggelaar	J. Landgraf	J. Tiggelaar
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Acronyms and Abbreviations

μPa	micropascal
ac	acre
ADIOS2	Automated Data Inquiry for Oil Spills 2
Anadarko	Anadarko Petroleum Corporation
bbl	barrel
BOEM	Bureau of Ocean Energy Management
BOP	blowout preventer
BSEE	Bureau of Safety and Environmental Enforcement
CFR	Code of Federal Regulations
CO	carbon monoxide
dB	decibel
DP	dynamically positioned
DPS	distinct population segment
EFH	Essential Fish Habitat
EIA	Environmental Impact Analysis
EIS	Environmental Impact Statement
EP	Exploration Plan
ESA	Endangered Species Act
FAD	fish aggregating device
FR	*Federal Register*
GPS	global positioning system
H_2S	hydrogen sulfide
ha	hectare
HAPC	Habitat Area of Particular Concern
IPF	impact-producing factor
km	kilometer
m	meter
MARPOL	International Convention for the Prevention of Pollution from Ships
MC	Mississippi Canyon
MMC	Marine Mammal Commission
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MSRC	Marine Spill Response Corporation
MWCC	Marine Well Containment Company
NAAQS	National Ambient Air Quality Standards
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NTL	Notice to Lessees and Operators
NWR	National Wildlife Refuge
OCS	Outer Continental Shelf
OSRA	Oil Spill Risk Analysis
OSRP	Oil Spill Response Plan
PAH	polycyclic aromatic hydrocarbons
PBR	potential biological removal
PM	particulate matter
PTS	permanent threshold shift
re	referenced to
SBM	synthetic-based drilling muds
SEL_{cum}	cumulative sound exposure level
SEMS	Safety and Environmental Management system
SO_x	sulfur oxides
SL	source level
SPL	sound pressure level
$SPL_{0\text{-}pk}$	zero to peak sound pressure level
SPL_{rms}	root-mean-square sound pressure level
TTS	temporary threshold shift
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WBM	water-based drilling muds
WCD	worst-case discharge

Introduction

Anadarko Petroleum Corporation (Anadarko), a wholly owned subsidiary of Occidental Petroleum Corporation, is submitting an Initial Exploration Plan (EP) for Mississippi Canyon (MC) Blocks 36 (MC 36), 37 (MC 37), and 80 (MC 80). Under this EP, Anadarko proposes to drill up to 52 wells (well locations C-A, C-AA, C-B, C-BB, C-C, C-CC, C-DDD, C-DDDD, C-E, C-EE, P-A, P-AA, P-B, P-BB, P-C, P-CC, P-D, P-DD, P-E, P-EE, P-F, P-FF, P-G, P-GG, P-H, and P-HH in MC 36; well locations C-AAA, C-AAAA, C-DD, C-EEE, C-EEEE, C-F, C-FF, C-G, C-GG, C-H, C-HH, C-I, C-II, C-J and C-JJ in MC 37, and well locations P-I, P-II, P-J, P-JJ, P-K, P-KK, P-L, P-LL, P-M and P-MM in MC 80. The Environmental Impact Analysis (EIA) provides information on potential environmental impacts of Anadarko's proposed activities.

The project area is approximately 51.6 mi (81.6 km) from the nearest shoreline (Louisiana), 121 mi (195 km) from the onshore support base at Port Fourchon, Louisiana, and 156 mi (251 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the location of the proposed wellsites ranges from approximately 3,473 to 4,187 ft (1,059 to 1,276 m). The proposed activities will be completed using a dynamically positioned (DP) semisubmersible drilling rig or DP drillship.

The EIA for this EP was prepared for submittal to the Bureau of Ocean Energy Management (BOEM) in accordance with applicable regulations, including Title 30 Code of Federal Regulations (CFR) 550.212(o) and 550.227. The EIA is a project- and site-specific analysis of the potential environmental impacts of Anadarko's planned activities. The EIA complies with guidance provided in existing Notices to Lessees and Operators (NTLs) issued by BOEM and its predecessors, Minerals Management Service (MMS) and Bureau of Ocean Energy Management, Regulation and Enforcement, including NTLs 2008-G04 (extended by 2015-N02) and 2015-N01. Potential impacts have been analyzed at a broader level in the 2017-2022 Programmatic Environmental Impact Statement (EIS) for the Outer Continental Shelf (OCS) Oil and Gas Leasing Program (BOEM, 2016a) and in multisale EISs for the Western and Central Gulf of Mexico Planning Areas (BOEM, 2012a, b, 2013, 2014, 2015, 2016b, 2017a). The most recent multisale EIS contains updated environmental baseline information in light of the *Deepwater Horizon* incident and addresses potential impacts of a catastrophic spill (BOEM, 2012a, b, 2013, 2014, 2015, 2016b, 2017a). The NMFS Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico assesses impacts and requires additional mitigation measures for protected species (NMFS, 2020a). The analyses from those documents are incorporated here by reference.

All the proposed activities and facilities in this EP are covered by the Regional Oil Spill Response Plan (OSRP) approved in August 2015 for Anadarko Petroleum Corporation and its subsidiary Anadarko US Offshore LLC. (Company Numbers 00981 and 02219 respectively) in accordance with 30 CFR Part 254. The June 2017 updates for the OSRP were acknowledged by BSEE in July 2017 and in compliance with 30 CFR 254.30(a). Non-regulatory required OSRP updates were submitted to BSEE in June 2018 and acknowledged as in compliance in July 2018. The OSRP biennial update was submitted 30 June 2019 and acknowledged as in compliance in September 2019.

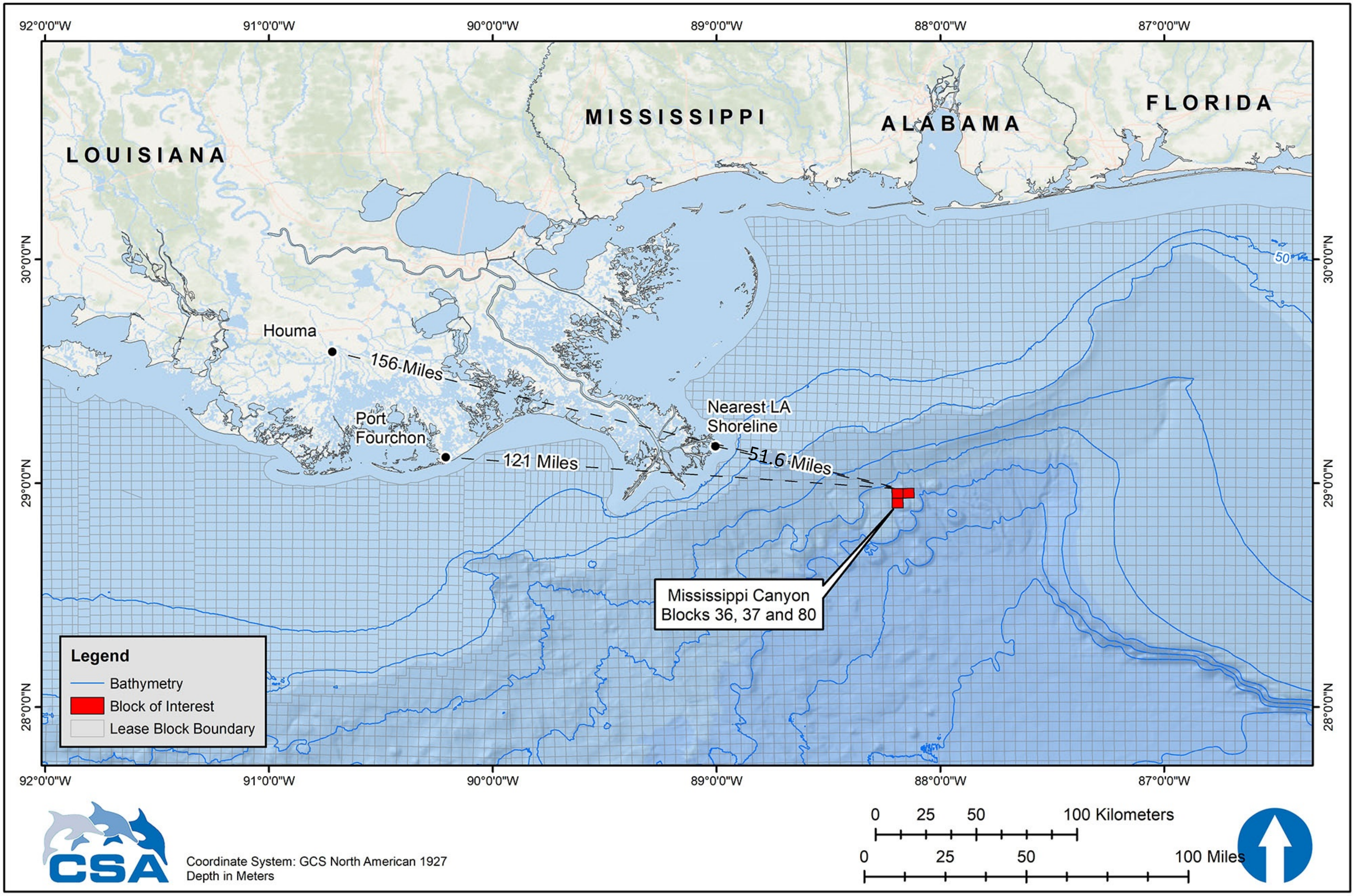

Figure 1. Location of Mississippi Canyon Blocks 36, 37, and 80.

The OSRP details Anadarko's plan to rapidly and effectively manage oil spills that may result from drilling and production operations. Anadarko has designed its spill response program based on a regional capability of response to spills ranging from small operational spills to a worst-case discharge (WCD) from a well blowout. Anadarko's spill response program meets the response planning requirements of the relevant coastal states and applicable federal oil spill planning regulations. The OSRP also includes information regarding Anadarko's regional oil spill organization and dedicated response assets, potential spill risks, and local environmental sensitivities. It describes personnel and equipment mobilization, incident management team organization, and an overview of actions to be taken and notifications necessary in the event of a spill.

The EIA is organized into **Sections A** through **I** corresponding to the information required by NTLs 2008-G04 and 2015-N01. The main impact-related discussions are in **Section A** (Impact-Producing Factors) and **Section C** (Impact Analysis). **Table 1** lists and summarizes the NTLs applicable to the EIA.

Table 1. Notices to Lessees and Operators (NTLs) applicable to the Environmental Impact Analysis (EIA).

NTL	Title	Summary
BOEM-2020-G01	Air Quality Information Requirements for Exploration Plans, Development Operations Coordination Documents, and Development and Production Plans in the Gulf of Mexico Region	Cancels and supersedes the air emission information portion of NTL 2008-G04, Information Requirement for Exploration Plans and Development Operations Coordination Documents, effective date May 5, 2008.
BOEM-2016-G01 or Appendix C (NMFS, 2020a)	Vessel Strike Avoidance and Injured/Dead Protected Species Reporting	Recommends protected species identification training; recommends that vessel operators and crews maintain a vigilant watch for marine mammals and slow down or stop their vessel movement to avoid colliding with protected species; and requires operators to report sightings of any injured or dead protected species. Reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with this NTL.
BOEM-2016-G02 or Appendix A (NMFS, 2020a)	Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program	Summarizes seismic survey mitigation measures, updates regulatory citations, and provides clarification on how the measures identified in the NTL will be used by BOEM, BSEE, and operators in order to comply with the Endangered Species Act and the Marine Mammals Protection Act. Reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with this NTL.
BSEE-2015-G03 or Appendix B (NMFS 2020a)	Marine Trash and Debris Awareness and Elimination	Instructs operators to exercise caution in the handling and disposal of small items and packaging materials; requires the posting of instructional placards at prominent locations on offshore vessels and structures; and mandates a yearly marine trash and debris awareness training and certification process.

Table 1. (Continued).

NTL	Title	Summary
BOEM 2015-N02	Elimination of Expiration Dates on Certain Notices to Lessees and Operators Pending Review and Reissuance	Eliminates expiration dates (past or upcoming) of all NTLs currently posted on the BOEM website.
BOEM 2015-N01	Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the Outer Continental Shelf (OCS) for Worst Case Discharge and Blowout Scenarios	Provides guidance regarding information required in worst-case discharge (WCD) descriptions and blowout scenarios.
BOEM 2014-G04	Military Warning and Water Test Areas	Provides contact links to individual command headquarters for the military warning and water test areas in the Gulf of Mexico.
BSEE 2014-N01	Elimination of Expiration Dates on Certain Notices to Lessees and Operators Pending Review and Reissuance	Eliminates expiration dates (past or upcoming) of all NTLs currently posted on the BSEE website.
BSEE-2012-N06	Guidance to Owners and Operators of Offshore Facilities Seaward of the Coast Line Concerning Regional Oil Spill Response Plans	Provides clarification, guidance, and information for preparation of regional Oil Spill Response Plans. Recommends description of response strategy for worst-case discharge scenarios to ensure capability to respond to oil spills is both efficient and effective.
2010-N10	Statement of Compliance with Applicable Regulations and Evaluation of Information Demonstrating Adequate Spill Response and Well Containment Resources	Informs operators using subsea blowout preventers (BOPs) or surface BOPs on floating facilities that applications for well permits must include a statement signed by an authorized company official stating that the operator will conduct all activities in compliance with all applicable regulations, including the increased safety measures regulations (75 *Federal Register* [FR] 63346). Informs operators that the BOEM will be evaluating whether each operator has submitted adequate information demonstrating that it has access to and can deploy containment resources to respond promptly to a blowout or other loss of well control.
2009-G40	Deepwater Benthic Communities	Provides guidance for avoiding and protecting high-density deepwater benthic communities (including chemosynthetic and deepwater coral communities) from damage caused by OCS oil and gas activities in water depths greater than 984 ft (300 m). Prescribes separation distances of 2,000 ft (610 m) from each mud and cuttings discharge location and 250 ft (76 m) from all other seafloor disturbances.
2009-G39	Biologically Sensitive Underwater Features and Areas	Provides guidance for avoiding and protecting biologically sensitive features and areas (e.g., topographic features, pinnacles, low relief live bottom areas, other potentially sensitive biological features) when conducting OCS operations in water depths less than 984 ft (300 m) in the Gulf of Mexico.
2008-G04	Information Requirements for Exploration Plans and Development Operations Coordination Documents	Provides guidance on information requirements for OCS plans, including EIA requirements and information regarding compliance with the provisions of the Endangered Species Act and Marine Mammal Protection Act.

Table 1. (Continued).

NTL	Title	Summary
2008-N05	Guidelines for Oil Spill Financial Responsibility for Covered Facilities	Provides clarification and guidance to operators/lessees on policies for submitting required Oil Spill Financial Responsibility documents to the Gulf of Mexico OCS Region as required under 30 CFR Part 253.
2005-G07	Archaeological Resource Surveys and Reports	Provides guidance on regulations regarding archaeological discoveries, specifies requirements for archaeological resource surveys and reports, and outlines options for protecting archaeological resources. Reissued in June 2020 to comply with Executive Order 13891 of October 9, 2019 and to rescind NTL 2011-JOINT-G01.

A. Impact-Producing Factors

Based on the description of Anadarko's proposed activities, a series of impact-producing factors (IPFs) have been identified. **Table 2** identifies the environmental resources that may be affected in the left column and identifies sources of impacts associated with the proposed project across the top. **Table 2**, adapted from Form BOEM-0142, has been developed *a priori* to focus the impact analysis on those environmental resources that may be impacted as a result of one or more IPFs. The tabular matrix indicates which of the routine activities and accidental events could affect specific resources. An "X" indicates that an IPF could reasonably be expected to affect a certain resource, and a dash (--) indicates no impact or negligible impact. Where there may be an effect, an analysis is provided in **Section C**. Potential IPFs for the proposed activities are listed below and briefly discussed in the following sections.

- Drilling rig presence, marine sound, and lights;
- Physical disturbance to the seafloor;
- Air pollutant emissions;
- Effluent discharges;
- Water intake;
- Onshore waste disposal;
- Marine debris;
- Support vessel and helicopter traffic (includes vessel collisions with resources and marine sound); and
- Accidents.

A.1 Drilling Rig Presence, Marine Sound, and Lights

The wells proposed in this EP will be drilled using a DP semisubmersible or a DP drillship. DP vessels use a global positioning system (GPS), specific computer software, and sensors in conjunction with a series of thrusters to maintain position. Through satellite navigation and position reference sensors, the location of the drilling rig is precisely monitored while thrusters, positioned at various locations about the rig pontoons, are activated to maintain position. This allows operations at sea in areas where mooring or anchoring is not feasible. Consequently, there will be no anchoring of the drilling rig during this project. The selected drilling rig is expected to be on site for an estimated 75 days per well, inclusive of mobilization, drilling, completion, and demobilization time. The drilling rig will maintain exterior lighting in accordance with applicable federal navigation and aviation safety regulations (International Regulations for Preventing Collisions at Sea, 1972 [72 COLREGS], Part C).

Potential impacts to marine resources from the drilling rig include the physical presence of the drilling rig in the ocean, working and safety lighting on the rig, and underwater sound produced during operations.

Table 2. Matrix of impact-producing factors (IPF) and affected environmental resources. X = potential impact; dash (--) = no impact or negligible impact.

Environmental Resources	IPFs									
	Drilling Rig Presence (incl. sound & lights)	Physical Disturbance to Seafloor	Air Pollutant Emissions	Effluent Discharges	Water Intake	Onshore Waste Disposal	Marine Debris	Support Vessel/Helicopter Traffic	Accidents	
									Small Fuel Spill	Large Oil Spill
Physical/Chemical Environment										
Air quality	--	--	--**X**(9)	--	--	--	--	--	**X**(6)	**X**(6)
Water quality	--	--	--	**X**	--	--	--	--	**X**(6)	**X**(6)
Seafloor Habitats and Biota										
Soft bottom benthic communities	--	**X**	--	**X**	--	--	--	--	--	**X**(6)
High-density deepwater benthic communities	--	--(4)	--	--(4)	--	--	--	--	--	**X**(6)
Designated topographic features	--	--(1)	--	--(1)	--	--	--	--	--	--
Pinnacle trend area live bottoms	--	--(2)	--	--(2)	--	--	--	--	--	--
Eastern Gulf live bottoms	--	--(3)	--	--(3)	--	--	--	--	--	--
Threatened, Endangered, and Protected Species and Critical Habitat										
Sperm whale (Endangered)	**X**(8)	--	--	--	--	--	--	**X**(8)	**X**(6,8)	**X**(6,8)
Bryde's whale (Endangered)	**X**(8)	--	--	--	--	--	--	**X**(8)	**X**(6,8)	**X**(6,8)
West Indian manatee (Threatened)	--	--	--	--	--	--	--	**X**(8)	--	**X**(6,8)
Non-endangered marine mammals (protected)	**X**	--	--	--	--	--	--	**X**	**X**(6)	**X**(6)
Sea turtles (Endangered/Threatened)	**X**(8)	--	--	--	--	--	--	**X**(8)	**X**(6,8)	**X**(6,8)
Piping Plover (Threatened)	--	--	--	--	--	--	--	--	--	**X**(6)
Whooping Crane (Endangered)	--	--	--	--	--	--	--	--	--	**X**(6)
Oceanic whitetip shark (Threatened)	**X**	--	--	--	--	--	--	--	--	**X(6)**
Giant manta ray (Threatened)	**X**	--	--	--	--	--	--	--	--	**X** (6)
Gulf sturgeon (Threatened)	--	--	--	--	--	--	--	--	--	**X**(6)
Nassau grouper (Threatened)	--	--	--	--	--	--	--	--	--	**X**(6)
Smalltooth sawfish (Endangered)	--	--	--	--	--	--	--	--	--	**X**(6)
Beach mice (Endangered)	--	--	--	--	--	--	--	--	--	**X**(6)
Florida salt marsh vole (Endangered)	--	--	--	--	--	--	--	--	--	**X**(6)
Threatened coral	--	--	--	--	--	--	--	--	--	**X**(6)
Coastal and Marine Birds										
Marine birds	**X**	--	--	--	--	--	--	**X**	**X**(6)	**X**(6)
Coastal Birds	--	--	--	--	--	--	--	**X**	--	**X**(6)
Fisheries Resources										
Pelagic communities and ichthyoplankton	**X**	--	--	**X**	**X**	--	--	--	**X**(6)	**X**(6)
Essential Fish Habitat	**X**	--	--	**X**	**X**	--	--	--	**X**(6)	**X**(6)
Archaeological Resources										
Shipwreck sites	--	--(7)	--	--	--	--	--	--	--	**X**(6)
Prehistoric archaeological sites	--	--(7)	--	--	--	--	--	--	--	**X**(6)
Coastal Habitats and Protected Areas										
Coastal habitats and protected areas	--	--	--	--	--	--	--	**X**	--	**X**(6)

Table 2. (Continued).

Environmental Resources	IPFs									
	Drilling Rig Presence (incl. sound & lights)	Physical Disturbance to Seafloor	Air Pollutant Emissions	Effluent Discharges	Water Intake	Onshore Waste Disposal	Marine Debris	Support Vessel/Helicopter Traffic	Accidents	
									Small Fuel Spill	Large Oil Spill
Socioeconomic and Other Resources										
Recreational and commercial fishing	**X**	--	--	--	--	--	--	--	**X**(6)	**X**(6)
Public health and safety	--	--	--	--	--	--	--	--	--	**X**(5,6)
Employment and infrastructure	--	--	--	--	--	--	--	--	--	**X**(6)
Recreation and tourism	--	--	--	--	--	--	--	--	--	**X**(6)
Land use	--	--	--	--	--	--	--	--	--	**X**(6)
Other marine uses	--	--	--	--	--	--	--	--	--	**X**(6)

*numbers refer to table footnotes.

Table 2 Footnotes and Applicability to this Program:

*Footnotes are numbered to correspond to entries in **Table 2**; applicability to each case is noted by a bullet point following the footnote.*

(1) *Activities that may affect a marine sanctuary or topographic feature. Specifically, if the well, rig site, or any anchors will be on the seafloor within the following:*
   (a) *4-mile zone of the Flower Garden Banks, or the 3-mile zone of Stetson Bank;*
   (b) *1,000-m, 1-mile, or 3-mile zone of any topographic feature (submarine bank) protected by the Topographic Features Stipulation attached to an Outer Continental Shelf (OCS) lease;*
   (c) *Essential Fish Habitat (EFH) criteria of 500 ft (152 m) from any no-activity zone; or*
   (d) *Proximity of any submarine bank (152 m [500-ft] buffer zone) with relief greater than 7 ft (2 m) that is not protected by the Topographic Features Stipulation attached to an OCS lease.*
   - None of these conditions (a through d) are applicable. The project area is not within or near any marine sanctuary, topographic feature, submarine bank, or no-activity zone.

(2) *Activities with any bottom disturbance within an OCS lease block protected through the Live Bottom (Pinnacle Trend) Stipulation attached to an OCS lease.*
   - The Live Bottom (Pinnacle Trend) Stipulation is not applicable to the project area.

(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.*
   - The Live Bottom (Low-Relief) Stipulation is not applicable to the project area.

(4) *Activities on blocks designated by the BOEM as being in water depths 400 m or greater.*
   - No impacts on high-density deepwater benthic communities are anticipated. There are no features indicative of seafloor hard bottom that could support high-density chemosynthetic communities or coral communities within 2,000 ft (610 m) of the proposed wellsite locations (Ocean Geo Solutions, 2020a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w).

(5) *Exploration or production activities where Hydrogen Sulfide (H_2S) concentrations greater than 500 ppm might be encountered.*
   - The lease blocks are classified as H_2S absent.

(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.*
   - Accidental hydrocarbon spills could affect the resources marked (X) in the matrix, and impacts are analyzed in **Section C**.

(7) *All activities that involve seafloor disturbances, including anchor emplacements, in any OCS block designated by the BOEM as having high-probability for the occurrence of shipwrecks or prehistoric sites, including such blocks that will be affected that are adjacent to the lease block in which your planned activity will occur. If the proposed activities are located a sufficient distance from a shipwreck or prehistoric site that no impact would occur, the EIA can note that in a sentence or two.*
   - No impacts to archaeological resources are expected. The project area is well beyond the 60-m depth contour used by BOEM as the seaward extent for prehistoric archaeological site potential in the Gulf of Mexico. The archaeological assessment (C&C Technologies, 2014) reported that no archaeologically significant sonar contacts are present in the survey area.

(8) *All activities that you determine might have an adverse effect on endangered or threatened marine mammals or sea turtles or their critical habitats.*
   - IPFs that may affect marine mammals, sea turtles, or their critical habitats include drilling rig presence, support vessel and helicopter traffic, and accidents. See **Section C**.

(9) *Production activities that involve transportation of produced fluids to shore using shuttle tankers or barges.*
   - Not applicable.

The physical presence of the drilling rig in the ocean can attract and potentially impact pelagic marine resources, as discussed in **Section C.5.1**. DP drillships maintain exterior lighting for working at night and for navigational and aviation safety in accordance with applicable federal safety regulations. This artificial lighting may also attract and directly or indirectly impact natural resources. Drilling operations produce underwater sounds that may impact certain marine resources. Sources of drilling-related sounds include, for example, riser rotation, DP thrusters, remotely operated vehicle operations and seabed mounted active acoustics (such as ultra-short baseline systems) for positioning.

The drilling rig operations and equipment can be expected to produce noise associated with propulsion machinery that transmits directly to the water during station keeping, drilling, and maintenance operations. Additional sound and vibration are transmitted through the hull to the water from auxiliary machinery, such as generators, pumps, and compressors onboard the drilling rig (Richardson et al., 1995). The noise levels produced by DP vessels for station-keeping are largely dependent on the level of thruster activity required to keep position and, therefore, vary based on local ocean currents, sea and weather conditions, and operational requirements. Representative source levels (SLs) for vessels in DP activities range from 184 to 190 decibels (dB) referenced to (re) 1 micropascal (µPa) m, with a primary amplitudes at frequencies below 600 Hz (Blackwell and Greene Jr., 2003, McKenna et al., 2012; Kyhn et al., 2014). When drilling, the drill string represents a long vertical sound source (McCauley, 1998). Based on available data, SLs from drilling rigs during drilling, in the absence of thrusters, can be expected to range between 154 and 176 dB re 1 µPa m (Nedwell et al., 2001). Sound associated with drilling operations from a drilling rig on active thrusters have broadband (10 Hz to 10 kHz) SLs of approximately 190 dB re 1 µPa m (Hildebrand, 2005). The use of thrusters, whether drilling or not, can elevate SLs from a drillship or semisubmersible to approximately 188 dB re 1 µPa m (Nedwell and Howell, 2004). Nedwell and Edwards (2004) reported sound pressure levels (SPLs) that the majority of noise from a semi-submersible drilling rig occurred below 600 Hz SPLs increased by 10 to 20 dB when drilling was active. Within the low bandwidths (<600 Hz), measured SPLs were shown to be greatly influenced by the drilling rig for up to 2 km; but at distances beyond 5 km, the drill rig did not contribute significantly to the overall SPLs in that bandwidth.

A.2 Physical Disturbance to the Seafloor

In water depths of 1,969 ft (600 m) or greater, DP drilling rigs disturb only a very small area of the seafloor around the wellbore where the bottom template and blowout preventer (BOP) are located. Depending on the specific well configuration, the total disturbed area is estimated to be 0.25 hectares (ha) (0.62 acres [ac]) per well (BOEM, 2012a). For the 52 wells proposed in this EP, the total potential area of seafloor disturbance is expected to be approximately 13 ha (32.2 ac).

A.3 Air Pollutant Emissions

Offshore air pollutant emissions will result from drilling rig operations as well as support vessel (both supply and crew vessels) and helicopter transits. These emissions occur mainly from combustion of diesel and aviation fuel (Jet A). The combustion of fuels occurs in diesel-powered generators, pumps, or motors and from lighter fuel motors. Primary air pollutants typically associated with emissions from internal combustion engines are suspended particulate matter ($PM_{2.5}$ and PM_{10}), sulfur oxides (SOx), nitrogen oxides (NOx), volatile organic compounds (VOCs), and carbon monoxide (CO) (Reşitoğlu et al., 2015).

The Air Quality Emissions Report (see EP Section G) prepared in accordance with BOEM requirements demonstrates that the projected emissions are below exemption levels set by the applicable regulations in 30 CFR 550.303. Based on this and the distance from shore, it can be concluded that the emissions will not significantly affect the air quality of the onshore area for any of the criteria pollutants. No further analysis or control measures are required.

A.4 Effluent Discharges

The discharges will include treated sanitary and domestic wastes, deck drainage, desalination unit brine, BOP fluid, non-pollutant completion fluids, wash water, uncontaminated ballast and bilge water, noncontact cooling water, fire water, water-based drilling muds (WBM) and cuttings, cuttings wetted with synthetic-based drilling muds (SBM), and excess cement. All offshore discharges will be in accordance with requirements of the National Pollutant Discharge Elimination System (NPDES) General Permit No. GMG290006 issued by the U.S. Environmental Protection Agency (USEPA), including permit compliance terms, discharge volumes, discharge rates, and associated monitoring requirements.

WBM and cuttings will be released at the seafloor during initial well-drilling intervals. The marine riser that enables the return of muds and cuttings to the surface vessel will not be in place during the initial drilling intervals, requiring deposition of drilling muds and cuttings on the seafloor until the riser is in place. Excess cement slurry also will be released at the seafloor during casing installation for the riserless portion of the drilling operations. Once the riser is in place, SBM will be used and collected on the drilling rig through the riser. The collected SBM will be re-used by the vendor or transported to Port Fourchon, Louisiana, for recycling and disposal at an approved facility. Cuttings wetted with SBMs will be treated and discharged to the seafloor in accordance with the NPDES permit.

A.5 Water Intake

Seawater will be drawn from the ocean for once-through, non-contact cooling of machinery on the drilling rig. Section 316(b) of the Clean Water Act requires NPDES permits to ensure that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available to minimize adverse environmental impact from impingement and entrainment of aquatic organisms. The General NPDES Permit specifies design requirements for facilities for which construction commenced after 17 July 2006 with a cooling water intake structure having a design intake capacity of greater than two million gallons of water per day, of which at least 25% is used for cooling purposes. The drilling rig ultimately selected for this project will be in compliance with all applicable cooling water intake structure design requirements, monitoring, and limitations.

A.6 Onshore Waste Disposal

Wastes generated during the proposed activities are tabulated in EP Section F. A total of approximately 6,500 bbl of trash and debris will be generated over the life of the project. Trash will be transported to shore in disposal bags for final disposal by municipal operators in accordance with applicable regulations. Other wastes transported to shore for re-use, recycling, or disposal include SBM and associated cuttings, chemical product waste (well treatment fluids), and used oil. All wastes will be transported to shore in containers approved by the

U.S. Department of Transportation for re-use, recycling, or disposal in accordance with applicable regulations.

A.7 Marine Debris

Anadarko will comply with all applicable regulations relating to solid waste handling, transportation, and disposal, including the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) Annex V requirements, and USEPA, U.S. Coast Guard (USCG), BSEE, and BOEM regulations. These regulations include prohibitions and compliance requirements regarding the deliberate discharging of containers and other similar materials (e.g., trash, debris) into the marine environment as well as the protective measures to be implemented to prevent the accidental loss of solid material into the marine environment. For example, BSEE regulations 30 CFR 250.300(a) and (b)(6) prohibit operators from deliberately discharging containers and other similar materials (e.g., trash, debris) into the marine environment, and 30 CFR 250.300(c) requires durable identification markings on equipment, tools, containers (especially drums), and other material. The USEPA and USCG regulations require operators to be proactive in avoiding accidental loss of solid materials by developing waste management plans, posting informational placards, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Additionally, the debris awareness training, instruction, and placards required by the Protected Species Lease Stipulation should minimize the amount of debris that is accidentally lost overboard by offshore personnel (NMFS, 2020a). In addition to the regulations in 30 CFR 250, BSEE issued NTL BSEE-2015-G03 which instructs operators to exercise caution in handling and disposal of small items and packaging materials, requires posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly training and certification process for marine trash and debris awareness. Compliance with these requirements is expected to result in either no or negligible impacts from this factor.

A.8 Support Vessel and Helicopter Traffic

Anadarko will use existing shorebase facilities in Port Fourchon, Louisiana, for support vessel activities. Support helicopters are expected to be based at heliport facilities in Houma, Louisiana. No terminal expansion or construction is planned at either location.

IPFs associated with support vessel and helicopter traffic include their physical presence and operational noise. Each factor is discussed in the following subsections.

A.8.1 Physical Presence

The project will be supported by crew and supply vessels making generally two to three round trips per week. A support vessel is expected to be on site for a total of three days per well. NMFS (2020a) found that support vessel traffic has the potential to disturb protected species (e.g., marine mammals, sea turtles, fishes) and creates a risk of vessel strikes. The probability of a vessel strike depends on the number, size, and speed of vessels as well as the distribution, abundance, and behavior of the species (Conn and Silber, 2013; Hazel et al., 2007; Jensen and Silber, 2004; Laist et al., 2001; Vanderlaan and Taggart, 2007; NMFS, 2020a). To reduce the potential for vessel strikes, BOEM issued NTL BOEM-2016-G01, which recommends protected species identification training and that vessel operators and crews maintain a vigilant watch for marine mammals and slow down or stop their vessel to avoid striking protected species and requires operators to report sightings of any injured or dead protected species. The boats typically move to the project area via the most direct route from the shorebase.

A helicopter will make approximately 10 round trips per week between the drilling rig and the heliport. The helicopter will be used to transport personnel and small supplies and will normally take the most direct route of travel between the shorebase and the project area when air traffic and weather conditions permit. Offshore support helicopters typically maintain a minimum altitude of 700 ft (213 m) while in transit offshore, 1,000 ft (305 m) over unpopulated areas or across coastlines, and 2,000 ft (610 m) overpopulated areas and sensitive habitats such as wildlife refuges and park properties. Additional guidelines and regulations specify that helicopters maintain an altitude of 1,000 ft (305 m) within 328 ft (100 m) of marine mammals (NMFS, 2020a).

A.8.2 Noise

Offshore support vessels associated with the proposed project will contribute to the overall acoustic environment by transmitting noise through both air and water. The support vessels will use conventional diesel-powered screw propulsion. Vessel noise is a combination of narrow band (tonal) and broadband sound (Richardson et al., 1995; Hildebrand, 2009; McKenna et al., 2012). Tones typically dominate up to approximately 50 Hz, whereas broadband sounds may extend to 100 kHz. The primary sources of vessel noise are propeller cavitation, propeller singing, and propulsion; other sources include engine noise, flow noise from water dragging along the hull, and bubbles breaking in the vessel's wake (Richardson et al., 1995). The intensity of noise from support vessels is roughly related to ship size, weight, and speed. Broadband SLs for smaller boats (a category that include supply and other service vessels) are in the range of 150 to 180 dB re 1 μPa m (Richardson et al., 1995; Hildebrand, 2009; McKenna et al., 2012).

Penetration of aircraft noise below the sea surface is greatest directly below the aircraft. Aircraft noise produced at angles greater than 13 degrees from vertical is mostly reflected from the sea surface and does not propagate into the water (Richardson et al., 1995). The duration of underwater sound from passing aircraft is much shorter in water than air; for example, a helicopter passing at an altitude of 500 ft (152 m) that is audible in air for 4 minutes may be detectable under water for only 38 seconds at 10 ft (3 m) depth and for 11 seconds at 59 ft (18 m) depth (Richardson et al., 1995).

Dominant tones in noise spectra from helicopters are below 500 Hz with a SL of approximately 149 to 151 dB re 1 μPa m (for a Bell 212 helicopter) (Richardson et al., 1995). Levels of noise received underwater from passing aircraft depend on the aircraft's altitude, the aspect (direction and angle) of the aircraft relative to the receiver, receiver depth, water depth, and seafloor type (Richardson et al., 1995). Received level diminishes with increasing receiver depth when an aircraft is directly overhead, but may be stronger at mid-water than at shallow depths when an aircraft is not directly overhead (Richardson et al., 1995). Because of the relatively high expected airspeeds during transits and these physical variables, aircraft-related noise (including both airborne and underwater noise) is expected to be very brief in duration.

A.9 Accidents

The accidents addressed in the EIA focuses on the following two potential types:

- a small fuel spill, which is the most likely type of spill during OCS exploration activities; and
- a large oil spill, up to and including the WCD for this EP, which is an oil spill resulting from an uncontrolled blowout.

The following subsections summarize assumptions about the sizes and fates of these spills as well as Anadarko's spill response plans. Impacts are analyzed in **Section C**.

Recent EISs (BOEM, 2012a, b, 2013, 2014, 2015, 2016b, 2017a) analyzed three types of accidents relevant to drilling operations that could lead to potential impacts to the marine environment: loss of well control, vessel collision, and chemical and drilling fluid spills. These types of accidents, along with a hydrogen sulfide (H_2S) release, are discussed briefly below.

Loss of Well Control. A loss of well control is the uncontrolled flow of a reservoir fluid that may result in the release of gas, condensate, oil, drilling fluids, sand, and/or water. Loss of well control includes incidents from the very minor up to the most serious well control incidents, while blowouts are considered to be a subset of more serious incidents with greater risk of oil spill or human injury (BOEM, 2016a, 2017a). Loss of well control may result in the release of drilling fluid and/or loss of oil. Not all loss of well control events result in blowouts (BOEM, 2012a). In addition to the potential release of gas, condensate, oil, sand, and/or water, the loss of well control can also resuspend and disperse bottom sediments (BOEM, 2012a, 2017a). BOEM (2016a) noted that most OCS blowouts have resulted in the release of gas.

Anadarko has a robust system in place to prevent loss of well control. Measures to prevent a blowout, reduce the likelihood of a blowout, and conduct effective and early intervention in the event of a blowout are described in the NTL 2015-N01 package submitted with this EP, as required by BOEM (as discussed in **Section A.9.1**). The potential for a loss of well control event will be minimized by adhering to the requirements of applicable regulations and NTL 2010-N10, which specifies additional safety measures for OCS activities.

Vessel Collisions. BSEE data show that there were 171 OCS-related collisions between 2007 and 2018 (BSEE, 2018). Most collision mishaps are the result of service vessels colliding with platforms or vessel collisions with pipeline risers. Approximately 10% of vessel collisions with platforms in the OCS resulted in diesel spills, and in several collision incidents, fires resulted from hydrocarbon releases. To date, the largest diesel spill associated with a collision occurred in 1979 when an anchor-handling boat collided with a drilling platform in the Main Pass lease area, spilling 1,500 barrels (bbl). Diesel fuel is the product most frequently spilled, but oil, natural gas, corrosion inhibitor, hydraulic fluid, and lube oil have also been released as the result of vessel collisions. Human error accounted for approximately half of all reported vessel collisions from 2006 to 2009. As summarized by BOEM (2017a), vessel collisions occasionally occur during routine operations. Some of these collisions have caused spills of diesel fuel or chemicals. Anadarko will comply with all applicable USCG and BOEM safety requirements to minimize the potential for vessel collisions.

Dropped Objects. Objects dropped overboard the DP drilling rig could potentially pose a risk to existing live subsea pipelines or other infrastructure. If a dropped pipe or other subsea equipment landed on existing seafloor infrastructure, loss of integrity of seafloor pipelines, umbilicals, etc. could result in a spill. Dropped objects could also result in seafloor disturbance and potential impacts to benthic communities. Anadarko and its contractors intend to comply with all BOEM and BSEE safety requirement to minimize the potential for objects dropped overboard.

Chemical Spills. Chemicals are stored and used for pipeline hydrostatic testing, leak and pressure testing of subsea equipment and during drilling and in well completion operations. The relative quantities of their use is reflected in the largest volumes spilled (BOEM, 2017b). Completion, workover, and treatment fluids are the largest quantity used and comprise the largest releases. Any potential leak due to pressure testing failure will be limited to a single line leak and would be limited to less than 1 bbl. Potentially spilled fluids include Transaqua HT, MEG 50/50, or methanol. Between 2007 and 2014, an average of two chemical spills <50 bbl in volume and three chemical spills >50 bbl in volume occurred each year (BOEM, 2017a).

Drilling Fluid Spills. There is the potential for drilling fluids, specifically SBMs, to be spilled due to an accidental riser disconnect (BOEM, 2017a). SBMs are relatively nontoxic to the marine environment and have the potential to biodegrade (BOEM, 2014). The majority of SBM releases are <50 bbl in size, but accidental riser disconnects may result in the release of medium (238 to 2,380 bbl) to large (>2,381 bbl) quantities of drilling fluids. In the event of an SBM spill, there could be short-term localized impacts on water quality and the potential for localized benthic impacts due to SBM deposition on the seafloor. Benthic impacts would be similar to those described in **Section C.2.1**. The potential for riser disconnect SBM spills will be minimized by adhering to the requirements of applicable regulations.

H_2S Release. MC 36, MC 37, and MC 80 are classified as H_2S absent.

A.9.1 Small Fuel Spill

Spill Size. According to the analysis by BOEM (2017b), the most likely type of small spill (<1,000 bbl) resulting from OCS activities is a failure related to the storage of oil or diesel fuel. Historically, most diesel spills have been ≤1 bbl, and this is predicted to be the most common spill volume in ongoing and future OCS activities in the Western and Central Gulf of Mexico Planning Areas (Anderson et al., 2012). As the spill volume increases, the incident rate declines dramatically (BOEM, 2017a). The median size for spills ≤1 bbl is 0.024 bbl, and the median volume for spills of 1 to 10 bbl is 3 bbl (Anderson et al., 2012). For the EIA, a small diesel fuel spill of 3 bbl is used. Operational experience suggests that the most likely cause of such a spill would be a rupture of the fuel transfer hose resulting in a loss of contents (3 bbl of fuel) (BOEM, 2012a).

Spill Fate. The fate of a small fuel spill in the project area would depend on meteorological and oceanographic conditions at the time as well as the effectiveness of spill response activities. However, given the open ocean location of the project area and response actions, it is expected that impacts from a small spill would be minimal (BOEM, 2016a).

The water-soluble fractions of diesel are dominated by two- and three-ringed polycyclic aromatic hydrocarbons (PAHs), which are moderately volatile (National Research Council, 2003a). The constituents of these oils are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. Due to its light density, diesel will not sink to the seafloor. Diesel dispersed in the water column can adhere to suspended sediments, but this generally occurs only in coastal areas with high suspended solids loads (National Research

Council, 2003a) and would not be expected to occur to any appreciable degree in offshore waters of the Gulf of Mexico. Diesel fuel is readily and completely degraded by naturally occurring microbes (NOAA, 2006).

Sheens from small fuel spills are expected to persist for relatively short periods of time, ranging from minutes (<1 bbl) to hours (<10 bbl) to a few days (10 to 1,000 bbl), and rapidly spread out, evaporate, and disperse into the water column (BOEM, 2012a).

For purposes of the EIA, the fate of a small diesel fuel spill was estimated using the National Oceanic and Atmospheric Administration's (NOAA) Automated Data Inquiry for Oil Spills 2 (ADIOS2) model (NOAA, 2016a). This model uses the physical properties of oils in its database to predict the rate of evaporation and dispersion over time as well as changes in the density, viscosity, and water content of the product spilled. It is estimated that over 90% of a small diesel spill would be evaporated or dispersed within 24 hours (NOAA, 2016a). The area of the sea surface with diesel fuel on it during this 24-hour period would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

The ADIOS2 results, coupled with spill trajectory information discussed below for a large spill, indicate that a small fuel spill would not impact coastal or shoreline resources. The project area is 51 mi (82 km) from the nearest shoreline (Plaquemines Parish, Louisiana). Slicks from small fuel spills are expected to persist for relatively short periods of time ranging from minutes (<1 bbl) to hours (<10 bbl) to a few days (10 to 1,000 bbl) and rapidly spread out, evaporate, and disperse into the water column (BOEM, 2012a). Because of the distance from shore of these potential spills on the OCS and their lack of persistence, it is unlikely that a spill would make landfall prior to dissipation (BOEM, 2012a).

<u>Spill Response</u>. In the unlikely event the shipboard procedures fail to prevent a fuel spill, response equipment and trained personnel would be activated so that any spill effects would be localized and would result only in short-term environmental consequences. EP Section H provides a discussion of Anadarko's response efforts if a spill were to occur during operational activities associated with the proposed EP.

<u>Weathering</u>. Following a diesel fuel spill, several physical, chemical, and biological processes, collectively called weathering, interact to change the physical and chemical properties of the diesel, and thereby influence its harmful effects on marine organisms and ecosystems. The most important weathering processes include spreading, evaporation, dissolution, dispersion into the water column, formation of water-in-oil emulsions, photochemical oxidation, microbial degradation, adsorption to suspended particulate matter, and stranding on shore or sedimentation to the seafloor (National Research Council, 2003a, International Tanker Owners Pollution Federation Limited, 2018).

Weathering decreases the concentration of diesel fuel and produces changes in its chemical composition, physical properties, and toxicity. The more toxic, light aromatic and aliphatic hydrocarbons are lost rapidly by evaporation and dissolution from the slick on the water surface. Evaporated hydrocarbons are degraded rapidly by sunlight. Biodegradation of diesel fuel on the water surface and in the water column by marine bacteria removes first the n-alkanes and then the light aromatics. Other petroleum components are biodegraded more slowly (National Research Council, 2003a). Diesel fuel spill response-related activities for facilities included in this EP are governed by Anadarko's Regional OSRP, which meets the requirements contained in 30 CFR 254.

A.9.2 Large Oil Spill (Worst Case Discharge)

Spill Size. The WCD scenario for this project is defined as an uncontrollable oil discharge from the subsea wellbore resulting from a blowout incident during drilling operations. The scenario assumes that the wellhead fails mechanically and a blowout occurs at the seafloor. The WCD volumes for MC 36, MC 37 and MC 80 were determined to be less than 371,735 bbl per day as previously approved under Plan Control No.: N-10029, and referenced under Plan Control No.: N-10117. Therefore, the overall highest WCD remains 371,735 bbl per day for the area. The highest WCD for this prospect is at MC 37 for 339,604 bbl per day and remains below the N-10029 WCD volume. (25,470,300 bbl per day maximum total for 75 day blowout.) The maximum total volume during a blowout could potentially be 33,827,885 bbl assuming 91 days for the maximum duration of a blowout, multiplied by the worst case daily uncontrolled blowout volume of 371,735 bbl per day.

Blowout Scenario. Anadarko prepared this blowout scenario pursuant to guidance provided in NTL No. 2015-N01. It is expected it could take up to 91 days to complete drilling a relief well.

Spill Probability. Holland (1997) estimated a probability of 0.0021 for a deep drilling blowout during exploration drilling based on U.S. Gulf of Mexico data. The International Association of Oil & Gas Producers (2010) conducted an analysis and estimated a blowout frequency of 0.0017 per exploratory well for non-North Sea locations. BOEM updated OCS spill frequencies (bbl spilled per bbl produced) to include the Macondo incident. According to ABS Consulting Inc. (2016), the spill rate for spills >1,000 bbl dropped to 0.22 spills per billion barrels produced. According to the ABSG Consulting (2018) analysis, the baseline risk of loss of well control spill >10,000 bbl on the OCS is estimated to be once every 27.5 years.

Spill Trajectory. The fate of a large oil spill in the project area would depend on meteorological and oceanographic conditions at the time. The Oil Spill Risk Analysis (OSRA) model is a computer simulation of oil spill transport that uses realistic data for winds and currents to predict spill trajectory. The OSRA report by Ji et al. (2004) provides conditional contact probabilities for shoreline segments in the Gulf of Mexico.

The results for the 30-day OSRA model for Launch Area 57 (where MC 36, MC 37, and MC 80 are located) are presented in **Table 3**. The model predicts up to a 4% chance of shoreline contact within 3 days of a spill. Shoreline contact is predicted within 10 days of a spill for shorelines in Terrebonne, Lafourche, Plaquemines, and St. Bernard parishes, Louisiana ranging from 1% to 14%. Within 30 days of a spill for shorelines ranging from Cameron Parish, Louisiana, to Bay County, Florida, the conditional probability of shoreline contact ranges from 1% to 21% (**Table 3**). Counties with a conditional probability for shoreline contact of < 0.5% for 3, 10, and 30 days are not shown in **Table 3**.

Table 3. Conditional probabilities of a spill in the project area contacting shoreline segments based on the 30-day Oil Spill Risk Analysis (OSRA) (From: Ji et al., 2004). Values are conditional probabilities that a hypothetical spill in OSRA Launch Area 57 could contact shoreline segments within 3, 10, or 30 days.

Shoreline Segment	County or Parish and State	Conditional Probability[1] of Contact (%)		
		3 Days	10 Days	30 Days
C13	Cameron Parish, Louisiana	--	--	1
C14	Vermilion Parish, Louisiana	--	--	1
C17	Terrebonne Parish, Louisiana	--	1	2
C18	Lafourche Parish, Louisiana	--	1	2
C20	Plaquemines Parish, Louisiana	4	14	21
C21	St. Bernard Parish, Louisiana	--	1	3
C22	Hancock County, Mississippi	--	--	1
C23	Harrison County, Mississippi	--	--	1
C24	Jackson County, Mississippi	--	--	1
C25	Mobile County, Alabama	--	--	1
C26	Baldwin County, Alabama	--	--	1
C27	Escambia County, Florida	--	--	1
C28	Okaloosa County, Florida	--	--	1
C29	Walton County, Florida	--	--	1
C30	Bay County, Florida	--	--	1

[1] Conditional probability refers to the probability of contact within the stated time period, assuming that a spill has occurred (-- indicates <0.5%). Values are conditional probabilities that a hypothetical spill in the project area (represented by OSRA Launch Area 57) could contact shoreline segments within 3, 10, or 30 days.

The original OSRA modeling runs reported by Ji et al. (2004) did not evaluate the fate of a spill over time periods exceeding 30 days, nor did they estimate the fate of a release that continues over a period of weeks or months. As noted by Ji et al. (2004), the OSRA model does not consider the chemical composition or biological weathering of oil spills, the spreading and splitting of oil spills, or spill response activities. The model does not specify a particular spill size but has been used by BOEM to evaluate contact probabilities for spills greater than 1,000 bbl.

BOEM presented additional OSRA modeling to simulate a spill that continues for 90 consecutive days, with each trajectory tracked for 60 days during four seasons. In this updated OSRA model (herein referred to as the 60-day OSRA model), 60 days was chosen as a conservative estimate of the maximum duration that spilled oil would persist on the sea surface following a spill (BOEM, 2017b). The spatial resolution is limited, with five launch points in the entire Western and Central Planning Areas of the Gulf of Mexico. These launch points were deliberately located in areas identified as having a high possibility of containing large oil reserves. The 60-day OSRA model launch point most appropriate for modeling a spill in the project area is Launch Point 2. The 60-day OSRA results for Launch Point 2 are presented in **Table 4**.

Table 4. Shoreline segments with a 1% or greater conditional probability of contact from a spill starting at Launch Point 2 based on the 60-day Oil Spill Risk Analysis (OSRA). Values are conditional probabilities that a hypothetical spill in the project area could contact shoreline segments within 60 days. Modified from: BOEM (2017a).

Season	Spring				Summer				Fall				Winter			
Day	3	10	30	60	3	10	30	60	3	10	30	60	3	10	30	60
County or Parish	Conditional Probability of Contact[1] (%)															
Matagorda, Texas	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Vermilion, Louisiana	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Terrebonne, Louisiana	--	--	--	--	--	--	--	1	--	--	--	--	--	--	2	2
Lafourche, Louisiana	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	1
Jefferson, Louisiana	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
Plaquemines, Louisiana	--	2	3	3	2	9	17	19	2	17	24	24	1	12	18	20
St. Bernard, Louisiana	--	5	6	6	1	8	13	14	1	8	10	10	1	5	8	8
Hancock, Mississippi	--	2	3	3	--	2	2	2	1	2	3	3	--	1	2	3
Harrison, Mississippi	2	5	5	5	1	4	5	5	1	2	3	3	2	3	4	4
Jackson, Mississippi	7	13	14	14	3	6	8	8	6	11	12	13	6	10	12	13
Mobile, Alabama	13	18	19	19	4	9	10	10	8	12	12	13	9	12	13	13
Baldwin, Alabama	8	15	18	18	2	8	9	9	1	2	3	3	3	6	7	7
Escambia, Florida	1	6	9	10	1	4	6	6	--	1	1	1	--	2	2	3
Okaloosa, Florida	--	1	2	2	--	1	2	2	--	--	--	--	--	--	--	--
Walton, Florida	--	--	1	1	--	1	1	1	--	--	--	1	--	--	--	--
Bay, Florida	--	2	3	3	--	1	2	3	--	--	--	--	--	--	--	1
Gulf, Florida	--	1	3	4	--	--	2	2	--	--	--	--	--	--	--	--
Franklin, Florida	--	--	1	2	--	--	1	1	--	--	--	--	--	--	--	--
Dixie, Florida	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--
Levy, Florida	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--
State Coastline	Conditional Probability of Contact[1] (%)															
Texas	--	--	--	--	--	--	--	1	--	--	1	2	--	--	--	2
Louisiana	--	6	8	9	3	17	30	35	3	25	36	36	2	18	29	33
Mississippi	9	20	22	22	5	12	15	15	8	15	18	19	8	15	18	20
Alabama	21	33	37	37	6	17	20	20	9	14	15	15	12	18	20	20
Florida	1	11	19	26	1	7	14	16	--	1	3	3	--	2	4	5

[1] Conditional probability refers to the probability of contact within the stated time period assuming that a spill has occurred (-- indicates <0.5%). Values are conditional probabilities that a hypothetical spill in the project area could contact shoreline segments within 60 days.

From Launch Point 2, potential shorelines with a 1% or greater conditional probability of contact within 60 days range from Matagorda County, Texas (winter season), to Levy County, Florida (spring season). Based on statewide contact probabilities within 60 days, Louisiana has the highest likelihood of contact during summer, fall, and winter (ranging from 33% to 36% conditional probability), while Alabama has the highest probability of contact in spring (37% conditional probability). The model predicts potential contact with Mississippi shorelines in any season ranging from a 15% conditional probability in summer to a 22% conditional probability in spring (within 60 days of a spill). Texas shorelines are predicted to be potentially contacted only during summer, fall, or winter, with conditional probabilities of contact 2% or less within 60 days. Florida shorelines are predicted to be potentially contacted during any season, with a probability up to 26% in spring. Based on the 60-day trajectories, counties or parishes with 10% or greater contact probability during any season include Plaquemines and St. Bernard Parishes in Louisiana; Jackson County in Mississippi; Mobile and Baldwin counties in Alabama; and Escambia County, Florida (**Table 4**).

OSRA is a preliminary risk assessment model. In the event of an actual oil spill, real-time monitoring and trajectory modeling would be conducted using current and wind data available from the rigs and permanent production structures in the area. Satellite and aerial monitoring of the plume and real-time trajectory modeling using wind and current data would continue on a daily basis to help position equipment and human resources throughout the duration of any major spill or uncontrolled release.

<u>Weathering</u>. The constituents of diesel fuel are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. NOAA has reported that diesel fuel is readily and completely degraded by naturally occurring microbes (NOAA, 2006).

Weathering decreases the concentration of oil and produces changes in its chemical composition, physical properties, and toxicity. The more toxic, light aromatic and aliphatic hydrocarbons are lost rapidly by evaporation and dissolution from a slick on the water surface. For example, the light, paraffinic crude oil spilled during the *Deepwater Horizon* incident lost approximately 55 wt. % to evaporation during the first 3 to 5 days while floating on the sea surface (Daling et al., 2014). Evaporated hydrocarbons are degraded rapidly by sunlight. Biodegradation of oil on the water surface and in the water column by marine bacteria removes first the n-alkanes and then the light aromatics from the oil. Other petroleum components are biodegraded more slowly. Photo-oxidation attacks mainly the medium and high molecular weight PAHs in the oil on the water surface.

<u>Spill Response</u>. Anadarko's Regional OSRP was approved in August 2015 for Anadarko Petroleum Corporation and its subsidiary Anadarko US Offshore LLC. (Company Numbers 00981 and 02219 respectively) in accordance with 30 CFR Part 254. The June 2017 updates for the OSRP were acknowledged by BSEE in July 2017 and in compliance with 30 CFR 254.30(a). Non-regulatory required OSRP updates were submitted to BSEE in June 2018 and acknowledged as in compliance in July 2018. The OSRP biennial update was submitted June 30, 2019 and acknowledged as in compliance in September 2019.

The OSRP provides a detailed plan that enables Anadarko to respond rapidly and effectively manage response efforts for oil spills that may result from drilling and production operations. The OSRP contains detailed information on "Quick Response" procedures, including:

- responsibilities of all Anadarko and contract personnel to report any observed discharge from known or unknown sources;
- procedures to locate and determine the size of a discharge; and
- contact information for alerting the spill management team, complete with names, phone numbers, and locations.

In the event of a large oil spill up to and including a WCD, Anadarko has access to surface and subsea response/containment capabilities that could be implemented through various organizations under contract. Anadarko's primary spill response equipment provider is Clean Gulf Associates (CGA).

CGA has skimming vessels capable of operating in shallow waters, nearshore areas, and offshore areas. These vessels have oleophilic brush pack skimming systems operating in troughs built into the hulls; below-deck storage; and marine electronics packages including marine, aircraft, and company-frequency radios, radar, moving map plotters, GPS, satellite phones, and depth finders. CGA also offers Fast Response Systems staged throughout the Gulf of Mexico available for offshore use.

The CGA high-volume open sea skimmer (HOSS) barge consists of a skimming system built into an oil recovery barge. There are 1,000-bbl recovered oil storage tanks built into the hull where oil can be separated and offloaded. Skimming operations are conducted from the control room overlooking the skimmer deck. The estimated daily recovery capacity for the HOSS barge is approximately 43,000 bbl of surface oil. CGA has recently acquired Koseq skimming arms and Aqua Guard skimmers to enhance its readiness. In addition, an x-band radar/infrared tracking system has been installed on the HOSS barge. Additional CGA equipment can be referenced online at http://www.cleangulfassoc.com/equipment.

Anadarko also has a contract with the Marine Spill Response Corporation (MSRC) for additional spill response equipment. MSRC has a dedicated fleet for the Atlantic/Gulf of Mexico region and additional available equipment staged throughout the U.S. MSRC equipment staged throughout the Gulf of Mexico includes oil spill response vessels, fast response vessels, oil spill response barges, platform supply vessels, and shallow water barges. Various equipment is outfitted with x-band radar and infrared technology for detecting surface oil. Additional MSRC capabilities and a complete equipment listing are available online at http://www.msrc.org/.

Anadarko is a member of the Marine Well Containment Company (MWCC). In the event of an incident, MWCC can provide a 15,000 psi single ram capping stack and dispersant injection capability. MWCC can install and operate the interim containment system, including subsea flowlines, manifolds, and risers. The interim system is engineered to be used in depths up to 10,000 ft (3,048 m) and has the capacity to contain 60,000 bbl of liquid per day (and 120 million standard cubic feet per day of gas) with potential for expansion.

Additionally, MWCC offers its members access to equipment, instruments, and supplies for marine environmental sampling and monitoring in the event of an oil spill in the Gulf of Mexico. Members have access to a mobile Laboratory Container, Operations Container, and Launch and Recovery System that enable water sampling and monitoring to water depths of 9,843 ft (3,000 m). The two 8 ft × 20 ft (2.4 m × 6.1 m) containers have been certified for offshore use by Det Norske Veritas and the American Bureau of Shipping. The Launch and Recovery System is a combined winch, A-frame, and 9,843 ft (3,000 m) long cable, customized for the instruments in the containers.

The containers are designed to enable rapid mobilization of necessary equipment to an incident site, including redundant systems to avoid downtime and supplies for sample handling and storage. Once deployed on a suitable vessel, the mobile containers then act as work spaces for scientists and operations personnel. See EP Section H for a detailed description of Anadarko's site-specific spill response measures for the plan.

B. Affected Environment

The project area is approximately 51.6 mi (81.6 km) from the nearest shoreline (Louisiana), 121 mi (195 km) from the onshore support base at Port Fourchon, Louisiana, and 156 mi (251 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the location of the proposed wellsites ranges from approximately 3,473 to 4,187 ft (1,059 to 1,276 m) (**Figure 2**) (Ocean Geo Solutions, 2020a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w).

A detailed description of the regional affected environment, including meteorology, oceanography, geology, air and water quality, benthic communities, threatened and endangered species, biologically sensitive resources, archaeological resources, socioeconomic conditions, and other marine uses is provided in recent EISs (BOEM, 2012a, 2013, 2014, 2015, 2016b, 2017a). These regional descriptions remain valid and are incorporated by reference. General background information is presented in the following sections, and brief descriptions of each potentially affected resource, including site-specific and new information if available, are presented in **Section C**.

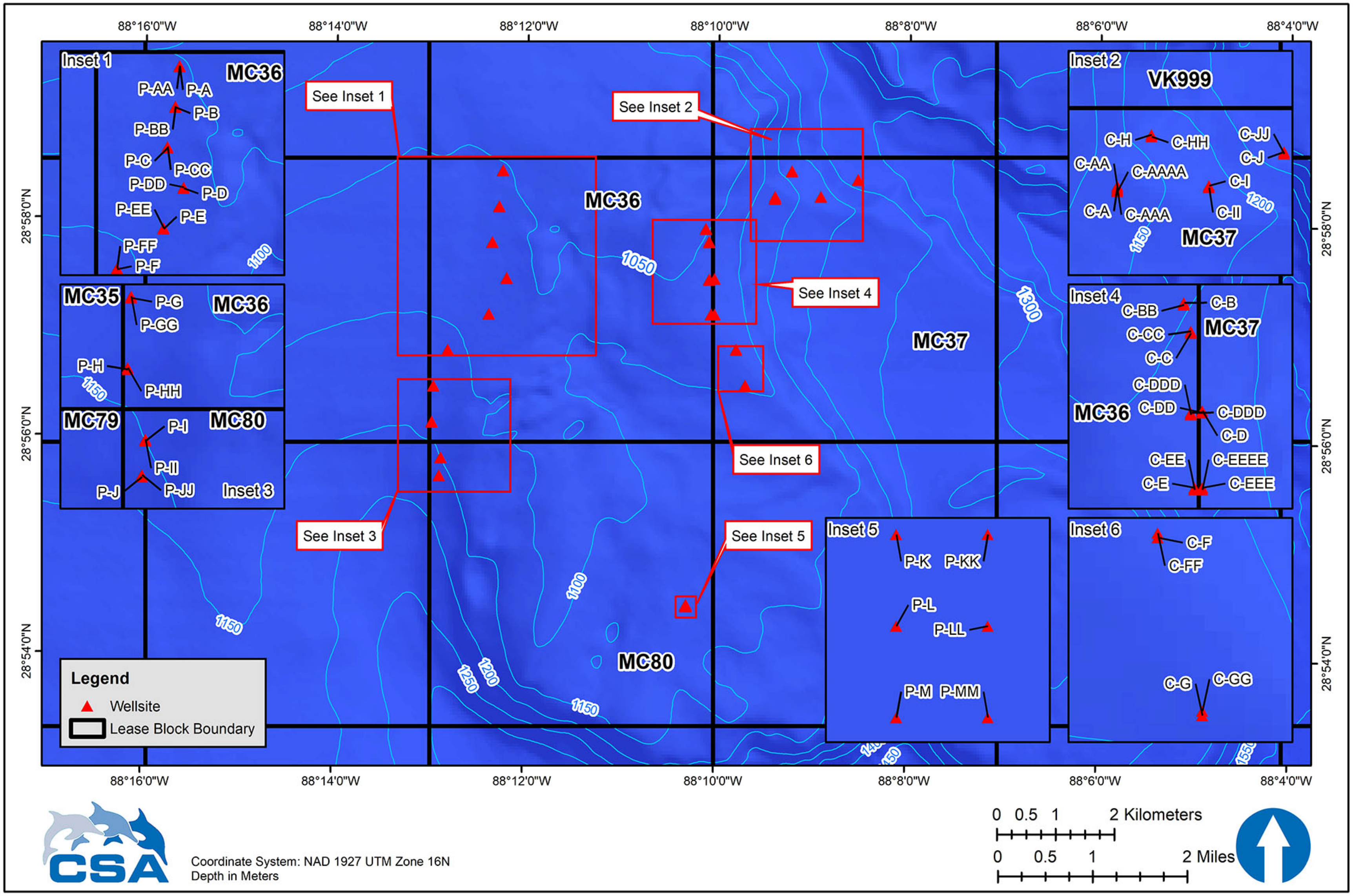

Figure 2. Bathymetric map of the project area showing the surface hole location of the proposed wellsites in Mississippi Canyon Blocks 36, 37, and 80.

C. Impact Analysis

This section analyzes the potential direct and indirect impacts of routine activities and accidents. Impacts have been analyzed extensively in lease sale EISs for the Central and Western Gulf of Mexico Planning Areas (BOEM, 2013, 2014, 2015, 2016a, b, 2017a). The information in these documents is incorporated by reference. Potential site-specific issues are addressed in this section, which is organized by the environmental resources identified in **Table 2** and addresses each potential IPF.

C.1 Physical/Chemical Environment

C.1.1 Air Quality

There are no site-specific air quality data for the project area due to the distance from shore. Because of the distance from shore-based pollution sources and the lack of sources offshore, air quality at the wellsite is expected to be good. The attainment status of federal OCS waters is unclassified because there is no provision in the Clean Air Act for classification of areas outside state waters (BOEM, 2012a).

In general, ambient air quality of coastal counties along the Gulf of Mexico is relatively good (BOEM, 2012a). As of October 2020, Mississippi, Alabama, and Florida Panhandle coastal counties are in attainment of the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants (USEPA, 2020). St. Bernard Parish in Louisiana is a nonattainment area for sulfur dioxide based on the 2010 standard. One coastal metropolitan area in Texas (Houston-Galveston-Brazoria) is a nonattainment area for 8-hour ozone (2015 Standard). One coastal metropolitan area in Florida (Tampa) was reclassified in October 2018 from a nonattainment area to maintenance status for lead based on the 2008 Standard (USEPA, 2020).

As noted earlier, based on calculations made pursuant to applicable regulations, emissions from drilling activities are not expected to be significant. Therefore, the only potential effects to air quality would be from air pollutant emissions associated with routine operations and accidental spills (a small fuel spill or a large oil spill). These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Air Pollutant Emissions

Air pollutant emissions are the only routine IPF likely to affect air quality. Offshore air pollutant emissions result primarily from the drilling operations and service vessels. These emissions occur mainly from combustion or burning of diesel and Jet A aircraft fuel. The combustion of fuels occurs primarily in generators, pumps, or motors and from lighter fuel motors. Primary air pollutants typically associated with OCS activities are suspended $PM_{2.5}$ and PM_{10}, ammonia, lead, SO_x, NO_x, VOCs, and CO. As noted by BOEM (2017b), emissions from routine activities are projected to have minimal impacts to onshore air quality because of the prevailing atmospheric conditions, anticipated emission rates, anticipated heights of emission sources, and the distance to shore of the proposed activities. The incremental contribution to cumulative impacts from activities similar to Anadarko's proposed activities is not significant and is not expected to cause or contribute to a violation of NAAQS. Given the levels of expected emissions and the distance of the project from shore, emissions from the activities described in Anadarko's proposed EP are not likely to contribute to violations of any NAAQS onshore.

Greenhouse gas emissions may contribute to climate change, with important effects on temperature, rainfall, frequency of severe weather, ocean acidification, and sea level rise (Intergovernmental Panel on Climate Change, 2014). Greenhouse gas emissions from this proposed project represent a negligible contribution to the total greenhouse gas emissions from reasonably foreseeable activities in the Gulf of Mexico area and are not expected to significantly alter or exceed any of the climate change impacts evaluated in the Programmatic EIS (BOEM, 2016a). Carbon dioxide and methane emissions from the project would constitute a small incremental contribution to greenhouse gas emissions from all OCS activities. According to Programmatic and OCS lease sale EISs (BOEM, 2016a, 2017a), estimated carbon dioxide emissions from OCS oil and gas sources are 0.4% of the U.S. total. Because of the distance from shore, routine operations in the project area are not expected to have any impact on air quality conditions along the coast, including nonattainment areas.

As noted in the lease sale EIS (BOEM, 2017a), emissions of air pollutants from routine activities in the Central Gulf of Mexico Planning Area are projected to have minimal impacts to onshore air quality because of the prevailing atmospheric conditions, emission heights, emission rates, and the distance of these emissions from the coastline. The Air Quality Emissions Report (see EP Section G) indicates that the projected project emissions are below exemption levels set by the applicable regulations in 30 CFR 550.303. Based on this and the distance from shore, it can be concluded that the emissions will not significantly affect the air quality of the onshore area for any of the criteria pollutants.

The Breton Wilderness Area, which is part of the Breton National Wildlife Refuge (NWR), is designated under the Clean Air Act as a Prevention of Significant Deterioration Class I air quality area. BOEM is required to notify the National Park Service and U.S. Fish and Wildlife Service (USFWS) if emissions from proposed projects may affect the Breton Class I area. Additional review and mitigation measures may be required for sources within 186 mi (300 km) of the Breton Class I area that exceed emission limits agreed upon by the administering agencies (National Park Service, 2010). The project area is approximately 64 mi (103 km) from the Breton Wilderness Area. Anadarko intends to comply with all BOEM requirements regarding air emissions.

There are three Class I air quality areas on the west coast of Florida: St Mark's Wildlife Refuge in Wakulla County, Florida, Chassahowitzka Wilderness Area in Hernando County, Florida, and Everglades National Park in Monroe, Miami-Dade, and Collier counties, Florida. The project area is approximately 249 mi (401 km) from the closest Florida Class I air quality area (Saint Mark's Wildlife Refuge Class I Air Quality Area). Anadarko will comply with emissions requirements as directed by BOEM. No further analysis or control measures are required.

Impacts of a Small Fuel Spill

Potential impacts of a small spill on air quality are expected to be consistent with those analyzed and discussed by (BOEM, 2012a, 2015, 2016b, 2017a). The probability of a small spill would be minimized by Anadarko's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Anadarko's OSRP is expected to reduce the potential impacts. EP Section H includes a detailed discussion of the spill response measures that would be employed. Given the open ocean location of the project area, the extent and duration of air quality impacts from a small spill would not be significant.

A small fuel spill would affect air quality near the spill site by introducing VOCs into the atmosphere through evaporation. The ADIOS2 model (see **Section A.9.1**) indicates that over 90% of a small diesel spill would be evaporated or dispersed within 24 hours (NOAA, 2016a). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

A small fuel spill should not affect coastal air quality because the spill would not be expected to make landfall or reach coastal waters prior to dissipating (see **Section A.9.1**).

Impacts of a Large Oil Spill

Potential impacts of a large oil spill on air quality are expected to be consistent with those analyzed and discussed by (BOEM, 2012a, 2015, 2016b, 2017a).

A large oil spill could potentially affect air quality by introducing VOCs into the atmosphere through evaporation from the slick. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. Real-time wind and current data from the project area would be available at the time of a spill and would be used to assess the fate and effects of VOCs released. Additional air quality impacts could occur if response measures included *in situ* burning of floating oil. Burning would generate a plume of black smoke and result in emissions of NO_x, SO_x, CO, and PM as well as greenhouse gases. However, *in situ* burning would occur only after authorization from the USCG Federal On-Scene Coordinator. This approval would also be based upon consultation with the regional response team, including USEPA.

Because of the project area's location (51.6 mi [81.6 km]) from the nearest shoreline, most air quality impacts would occur in offshore waters with minimal chance to affect onshore air quality.

C.1.2 Water Quality

There are no site-specific baseline water quality data for the project area. Deepwater areas in the northern Gulf of Mexico are relatively homogeneous with respect to temperature, salinity, and oxygen (BOEM, 2017a). Kennicutt (2000) noted that the deepwater region has little evidence of contaminants in the dissolved or particulate phases of the water column. Within the northern Gulf of Mexico, there are localized areas (termed natural seeps) that release natural seepage of oil, gas, and brines from sub-surface deposits into near surface sediments and up through the water column. No natural seeps were noted within 2,000 ft (610 m) of the proposed wellsites (Ocean Geo Solutions, 2020a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w).

The only IPFs that may affect water quality are effluent discharges associated with routine operations and two types of accidents (a small fuel spill and a large oil spill) as discussed below.

Impacts of Effluent Discharges

Discharges of treated SBM cuttings may produce temporary, localized increases in suspended solids in the water column around the drilling rig. In general, turbid water can be expected to extend between a few hundred meters and several kilometers down current from the discharge point for water-based drilling muds and cuttings (Neff, 1987). SBMs will be collected on the rig and either reused by the vendor or transported to Port Fourchon, Louisiana, for recycling and disposal at an approved facility. Cuttings wetted with SBMs and SBM discharges associated with weekly safety diverter valve testing on the drilling rig are expected to be treated to SBM levels at or below NPDES requirements and discharged overboard at the drillsite in accordance with all NPDES permit limitations and requirements. After discharge, SBMs retained on cuttings would be expected to adhere tightly to the cuttings particles and, consequently, would not produce substantial turbidity as the cuttings sink through the water column (Neff et al., 2000). No persistent impacts on water quality in the project area are expected.

Water-based drilling muds and cuttings will be released at the seafloor during the initial well intervals before the marine riser, which allows returns to the surface, is set. Excess cement slurry also will be released at the seafloor during casing installation for the riserless portion of the drilling operations. Discharges of drilling muds and cuttings are likely to have little impact on water quality due to the low toxicity and rapid dispersion of these discharges (National Research Council, 1983; Neff, 1987; Hinwood et al., 1994). WBMs typically have low toxicity and there is little chance of toxic effects on water column organisms.

Treated sanitary and domestic wastes, including those from support vessels, may have a transient effect on water quality in the immediate vicinity of the discharge. Treated sanitary and domestic wastes may have elevated levels of nutrients, organic matter, and chlorine but should dilute rapidly to undetectable levels within tens to hundreds of meters from the source. All NPDES permit limitations and requirements as well as USCG regulations (as applicable) are expected to be met during proposed activities; therefore, little or no impact on water quality from the overboard releases of treated sanitary and domestic wastes is anticipated.

Deck drainage includes all effluents resulting from rain, deck washings, and runoff from curbs, gutters, and drains (including drip pans) in work areas. Rainwater that falls on uncontaminated areas of the drilling rig will flow overboard without treatment. However, rainwater that falls on the drilling rig deck and other areas such as chemical storage areas and places where equipment is exposed will be collected, and oil and water will be separated to meet NPDES permit requirements. Based on expected adherence to permit limits and applicable regulations, little or no impact on water quality from deck drainage is anticipated.

Other discharges in accordance with the NPDES permit, such as desalination unit brine; BOP hydraulic fluids; and uncontaminated cooling water, firewater, ballast water, bilge water, and other discharges of seawater and freshwater to which treatment chemicals have been added are expected to dilute rapidly and have little or no impact on water quality.

Support vessels will discharge treated sanitary and domestic wastes. These are not expected to have a significant impact on water quality in the vicinity of the discharges. Support vessel discharges are expected be in accordance with USCG and the MARPOL 73/78 Annex V requirements and, as applicable, the NPDES Vessel General Permit, and therefore are not expected to cause significant impacts on water quality.

Impacts of a Small Fuel Spill

Potential impacts of a small spill on water quality are expected to be consistent with those analyzed and discussed by BOEM (2012a, 2015, 2016b, 2017a). The probability of a small spill would be minimized by Anadarko's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Anadarko's OSRP is expected to potentially help mitigate and reduce the impacts. EP Section H provides details on spill response measures in addition to the summary information provided in the EIA.

The water-soluble fractions of diesel are dominated by two- and three-ringed PAHs, which are moderately volatile (National Research Council, 2003a). The molecular weight of diesel oil constituents is light to intermediate and can be readily degraded by aerobic microbial oxidation. Diesel oil is much lighter than water (specific gravity is between 0.83 and 0.88, compared to 1.03 for seawater). When spilled on water, diesel oil spreads very quickly to a thin film of rainbow and silver sheens, except for marine diesel, which may form a thicker film of dull or dark colors. However, because diesel oil has a very low viscosity, it is readily dispersed into the water column when winds reach 5 to 7 knots or with breaking waves (NOAA, 2017a). It is possible for the diesel oil that is dispersed by wave action to form droplets that are small enough be kept in suspension and moved by the currents.

Diesel dispersed in the water column can adhere to suspended sediments but this generally occurs only in coastal areas with high suspended solid loads (National Research Council, 2003a) and would not be expected to occur to any appreciable degree in offshore waters of the Gulf of Mexico.

The extent and persistence of water quality impacts from a small diesel fuel spill would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. It is estimated that more than 90% of a small diesel spill would evaporate or disperse within 24 hours (NOAA, 2016a) (see **Section A.9.1**). The sea surface area covered with a very thin layer of diesel fuel would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions. In addition to removal by evaporation, constituents of diesel oil are readily and completely degraded by naturally occurring microbes (NOAA, 2006, 2017a). Given the open ocean location of the project area, the extent and duration of water quality impacts from a small spill would not be significant.

Impacts of a Large Oil Spill

Potential impacts of a large oil spill on water quality are expected to be consistent with those analyzed and discussed by BOEM (2012a, 2015, 2016b, 2017a).

Most of the spilled oil would be expected to form a slick at the surface, although information from the *Deepwater Horizon* incident indicates that submerged oil droplets can be produced when subsea dispersants are applied at the wellhead (Camilli et al., 2010; Hazen et al., 2010; NOAA, 2011a,b,c). Dispersants would be applied only after approval from the Federal On-Scene Coordinator with collaboration from the USEPA and Regional Response Team Region 6.

The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. Real-time wind and current data from the project area would be available at the time of a spill and would be used to assess the fate and effects of VOCs released. Weathering processes that affect spilled oil on the sea include adsorption (sedimentation), biodegradation, dispersion, dissolution, emulsification, evaporation, and photo oxidation. Most crude oil blends will emulsify quickly when spilled, creating a stable mousse that presents a more persistent cleanup and removal challenge (NOAA, 2017b).

Hazen et al. (2010) studied the impacts and fate of oil released in the deepwater environment after the 2010 *Deepwater Horizon* incident. Initial studies suggested that the potential exists for rapid intrinsic bioremediation (bacterial degradation) of subsea dispersed oil in the water column by deep-sea indigenous microbial activity without significant oxygen depletion

(Hazen et al., 2010), although other studies showed that oil bioremediation caused oxygen drawdown in deep waters (Kessler et al., 2011; Dubinsky et al., 2013). Additional studies investigated the effects of deepwater dissolved hydrocarbon gases (e.g., methane, propane, ethane) and the microbial response to a deepwater oil spill. Results suggest deepwater dissolved hydrocarbon gases may promote rapid hydrocarbon respiration by low-diversity bacterial blooms, thus priming indigenous bacterial populations for rapid hydrocarbon degradation of subsea oil (Kessler et al., 2011; Du and Kessler, 2012; Valentine et al., 2014). A 2017 study identified water temperature, taxonomic composition of initial bacterial community, and dissolved nutrient levels as factors that may regulate oil degradation rates by deep-sea indigenous microbes (Liu et al., 2017).

Due to the project area being located approximately 51.6 mi (81.6 km) from the nearest shoreline (Plaquemines Parish, Louisiana), it is expected that most water quality impacts would occur in offshore waters before low molecular weight alkanes and volatiles are weathered (Operational Science Advisory Team, 2011), especially in the event of a spill lasting less than 30 days. The 30-day OSRA modeling (**Table 3**) indicates nearshore waters and embayments in Plaquemines Parish in Louisiana is the coastal area most likely to be affected (4% probability within 3 days, 14% probability within 10 days, and 21% probability within 30 days). Other shorelines from Cameron Parish, Louisiana to Bay County, Florida could be affected within 30 days ranging from 1% to 3% probability contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Matagorda County, Texas to Levy County, Florida (up to 24% conditional probability within 60 days).

C.2 Seafloor Habitats and Biota

The water depth at the location of the proposed wellsites ranges from approximately 3,473 to 4,187 ft (1,059 to 1,276 m). According to BOEM (2016a), existing information for the deepwater Gulf of Mexico indicates that the seafloor is composed primarily of soft sediments; exposed hard substrate habitats and associated biological communities are rare. The site clearance letters did not note the presence of deepwater benthic communities within 2,000 ft (610 m) of the proposed wellsites (Ocean Geo Solutions, 2020a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w). The IPFs with potential impacts listed in **Table 2** are discussed below.

C.2.1 Soft Bottom Benthic Communities

There are no site-specific benthic community data from the project area. However, data from the Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology Study (Wei, 2006; Rowe and Kennicutt, 2009; Wei et al., 2010; Carvalho et al., 2013) can be used to describe typical baseline benthic communities in the area. **Table 5** summarizes data collected at two stations in water depths similar to those in the proposed drilling area.

Table 5. Baseline benthic community data from stations near the project area in similar depths sampled during the Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology Study (Adapted from: Wei, 2006; Rowe and Kennicutt, 2009).

Station	Water Depth (m)	Density		
		Meiofauna (individuals m^{-2})	Macroinfauna (individuals m^{-2})	Megafauna (individuals ha^{-1})
S36	1,825	799,963	4,481	359
HiPro	1,565	343,118	5,076	--

Meiofaunal and megafaunal abundances from Rowe and Kennicutt (2009); macroinfaunal abundance from Wei (2006); -- = no data available; m = meter; ha = hectare.

Densities of meiofauna (animals passing through a 0.5-mm sieve but retained on a 0.062-mm sieve) at stations in the vicinity of the project area ranged from approximately 343,000 to 800,000 individuals m^{-2} (**Table 5**) (Rowe and Kennicutt, 2009). Nematodes, nauplii, and harpacticoid copepods were the three dominant meiofaunal groups, accounting for about 90% of total abundance.

The benthic macroinfauna is characterized by small mean individual sizes and low densities, both of which reflect the meager primary production in surface waters of the Gulf of Mexico continental slope (Wei, 2006). Densities decrease exponentially with water depth. Based on an equation presented by Wei (2006), macroinfaunal densities in the water depths of the project area are expected to range from approximately 2,640 to 3,100 individuals m^{-2}.

Polychaetes are typically the most abundant macroinfaunal group on the northern Gulf of Mexico continental slope, followed by amphipods, tanaids, bivalves, and isopods. Carvalho et al. (2013) found polychaete abundance to be higher in the central region of the northern Gulf of Mexico when compared to the eastern and western regions. Wei (2006) recognized four depth-dependent faunal zones (1 through 4), two of which are divided horizontally. The project area is in Zone 1. Zone 1 ranges in depth from 699 to 5,158 ft (213 to 1572 m) and includes stations on the upper Texas-Louisiana Slope, the west flank of the upper Mississippi Fan, the head of Mississippi Canyon, and the upper West Florida Terrace. The most abundant species in this zone were the polychaetes *Litocorsa antennata*, *Prionospio cirrifera*, and *Aricidea suecica*; the amphipod *Ampelisca mississippina*; and the bivalve *Heterodonta* spp. (Wei, 2006).

The megafaunal density at a station in the vicinity of the project area was 359 individuals ha^{-1}. Common megafauna included motile groups such as decapods, ophiuroids, holothurians, and demersal fishes as well as sessile groups such as sponges and anemones (Rowe and Kennicutt, 2009).

Bacteria also are an important component in terms of biomass and cycling of organic carbon (Cruz-Kaegi, 1998). For example, in deep sea sediments, Main et al. (2015) observed that microbial oxygen consumption rates increased and bacterial biomass decreased with hydrocarbon contamination. Bacterial biomass at the depth range of the project area typically is about 1 to 2 g C m^{-2} in the top 15 cm of sediments (Rowe and Kennicutt, 2009).

IPFs that potentially may affect benthic communities are physical disturbance to the seafloor, effluent discharges (drilling muds and cuttings), and potential effects from large oil spill resulting from a well blowout at the seafloor. A small fuel spill would not affect benthic communities because the diesel fuel is expected to float and dissipate on the sea surface.

Impacts of Physical Disturbance to the Seafloor

In water depths such as those in the project area, DP drillships or semisubmersibles disturb the seafloor only around the wellbore (surface hole location) where the bottom template and BOP are located. Depending upon the specific well configuration, this area is generally about 0.25 ha (0.62 ac) per well (BOEM, 2012a). For the 52 wells proposed in this EP, an estimated total of approximately 13 ha (32.2 ac) of seafloor may be disturbed. However, the total area disturbed may be less due to the close proximity of some of the proposed wellsites.

The areal extent of these impacts from the DP drilling rig are expected to be small compared to the project area itself, and these types of soft bottom communities are ubiquitous along the northern Gulf of Mexico continental slope (Gallaway, 1988; Gallaway et al., 2003; Rowe and Kennicutt, 2009). Impacts from the physical disturbance of the seafloor during this project are expected be localized and will not likely have a significant impact on soft bottom benthic communities in the region.

Impacts of Effluent Discharges

Drilling muds and cuttings are the only effluents that are likely to affect benthic communities. During initial well interval(s) before the marine riser is set, cuttings and water-based mud will be released at the seafloor. Excess cement slurry will also be released at the seafloor during casing installation for the riserless portion of the drilling operations. Cement slurry components typically include cement mix and some of the same chemicals used in water-based drilling muds (Boehm et al., 2001). The main impacts will be burial and smothering of benthic organisms within several meters to tens of meters around the wellbore where cuttings and water-based muds physically contact the seafloor. Soft bottom sediments disturbed by cuttings, drilling muds, and cement slurry will eventually be recolonized through larval settlement and migration from adjacent areas. Because some deep-sea biota grow and reproduce slowly, recovery may require several years for the area within meters to tens of meters of the wellbore.

Discharges of washed SBM cuttings from the rig may affect benthic communities, primarily within several hundred meters of the wellsite. The fate and effects of SBM cuttings have been reviewed by Neff et al. (2000), and monitoring studies have been conducted in the Gulf of Mexico by Continental Shelf Associates (2004, 2006). In general, washed cuttings with adhering SBMs tend to clump together and form thick cuttings piles close to the drillsite. Areas of SBM cuttings deposition may develop elevated organic carbon concentrations and anoxic conditions (Continental Shelf Associates, 2006). Where SBM cuttings accumulate in concentrations of approximately 1,000 mg kg^{-1} or higher, benthic infaunal communities may be adversely affected due to both the toxicity of the base fluid and organic enrichment (with resulting anoxia) (Neff et al., 2000). Infauna numbers may increase and diversity may decrease as opportunistic species that tolerate low oxygen and high H_2S predominate (Continental Shelf Associates, 2006). As the base synthetic fluid is decomposed by microbes, the area will gradually return to pre-drilling conditions. Disturbed sediments will be recolonized through larval settlement and migration from adjacent areas.

The areal extent of impacts from drilling discharges will be small. Assuming a typical effect radius of 1,640 ft (500 m), the affected area around the wellsite would represent about 3% of the seafloor within a lease block. Soft bottom communities are ubiquitous along the northern Gulf of Mexico continental slope (Gallaway, 1988; Gallaway et al., 2003; Rowe and Kennicutt, 2009). Impacts from drilling discharges are expected to have no significant impact on soft bottom benthic communities in the region. It is expected that the rig will move to safe zones for short periods of time to perform maintenance on critical equipment. All discharges during these times are expected to meet NPDES permit requirements.

Impacts of a Large Oil Spill

The most likely effects of a subsea blowout on benthic communities would be within a few hundred meters of the wellsite. BOEM (2012a) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 984 ft (300 m) radius. While coarse sediments (sands) would probably settle at a rapid rate within 1,312 ft (400 m) from the blowout site, fine sediments (silts and clays) could be resuspended for more than 30 days and dispersed over a wider area. Based on previous studies, surface sediments at the project area are assumed to largely be silt and clay (Rowe and Kennicutt, 2009).

While impacts from a large oil spill are anticipated to be confined to the immediate vicinity of the wellhead, depending on the specific circumstances of the incident, additional benthic community impacts could extend beyond the immediate vicinity of the wellhead (BOEM, 2017a). During the *Deepwater Horizon* incident, subsurface oil plumes were reported in water depths of approximately 3,600 ft (1,100 m), extending at least 22 mi (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010). Noirungsee et al. (2020) observed that pressure has a significant influence on deep-sea sediment microbial communities with the addition of dispersant and oil with dispersants being shown to have an inhibitory effect on hydrocarbon degraders. Thus, the dispersant persistence due to hydrostatic pressure could further limit microbial oil biodegradation (Noirungsee et al., 2020).

C.2.2 High-Density Deepwater Benthic Communities

As defined by NTL 2009-G40, high-density deepwater benthic communities are features or areas that could support high-density chemosynthetic communities or features or areas that could support high-density hard bottom communities, including deepwater coral-dominated communities. Chemosynthetic communities were discovered in the central Gulf of Mexico in 1984 and have been studied extensively (MacDonald, 2002). Deepwater coral communities are also known from numerous locations in the Gulf of Mexico (Brooke and Schroeder, 2007; CSA International, 2007; Brooks et al., 2012). In the Gulf of Mexico, deepwater coral communities occur almost exclusively on exposed authigenic carbonate rock created by a biogeochemical (microbial) process.

Monitoring programs on the Gulf of Mexico continental slope have shown that benthic impacts from drilling discharges typically are concentrated within approximately 1,640 ft (500 m) of the wellsite, although detectable deposits may extend beyond this distance (Continental Shelf Associates, 2004; Neff et al., 2005; Continental Shelf Associates, 2006). In water depths such as those encountered in the project area, DP drilling vessels disturb the seafloor only around the wellbore where the bottom template and BOP are located. Depending on the specific well configuration, this area is approximately 0.25 ha (0.62 ac) per well (BOEM, 2012a).

The site clearance letters did not identify any features that could support high-density deepwater benthic communities within 2,000 ft (610 m) of the proposed wellsites (Ocean Geo

Solutions, 2020a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w). The nearest known high-density deepwater benthic community is located in Viosca Knoll Block 826, approximately 16 mi (26 km) from the project area. Due to the distance from the project area, it is unlikely that these communities will be affected by routine operations.

The only IPF identified for this project that could affect high-density deepwater benthic communities is a large oil spill from a well blowout at the seafloor. A small fuel spill would not affect benthic communities because the diesel fuel would float and dissipate on the sea surface. Physical disturbance and effluent discharge are not considered IPFs for deepwater benthic communities because these communities are not expected to be present down current in the close vicinity of the proposed wellsites.

Impacts of a Large Oil Spill

A large oil spill caused by a seafloor blowout could cause direct impacts (i.e., caused by the physical impacts of a blowout) on benthic communities within approximately 984 ft (300 m) of the wellhead (BOEM, 2012a, 2013). However, based on the site clearance letters for the proposed wellsites (Ocean Geo Solutions, 2020a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w), there are no seafloor features that could support high-density deepwater benthic communities within 2,000 ft (610 m) of the proposed wellsite. Therefore, this type of impact is not expected.

Additional benthic community impacts could extend beyond the immediate vicinity of the wellhead, depending on the specific circumstances (BOEM, 2017a). During the *Deepwater Horizon* spill, subsurface plumes were reported at a water depth of approximately 3,600 ft (1,100 m), extending at least 22 mi (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010). Oil plumes that contact sensitive benthic communities before degrading could potentially impact the resource (BOEM, 2017a). Potential impacts on sensitive resources would be an integral part of the decision and approval process for the use of dispersants, and such approval would be obtained from the Federal On-Scene Coordinator prior to the use of dispersants.

The biological effects and fate of the oil remaining in the Gulf of Mexico from the *Deepwater Horizon* incident are still being studied, but numerous papers have been published discussing the nature of subsea oil plumes (e.g., Ramseur, 2010; Reddy et al., 2012; Valentine et al., 2014). Hazen et al. (2010) reported changes in plume hydrocarbon composition with distance from the source. Incubation experiments with environmental isolates demonstrated faster than expected hydrocarbon biodegradation rates at 5°C (41°F). Based on these results, Hazen et al. (2010) suggested the potential exists for intrinsic bioremediation of the oil plume in the deepwater column without substantial oxygen drawdown.

Potential impacts of oil on high-density deepwater benthic communities are discussed in recent EISs (BOEM, 2012a, 2015, 2016b, 2017a). Oil droplets or oiled sediment particles could come into contact with chemosynthetic organisms or deepwater corals in the vicinity of the spill site. Impacts could include loss of habitat, biodiversity, and live coral coverage; destruction of hard substrate; reduction or loss of one or more commercial and recreational fishery habitats; or changes in sediment characteristics (BOEM, 2012a, 2017a).

C.2.3 Designated Topographic Features

The lease block is not within or near a designated topographic feature or a no-activity zone as identified in NTL 2009-G39. The nearest designated Topographic Feature Stipulation Block is located approximately 79 mi (127 km) from the project area. There are no IPFs associated with routine operations that could cause impacts to designated topographic features.

Due to the distance from the project area, it is unlikely that designated topographic features could be affected by an accidental spill. A small fuel spill would float and dissipate on the surface and would not reach these seafloor features. In the event of an oil spill from a well blowout, a surface slick would not contact these seafloor features. If a subsurface plume were to occur, impacts on these features would be unlikely due to the distance and the difference in water depth. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume up onto the continental shelf edge where the designated Topographic Features are located.

C.2.4 Pinnacle Trend Area Live Bottoms

The project area is not covered by the Live Bottom (Pinnacle Trend) Stipulation. As defined by NTL 2009-G39, the nearest Pinnacle Stipulation Block is located approximately 15 mi (24 km) from the project area. There are no IPFs associated with routine operations that could cause impacts to pinnacle trend area live bottoms due to the distance from the project area.

Due to the distance from the project area, it is unlikely that pinnacle trend live bottom areas would be affected by an accidental spill. A small fuel spill would float on the surface and would not reach these seafloor features. In the event of an oil spill from a well blowout, a surface slick would not contact these seafloor features. If a subsurface plume were to occur, impacts on these features would be unlikely due to the distance and the difference in water depth. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume up onto the continental shelf edge where the Pinnacle Trend Area Live Bottoms are located.

C.2.5 Eastern Gulf Live Bottoms

The project area is not covered by the Live Bottom (Low-Relief) Stipulation, which applies to seagrass communities and low-relief hard bottom reef within the Eastern Gulf of Mexico Planning Area leases in water depths of 328 ft (100 m) or less and portions of Pensacola and Destin Dome Area blocks in the Central Gulf of Mexico Planning Area. The nearest block covered by the Live Bottom Stipulation, as defined by NTL 2009-G39, is located approximately 35 mi (56 km) from the project area. There are no IPFs associated with routine operations that could cause impacts to eastern Gulf live bottom areas due to the distance from the project area.

Because of the distance from the project area, it is unlikely that Eastern Gulf live bottom areas would be affected by an accidental spill. A small fuel spill would float and dissipate on the surface and would not reach these seafloor features. In the event of an oil spill from a well blowout, a surface slick would not contact these seafloor features. If a subsurface plume were to occur, impacts on these features would be unlikely due to the distance and the difference in water depth. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume up onto the continental shelf.

C.3 Threatened, Endangered, and Protected Species and Critical Habitat

This section discusses species listed as endangered or threatened under the Endangered Species Act (ESA). In addition, it includes all marine mammal species in the region, which are protected under the Marine Mammal Protection Act (MMPA).

Endangered or Threatened species that may occur in the project area and/or along the northern Gulf Coast are listed in **Table 6**. The table also indicates the location of critical habitat (if designated in the Gulf of Mexico). Critical habitat is defined as (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. The National Marine Fisheries Service (NMFS) has jurisdiction for ESA-listed marine mammals (cetaceans), sea turtles, and fishes in the Gulf of Mexico. The USFWS has jurisdiction for ESA-listed birds, the West Indian manatee (*Trichechus manatus*), and sea turtles while on their nesting beaches.

Table 6. Federally listed Endangered and Threatened species potentially occurring in the project area and along the northern Gulf Coast.

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Marine Mammals					
Bryde's whale	*Balaenoptera edeni*	E	X	--	None
Sperm whale	*Physeter macrocephalus*	E	X	--	None
West Indian manatee	*Trichechus manatus*[1]	T	--	X	Florida (Peninsular)
Sea Turtles					
Loggerhead turtle	*Caretta caretta*	T,E[2]	X	X	Nesting beaches and nearshore reproductive habitat in Mississippi, Alabama, and Florida (Panhandle); *Sargassum* habitat including most of the central & western Gulf of Mexico.
Green turtle	*Chelonia mydas*	T	X	X	None
Leatherback turtle	*Dermochelys coriacea*	E	X	X	None
Hawksbill turtle	*Eretmochelys imbricata*	E	X	X	None
Kemp's ridley turtle	*Lepidochelys kempii*	E	X	X	None
Birds					
Piping Plover	*Charadrius melodus*	T	--	X	Coastal Texas, Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Whooping Crane	*Grus americana*	E	--	X	Coastal Texas (Aransas National Wildlife Refuge)
Fishes					
Oceanic whitetip shark	*Carcharhinus longimanus*	T	X	--	None
Giant manta ray	*Mobula birostris*	T	X	X	None
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T	--	X	Coastal Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Nassau grouper	*Epinephelus striatus*	T	--	X	None
Smalltooth sawfish	*Pristis pectinata*	E	--	X	Southwest Florida

Table 6. (Continued).

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Invertebrates					
Elkhorn coral	*Acropora palmata*	T	--	X	Florida Keys and the Dry Tortugas
Staghorn coral	*Acropora cervicornis*	T	--	X	Florida Keys and the Dry Tortugas
Pillar coral	*Dendrogyra cylindrus*	T	--	X	None
Rough cactus coral	*Mycetophyllia ferox*	T	--	X	None
Lobed star coral	*Orbicella annularis*	T	--	X	None
Mountainous star coral	*Orbicella faveolata*	T	--	X	None
Boulder star coral	*Orbicella franksi*	T	--	X	None
Terrestrial Mammals					
Beach mice (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus*	E	--	X	Alabama and Florida (Panhandle) beaches
Florida salt marsh vole	*Microtus pennsylvanicus dukecampbelli*	E	--	X	None

E = endangered; T = threatened; X = potentially present; -- = not present.

[1] There are two subspecies of West Indian manatee: the Florida manatee (*T. m. latirostris*), which ranges from the northern Gulf of Mexico to Virginia, and the Antillean manatee (*T. m. manatus*), which ranges from northern Mexico to eastern Brazil. Only the Florida manatee subspecies is likely to be found in the northern Gulf of Mexico. On 30 March 2017, the USFWS announced the West Indian manatee, including the Florida manatee subspecies, was reclassified as threatened.

[2] The loggerhead turtle is composed of nine distinct population segments (DPS). The only DPS that may occur in the project area (Northwest Atlantic DPS) is listed as threatened (76 *Federal Register* [FR] 58868; 22 September 2011).

Coastal Endangered or Threatened species that may occur along the northern Gulf Coast include the West Indian manatee, Piping Plover (*Charadrius melodus*), Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*), Whooping Crane (*Grus americana*), Gulf sturgeon (*Acipenser oxyrinchus desotoi*), smalltooth sawfish (*Pristis pectinate*), and four subspecies of beach mouse. Critical habitat has been designated for all of these species (except the Florida salt marsh vole) as indicated in **Table 6** and discussed in individual sections.

The sperm whale (*Physeter macrocephalus*), five species of sea turtles, and the oceanic whitetip shark (*Carcharhinus longimanus*) are the only Endangered or Threatened species likely to occur in or near the project area. The listed sea turtles include the leatherback turtle (*Dermochelys coriacea*), Kemp's ridley turtle (*Lepidochelys kempii*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*), and green turtle (*Chelonia mydas*) (Pritchard, 1997). Effective 11 August 2014, NMFS has designated certain marine areas as critical habitat for the Northwest Atlantic Distinct Population Segment (DPS) of the loggerhead sea turtle (see **Section C.3.5**). No critical habitat has been designated in the Gulf of Mexico for the leatherback turtle, Kemp's ridley turtle, hawksbill turtle, green turtle, or the sperm whale. Five endangered mysticetes (blue whale [*Balaenoptera musculus*], fin whale [*Balaenoptera physalus*], humpback whale[*Megaptera novaeangliae*] , North Atlantic right whale [*Eubalaena glacialis*], and sei whale [*Balaenoptera borealis*]) have been reported in the Gulf of Mexico, but are considered rare or extralimital (Würsig et al., 2000). These species are not included in the most recent NMFS stock assessment report (Hayes et al., 2020) nor in the most recent BOEM multisale EIS (BOEM, 2017a); therefore, they are not considered further in the EIA.

The Bryde's whale (*Balaenoptera edeni*) exists in the Gulf of Mexico as a small, resident population. It is the only baleen whale known to be resident to the Gulf and is federally listed as Endangered. The genetically distinct Northern Gulf of Mexico stock is severely restricted in range, being found only in the northeastern Gulf in the waters of the DeSoto Canyon (Waring et al., 2016) and are therefore not likely to occur within the project area. The Threatened giant manta ray (*Mobula birostris*) is known from the Gulf of Mexico and could occur in the project area but is most commonly observed in the Gulf of Mexico at the Flower Garden Banks. The Nassau grouper (*Epinephelus striatus*) has been observed in the Gulf of Mexico at the Flower Garden Banks but is most commonly observed in shallow tropical reefs of the Caribbean and is not expected to occur in the project area.

Seven Threatened coral species are known from the northern Gulf of Mexico: elkhorn coral (*Acropora palmata*), staghorn coral (*Acropora cervicronis*), lobed star coral (*Orbicella annularis*), mountainous star coral (*Orbicella faveolata*), boulder star coral (*Orbicella franksi*), pillar coral (*Dendrogyra cylindrus*), and rough cactus coral (*Mycetophyllia ferox*). None of these species are expected to be present in the project area (**Section C.3.15**).

There are no other Threatened or Endangered species in the Gulf of Mexico that are reasonably likely to be adversely affected by either routine or accidental events. The IPFs with potential impacts listed in **Table 2** are discussed below.

C.3.1 Sperm Whale (Endangered)

The only Endangered marine mammal likely to be present at or near the project area is the sperm whale. Resident populations of sperm whales occur within the Gulf of Mexico; a species description is presented in the recovery plan for this species (NMFS, 2010b). Gulf of Mexico sperm whales are classified as an endangered species and a "strategic stock" (defined as a stock that may have unsustainable human-caused impacts) by NOAA Fisheries (Waring et al., 2016). A "strategic stock" is defined by the MMPA as a marine mammal stock that meets the following criteria:

- The level of direct human-caused mortality exceeds the potential biological removal level;
- Based on the best available scientific information, is in decline and is likely to be listed as a threatened species under the ESA within the foreseeable future; or
- Is listed as a Threatened or Endangered species under the ESA or is designated as depleted under the MMPA.

Current threats to sperm whale populations are defined as "any factor that could represent an impediment to recovery." Current threats to sperm whale populations worldwide include fisheries interactions, anthropogenic marine sound, vessel interactions, contaminants and pollutants, disease, injury from marine debris, research, predation and natural mortality, direct harvest, competition for resources, loss of prey base due to climate change and ecosystem change, and cable laying. In the Gulf of Mexico, the impacts from many of these threats are identified as either low or unknown (BOEM, 2012a).

In 2013, NMFS conducted a status review to consider designating the Gulf of Mexico population of the sperm whale as a DPS under the ESA but concluded that the designation of a Gulf of Mexico DPS for sperm whales was not warranted (78 *FR* 68032).

The distribution of sperm whales in the Gulf of Mexico is correlated with mesoscale physical features such as eddies associated with the Loop Current (Jochens et al., 2008). Sperm whale populations in the north-central Gulf of Mexico are present throughout the year (Davis et al., 2000). Results of a multi-year tracking study show female sperm whales are typically concentrated along the upper continental slope between the 656 and 3,280 ft (200 and 1,000 m) depth contours (Jochens et al., 2008). Male sperm whales were more variable in their movements and were documented in water depths greater than 9,843 ft (3,000 m). Generally, groups of sperm whales sighted in the Gulf of Mexico during the MMS-funded Sperm Whale Seismic Study of mixed-sex groups comprising adult females with juveniles, and groups of bachelor males. Typical group size for mixed groups was 10 individuals (Jochens et al., 2008).

A review of sighting reports from seismic mitigation surveys in the Gulf of Mexico conducted over a 6-year period found a mean group size for sperm whales of 2.5 individuals (Barkaszi et al., 2012). In these mitigation surveys, sperm whales were the most common large cetacean encountered. The Sperm Whale Seismic Study results also showed that sperm whales transit through the vicinity of the project area. Movements of satellite-tracked individuals suggest that this area of the continental slope is within the home range of the Gulf of Mexico population (within the 95% utilization distribution) (Jochens et al., 2008).

IPFs that may potentially affect sperm whales include drilling rig presence, marine sound, and lights; support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges are likely to have negligible impacts on sperm whales due to rapid dilution, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of these marine mammals. Though NMFS (2020a) stated marine debris as an IPF, compliance with BSEE NTL 2015-G03 and NMFS (2020a) Appendix B will minimize the potential for marine debris-related impacts on sperm whales. NMFS (2020a) estimates that no more than three sperm whales will be non-lethally taken, with one sperm whale lethally taken through the ingestion of marine debris over 50 years of proposed action. Therefore, marine debris is likely to have negligible impacts on sperm whales and is not discussed further.

Impacts of Drilling Rig Presence, Marine Sound, and Lights

Noise from routine drilling activities (see **Section A.1**) has the potential to disturb individuals or groups of sperm whales or mask the sounds they would normally produce or hear. Behavioral responses to noise by marine mammals vary widely and overall, are short-term and include, temporary displacement or cessation of feeding, resting, or social interactions (NMFS, 2009a; Gomez et al., 2016). Additionally, behavioral changes resulting from auditory masking sounds may induce an animal to produce more calls, longer calls, or shift the frequency of the calls. For example, masking caused by vessel noise was found to result in a reduced number of whale calls in the Gulf of Mexico (Azzara et al., 2013).

NMFS (2016) lists sperm whales in the same functional hearing group (i.e., mid-frequency cetaceans) as most dolphins and other toothed whales, with an estimated hearing sensitivity from 150 Hz to 160 kHz. Therefore, vessel related noise is likely to be heard by sperm whales. Frequencies <150 Hz produced by the drilling operations are not likely to be perceived with any significance by mid-frequency cetaceans. The sperm whale may possess better hearing at lower frequencies than some of the other odontocetes, although not as low as many baleen whale species that primarily produce sounds between 30 Hz and 5 kHz (Wartzok and Ketten, 1999). Generally, most of the acoustic energy produced by sperm whales is present at frequencies below 10 kHz, although diffuse energy up to and past 20 kHz is common, with SLs up to 236 dB re1 µPa m (Møhl et al., 2003).

It is expected that, due to the relatively stationary nature of the proposed drilling operations, sperm whales would avoid the proposed operations area, and noise levels that could cause auditory injury would not be encountered. Noise associated with proposed vessel operations may cause behavioral (disturbance) effects to sperm whales. Observations of behavioral responses of marine mammals to anthropogenic sounds, in general, have been limited to short term behavioral responses, which included the cessation of feeding, resting, or social interactions (NMFS, 2009a). Animals can determine the direction from which a sound arrives based on cues, such as differences in arrival times, sound levels, and phases at the two ears. Thus, an animal's directional hearing capabilities have a bearing on its ability to avoid noise sources (National Research Council, 2003b).

The acoustic criteria (NMFS, 2018a) are based on received sound level accumulations that equate to the onset of marine mammal auditory threshold shifts. For mid-frequency cetaceans exposed to a non-impulsive source, permanent threshold shifts (PTS) are estimated to occur when the mammal has received a cumulative sound exposure level (SEL_{cum}) of 198 dB re 1 μPa^2 s over a 24-hour period. Similarly, temporary threshold shifts (TTS) are estimated to occur when the mammal has received a SEL_{cum} of 178 dB re 1 μPa^2 s over a 24-hour period. Due to the transient nature of sperm whales and the stationary nature of installation activities, it is not expected that any sperm whales will remain within the ensonified area for a full 24-hour period to receive a SEL_{cum} necessary for the onset of PTS or TTS.

There are other OCS facilities and activities near the project area, and the region as a whole has a large number of similar marine sound sources. Drilling-related marine sound associated with this project will contribute to increases in the ambient marine sound environment of the Gulf of Mexico, but it is not expected in amplitudes sufficient to result in auditory injuries to sperm whales. The proposed activity may cause disturbance effects, primarily avoidance or temporary displacement from the project area. Drilling rig lighting and presence are not identified as IPFs for sperm whales (NMFS, 2007; BOEM, 2016a, 2017a).

Impacts of Support Vessel and Helicopter Traffic

NMFS has found that support vessel traffic has the potential to disturb sperm whales, and there is also a risk of vessel strikes, which are identified as a threat in the recovery plan for this species (NMFS, 2010b). To reduce the potential for vessel strikes, BOEM issued BOEM-2016-G01. This NTL recommends that vessel operators and crews receive protected species identification training. Vessel operators are required to maintain a vigilant watch for and report sightings of any injured or dead protected species. In addition, when whales are sighted, vessel operators and crews are required to maintain a distance of 328 ft (100 m) or greater from the sighted animal whenever possible (NMFS, 2020a). Vessel operators are required to reduce vessel speed to 10 knots or less, if safety permits, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel. Compliance with these mitigation measures is expected to minimize the likelihood of vessel strikes as well as reduce the chance for disturbing sperm whales.

NMFS (2020a) analyzed the potential for vessel strikes and harassment of sperm whales. With implementation of the mitigation measures in NTL BOEM-2016-G01, NMFS concluded that the observed avoidance of passing vessels by sperm whales is an advantageous response to avoid a potential threat and is not expected to result in any significant effect on migration, breathing, nursing, breeding, feeding, or sheltering to individuals, or have any consequences at the population level. With implementation of the vessel strike avoidance measures requirement to maintain a distance of 328 ft (100 m) from sperm whales, the NMFS (2020a) concluded that the potential for harassment of sperm whales would be reduced to insignificant levels.

Helicopter traffic also has the potential to disturb sperm whales. Smultea et al. (2008) documented responses of sperm whales offshore Hawaii to fixed wing aircraft flying at an altitude of 800 ft (245 m). A reaction to the initial pass of the aircraft was observed during 3 (12%) of 24 sightings. All three responses consisted of a hasty dive and occurred at less than 1,180 ft (360 m) lateral distance from the aircraft. Additional reactions were seen when aircraft circled certain whales to make further observations. Based on other studies of cetacean responses to sound, the authors concluded that the observed reactions to brief overflights by the aircraft were short-term and limited to behavioral disturbances.

While flying offshore in the Gulf of Mexico, support helicopters maintain altitudes above 700 ft (213 m) during transit to and from the working area. In the event that a whale is observed during transit, the helicopter will not approach or circle the animals. Although responses are possible (Smultea et al., 2008), NMFS (2020a) concluded that this altitude would minimize the potential for disturbing sperm whales. Therefore, no significant impacts are expected.

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals, including sperm whales, are discussed by NMFS (2007) and BOEM (2017a). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011) with discussions germane to the Gulf of Mexico populations concerning composition and fate of petroleum and spill-treating agents in the marine environment, aspects of cetacean ecology, and physiological and toxic effects of oil on cetaceans. For this EP, there are no unique site-specific issues with respect to spill impacts on these animals that were not analyzed in the previous documents.

The probability of a fuel spill will be minimized by Anadarko's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Anadarko's OSRP will mitigate and lessen the potential for impacts on sperm whales. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be brief.

A small fuel spill in offshore waters would produce a thin sheen on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours (NOAA, 2016a). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and marine sound of response vessels and aircraft (MMC, 2011). However, due to the limited areal extent and short duration of water quality impacts from a small fuel spill as well as the mobility of sperm whales, no significant impacts would be expected.

The probability of a fuel spill will be minimized by Anadarko's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Anadarko's OSRP will mitigate and lessen the potential for impacts on sperm whales. Given the open ocean location of the project area, the duration of a small spill and therefore potential for impacts to occur would be very brief.

Impacts of a Large Oil Spill

Potential spill impacts on marine mammals, including sperm whales, are discussed by NMFS (2020a) and BOEM (2017a). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011). For this EP, there are no unique site-specific issues with respect to spill impacts on sperm whales.

Impacts of oil spills on sperm whales can include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, marine sound, dispersants) (MMC, 2011). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil (and dispersants) directly or via contaminated prey; and stress from the activities and marine sound of response vessels and aircraft. The level of impact of oil exposure depends on the amount, frequency, and duration of exposure; route of exposure; and type or condition of petroleum compounds or chemical dispersants (Hayes et al., 2019). Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals, including displacement from prime habitat, disruption of social structure, changing prey availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event of oil from a large spill contacting sperm whales, it is expected that impacts resulting in the injury or death of individual sperm whales would be adverse. Based on the current potential biological removal (PBR) level for the Gulf of Mexico stock of sperm whales (1.1), mortality of a single sperm whale would constitute a significant impact to the local (Gulf of Mexico) stock of sperm whales but would not likely be significant at the species level. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 to reduce the potential for striking or disturbing these animals.

C.3.2 Bryde's Whale (Endangered)

The Bryde's whale is the only year-round resident baleen whale in the northern Gulf of Mexico. The Bryde's whale is most frequently sighted in the waters over the DeSoto Canyon between the 328 ft (100 m) and 3,280 ft (400 m) isobaths (Rosel et al., 2016; Hayes et al., 2019). Based on the available data, it is possible that Bryde's whales could occur in the project area.

In 2014, a petition was submitted to designate the northern Gulf of Mexico population as a DPS and list it as endangered under the ESA (Natural Resources Defense Council, 2014). This petition received a 90-day positive finding by NMFS in 2015 and a proposed rule to list was published in

2016 (Hayes et al., 2019). On 15 April 2019, NMFS issued a final rule to list the Gulf of Mexico DPS of Bryde's whale as Endangered under the ESA. The listing was effective on 15 May 2019.

IPFs that could affect the Bryde's whales include drilling rig presence, marine sound, and lights; support vessel and helicopter traffic; and both types of spill accidents: a small fuel spill and a large oil spill. It is unlikely that the Bryde's whales could occur in the project area. Effluent discharges are likely to have negligible impacts on Bryde's whales due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility and low abundance of Bryde's whales in the Gulf of Mexico. Though NMFS (2020a) stated marine debris as an IPF, compliance with BSEE NTL 2015-G03 and NMFS (2020a) Appendix B will minimize the potential for marine debris-related impacts on Bryde's whales. NMFS (2020a) estimated one sublethal take and no lethal takes of Bryde's whales from marine debris over 50 years of proposed action. Therefore, marine debris is likely to have negligible impacts on Bryde's whales and is not discussed further.

Impacts of Drilling Rig Presence, Marine Sound, and Lights

Noise produced by the drilling rig and construction vessel may be emitted at levels that could potentially disturb individual whales or mask the sounds animals would normally produce or hear. Noise associated with drilling and installation activities is relatively weak in intensity, and an individual animal's noise exposure would be transient. As discussed in **Section A.1**, an actively drilling rig may produce broadband (10 Hz to 10 kHz) SLs from approximately 180 to 190 dB re 1 µPa m (Hildebrand, 2005). Noise produced by the drilling rig and construction vessel may be emitted at levels that could potentially disturb individual whales or mask the sounds animals would normally produce or hear. SLs associated with drilling and installation activities is relatively weak in intensity, and an individual animal's noise exposure would be transient. As discussed in **Section A.1**, an actively drilling rig may produce broadband (10 Hz to 10 kHz) noise with a maximum SL of approximately 180 to 190 dB re 1 µPa m (Hildebrand, 2005).

NMFS (2018a) lists Bryde's whales in the functional hearing group of low-frequency cetaceans (baleen whales), with an estimated hearing sensitivity from 7 Hz to 35 kHz. Therefore, vessel related noise is likely to be heard by Bryde's whales. Frequencies <1,000 Hz produced by the drilling operations are more likely to be perceived by low-frequency cetaceans.

It is expected that, due to the relatively stationary nature of the drilling operations, Bryde's whales would move away from the proposed operations area, and noise levels that could cause auditory injury would be avoided. Noise associated with proposed vessel operations may cause behavioral (disturbance) effects to individual Bryde's whales. NMFS (2018a) presents criteria that are used in the interim to determine behavioral disturbance thresholds for marine mammals and are applied equally across all hearing groups. Received root-mean-square sound pressure levels (SPL_{rms}) of 120 dB re 1 µPa from a non-impulsive source are considered high enough to elicit a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. However, exposure to a SPL_{rms} of 120 dB re 1 µPa alone does not equate to a behavioral response or a biological consequence; rather it represents the level at which onset of a behavioral response may occur.

For low-frequency cetaceans, specifically the Bryde's whale, PTS and TTS onset from non-impulsive sources is estimated to occur at SEL_{cum} of 199 dB re 1 µPa^2 s and 179 re 1 µPa^2 s, repectively. Due to transient nature of Bryde's whales and the stationary nature of installation activities, it is not expected that any sperm whales will remain within the ensonified area for a full 24-hour period to receive a SEL_{cum} necessary for the onset of auditory threshold shifts

The drilling rig will be located within a deepwater, open ocean environment. Sounds generated by drilling operations will be generally non-impulsive, with some variability in sound level and frequency. This analysis assumes that the continuous nature of sounds produced by the drilling rig will provide individual whales with cues relative to the direction and relative distance (sound intensity) of the sound source, and the fixed position of the drilling rig will allow for active avoidance of potential physical impacts. Drilling-related noise associated with this project may contribute to increases in the ambient noise environment of the Gulf of Mexico, but it is not expected to be in amplitudes sufficient enough to cause hearing effects to Bryde's whales and due to the low density of Bryde's whales in the Gulf of Mexico, no significant impacts are expected.

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb Bryde's whales and creates of the potential for vessel strikes. To reduce the potential for vessel strikes, BOEM has issued NTL BOEM-2016-G01, which recommends protected species identification training and that vessel operators and crews maintain a vigilant watch for marine mammals and slow down or stop their vessel to avoid striking protected species and requires operators to report sightings of any injured or dead protected species. When baleen whales are sighted, vessel operators and crews are required to attempt to maintain a distance of 1,640 ft (500 m) or greater whenever possible (NMFS, 2020a). Vessel operators are required to reduce vessel speed to 10 knots or less, when safety permits, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel. Compliance with this NTL will minimize the likelihood of vessel strikes as well as reduce the chance for disturbing Bryde's whales.

Helicopter traffic also has the potential to disturb Bryde's whales. Based on studies of cetacean responses to sound, the observed responses to brief overflights by aircraft were short-term and limited to behavioral disturbances (Smultea et al., 2008). Helicopters maintain altitudes above 700 ft (213 m) during transit to and from the offshore working area. In the event that a whale is observed during transit, the helicopter will not approach or circle the animal(s). In addition, guidelines and regulations issued by NMFS under the authority of the MMPA specify that helicopters maintain an altitude of 1,000 ft (305 m) within 328 ft (100 m) of marine mammals (NMFS, 2020a).

The current PBR level for the Gulf of Mexico stock of Bryde's whale is 0.03 (Hayes et al., 2019). Mortality of a single Bryde's whale would constitute a significant impact to the local (Gulf of Mexico) stock of Bryde's whales. However, it is very unlikely that Bryde's whale occur within the project area, including the transit corridor for support vessels; consequently, the probability of a vessel collision with this species is extremely low. Compliance with these mitigation measures will minimize the likelihood of vessel strikes as well as reduce the chance for disturbing Bryde's whales. Due to the brief potential for disturbance the low density of Bryde's whales thought to reside in the Gulf of Mexico, no significant impacts are expected.

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals are discussed by NMFS (2020a) and BOEM (2012a, 2015, 2016b, 2017a). Oil impacts on marine mammals are discussed by Geraci and St. Aubin

(1990) and by the MMC (2011). In the unlikely event of a spill, implementation of Anadarko's OSRP will mitigate and reduce the potential for impacts on Bryde's whales. Given the open ocean location of the project area and the duration of a small spill, any impacts are expected to be brief.

A small fuel spill in offshore waters would produce a thin slick on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the spill as well as the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that more than 90% would evaporate or disperse naturally within 24 hours (NOAA, 2016a). The area of diesel fuel on the sea surface would range from 1.2 to 12 ac (0.5 to 5 ha), depending on sea state and weather conditions.

Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and noise of response vessels and aircraft (MMC, 2011). However, due to the limited areal extent and short duration of water quality impacts from a small fuel spill, as well as the mobility of Bryde's whales and the unlikelihood of occurrence in the project area, no significant impacts are expected.

Impacts of a Large Oil Spill

Potential spill impacts on marine mammals are discussed by BOEM (2012a, 2015, 2016b, 2017a), and NMFS (2007). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011).

Potential impacts of a large oil spill on Bryde's whales could include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, noise, dispersants) (MMC, 2011). Direct physical and physiological effects could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil (and dispersants) directly or via contaminated prey; and stress from the activities and noise of response vessels and aircraft. The level of impact of oil exposure depends on the amount, frequency, and duration of exposure; route of exposure; and type or condition of petroleum compounds or chemical dispersants (Hayes et al., 2019). Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals from prime habitat, disruption of social structure, changing prey availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event of a large spill, the level of vessel and aircraft activity associated with spill response could disturb Bryde's whales and potentially result in vessel strikes, entanglement, or other injury or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 (see **Table 1**) to reduce the potential for striking or disturbing these animals.

In the event of oil from a large spill contacting Bryde's whales, it is expected that impacts resulting in the injury or death of individual Bryde's whales would be significant based on the current PBR level for the Gulf of Mexico subspecies and stock (0.03). Mortality of a single Bryde's whale would constitute a significant impact to the local (Gulf of Mexico) stock of Bryde's whales. The core distribution area for Bryde's whales is within the eastern Gulf of Mexico OCS Planning Area; therefore, it is very unlikely that Bryde's whale occur within the project area and surrounding waters. Consequently, the probability of spilled oil from a project-related well blowout reaching Bryde's whales is extremely low.

C.3.3 West Indian Manatee (Threatened)

Most of the Gulf of Mexico manatee population is located in peninsular Florida, but manatees have been seen as far west as Texas during the summer (U.S. Fish and Wildlife Service, 2001a). A species description is presented in the West Indian manatee recovery plan (U.S. Fish and Wildlife Service, 2001a). Critical habitat has been designated in southwest Florida.

Manatee sightings in Louisiana have increased as the species extends its presence farther west of Florida in the warmer months (Wilson, 2003). Manatees are typically found in coastal and riverine habitats, but have rarely been seen in deepwater areas, usually in colder months when they seek refuge from colder coastal waters (U.S. Fish and Wildlife Service, 2001a; Fertl et al., 2005; Pabody et al., 2009). There have been three verified reports of Florida manatee sightings on the OCS during seismic mitigation surveys in mean water depths of over 1,969 ft (600 m) (Barkaszi and Kelly, 2019).

IPFs that potentially may affect manatees include support vessel and helicopter traffic and a large oil spill. A small fuel spill in the project area would be unlikely to affect manatees, as the project area is approximately 51.6 mi (81.6 km) from the nearest shoreline (Louisiana). As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating. Compliance with BSEE-NTL 2015-G03 is intended to minimize the potential for marine debris-related impacts on manatees.

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb manatees, and there is also a risk of vessel strikes, which are identified as a threat in the recovery plan for this species (U.S. Fish and Wildlife Service, 2001a). Manatees are expected to be limited to shelf and coastal waters, and impacts are expected to be limited to transits of these vessels and helicopters through these waters. To reduce the potential for vessel strikes, BOEM issued NTL 2016-G01, which recommends protected species identification training for vessel operators and that vessels slow down or stop their vessel to avoid striking protected species. The NTL also requires that operators and crews maintain a vigilant watch for marine mammals and report sightings of any injured or dead protected species. Vessel strike avoidance measures described in NMFS (2020a) for the marine mammal species managed by that agency may also provide some additional indirect protections to manatees. The current PBR level for the Florida subspecies of manatee is 14 (USFWS, 2014). In the event of a vessel strike during support vessel transits, the mortality of a single manatee would constitute an adverse but insignificant impact to the subspecies.

Helicopter traffic also has the potential to disturb manatees. Rathbun (1988) reported that manatees were disturbed more by helicopters than by fixed-wing aircraft; however, the helicopter was flown at relatively low altitudes of 66 to 525 ft (20 to 160 m). Helicopters used in support operations maintain a minimum altitude of 700 ft (213 m) while in transit offshore, 1,000 ft (305 m) over unpopulated areas or across coastlines, and 2,000 ft (610 m) overpopulated areas and sensitive habitats such as wildlife refuges and park properties. In addition, guidelines and regulations specify that helicopters maintain an altitude of 1,000 ft (305 m) within 328 ft (100 m) of marine mammals (BOEM, 2017a; NMFS, 2020a). This mitigation measure will minimize the potential for disturbing manatees. No significant impacts are expected.

Impacts of a Large Oil Spill

The potential for significant impacts to manatees from a large oil spill would be most likely associated with coastal oiling in areas of manatee habitats. Based on the 30-day OSRA modeling (**Table 3**), indicates nearshore waters and embayments in Plaquemines Parish, Louisiana is the coastal area most likely to be affected (4% probability within 3 days, 14% probability within 10 days, and 21% probability within 30 days). Other shorelines from Cameron Parish, Louisiana to Bay County, Florida could be affected within 30 days ranging from 1% to 3% probability contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Matagorda County, Texas to Levy County, Florida (up to 24% conditional probability within 60 days). This range does not include any areas of manatee critical habitat.

In the event that manatees were exposed to oil, effects could include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, marine sound, dispersants) (MMC, 2011). Direct physical and physiological effects can include asphyxiation, acute poisoning, lowering of tolerance to other stress, nutritional stress, and inflammation from infection (BOEM, 2017a). Indirect impacts include stress from the activities and noise of response vessels and aircraft. Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals from prime habitat, disruption of social structure, changing prey availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event that a large spill reached coastal waters where manatees were present, the level of vessel and aircraft activity associated with spill response could disturb manatees and potentially result in vessel strikes, entanglement, or other injury or stress. Response vessels would be expected to operate in accordance with NTL BOEM-2016-G01 (see **Table 1**) to reduce the potential for striking or disturbing these animals, and therefore no significant impacts are expected.

In the event of oil from a large spill enters areas inhabited by manatees, it is expected that impacts resulting in the injury or death of individual manatees could be significant at the population level. The current PBR level for the Florida subspecies of Antillean manatee is 14 (USFWS, 2014). It is not anticipated that groups of manatees would occur in coastal waters of the north central GOM and therefore large groups are unlikely to be affected by a large spill. Mortality of individual manatees from a large oil spill would constitute an adverse but insignificant impact to the subspecies.

C.3.4 Non-Endangered Marine Mammals (Protected)

Excluding the three Endangered or Threatened species that have been cited previously, there are 20 additional species of marine mammals that may be found in the Gulf of Mexico, including dwarf and pygmy sperm whales (*Kogia sima* and *K. breviceps*, respectively), four species of beaked whales, and 14 species of delphinid whales (dolphins). All marine mammals are protected species under the MMPA. The most common non-endangered cetaceans in the deepwater environment are small odontocetes such as the pantropical spotted dolphin (*Stenella attenuata*), spinner dolphin (*Stenella longirostris*), and Clymene dolphin (*Stenella clymene*). A brief summary is presented below, and additional information on these groups is presented by BOEM (2017a).

<u>Dwarf and pygmy sperm whales</u>. At sea, it is difficult to differentiate dwarf sperm whales from pygmy sperm whales, and sightings are often grouped together as *Kogia* spp. Both species have a worldwide distribution in temperate to tropical waters. In the Gulf of Mexico, both species occur primarily along the continental shelf edge and in deeper waters off the continental shelf (Mullin et al., 1991; Mullin, 2007; Waring et al., 2016). Either species could occur in the project area.

<u>Beaked whales</u>. Four species of beaked whales are known to occur in the Gulf of Mexico: Blainville's beaked whale (*Mesoplodon densirostris*), Sowerby's beaked whale (*Mesoplodon bidens*), Gervais' beaked whale (*Mesoplodon europaeus*), and Cuvier's beaked whale (*Ziphius cavirostris*). Stranding records (Würsig et al., 2000) as well as passive acoustic monitoring in the Gulf of Mexico (Hildebrand et al., 2015) suggest that Gervais' beaked whale and Cuvier's beaked whale are the most common species in the region. The Sowerby's beaked whale is considered extralimital, with only one document stranding in the Gulf of Mexico (Bonde and O'Shea, 1989). Blainville's beaked whales are rare, with only four documented strandings in the northern Gulf of Mexico (Würsig et al., 2000).

Due to the difficulties of at sea identification, beaked whales in the Gulf of Mexico are identified either as Cuvier's beaked whales or are grouped into an undifferentiated species complex (*Mesoplodon* spp.). In the northern Gulf of Mexico, they are broadly distributed in water depths greater than 3,281 ft (1,000 m) over lower slope and abyssal landscapes (Davis et al., 2000; Hldebrand et al., 2015). Any of these species could occur in the project area (Waring et al., 2016).

<u>Delphinids</u>. Fourteen species of delphinids are known from the Gulf of Mexico, including Atlantic spotted dolphin (*Stenella frontalis*), bottlenose dolphin (*Tursiops truncatus*), Clymene dolphin, false killer whale (*Pseudorca crassidens*), Fraser's dolphin (*Lagenodelphis hosei*), killer whale (*Orcinus orca*), melon-headed whale (*Peponocephala electra*), pantropical spotted dolphin, pygmy killer whale (*Feresa attenuata*), short-finned pilot whale (*Globicephala macrorhynchus*), Risso's dolphin (*Grampus griseus*), rough-toothed dolphin (*Steno bredanensis*), spinner dolphin, and striped dolphin (*Stenella coeruleoalba*). Any of these species could occur in the project area (Waring et al., 2016).

The bottlenose dolphin is a common inhabitant of the northern Gulf of Mexico, particularly within continental shelf waters. There are two ecotypes of bottlenose dolphins, a coastal form and an offshore form, which are genetically isolated from each other (Waring et al., 2016). The offshore form of the bottlenose dolphin may occur within the project area. Inshore populations of coastal bottlenose dolphins in the northern Gulf of Mexico are separated into 31 geographically distinct population units, or stocks, for management purposes by NMFS (Hayes et al., 2020).

IPFs that potentially may affect non-endangered marine mammals include drilling rig presence, marine sound, and lights; support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges are likely to have negligible impacts on marine mammals due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of marine mammals. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on marine mammals.

Impacts of Drilling Rig Presence, Marine Sound, and Lights

The presence of the drilling rig presents an attraction to pelagic food sources that may attract cetaceans. Some odontocetes have shown increased feeding activity around lighted platforms at night (Todd et al., 2009). Therefore, prey congregation could pose an attraction to protected species that exposes them to higher levels or longer durations of noise that might otherwise be avoided. Despite the attraction of rigs as food sources for non-endangered marine mammals, drilling and support vessel presence and lighting are not considered as IPFs for marine mammals (BOEM, 2017a).

Noise from routine drilling and well completion operations has the potential to disturb marine mammals. As discussed in **Section A.1,** noise impacts would be expected at greater distances when DP thrusters are in use than with vessel and drilling noise alone and are dependent on variables relating to sea state conditions, thruster type and usage. Three functional hearing groups are represented in the 20 non-endangered cetaceans found in the Gulf of Mexico. Eighteen of the 20 odontocete species are considered to be in the mid-frequency functional hearing group and two species (*Kogia* spp.) are in the high-frequency functional hearing group, (NMFS, 2018a). Thruster and drilling noise will affect each group differently depending on the frequency bandwidths produced by operations. Generally, noise produced by drilling rigs on DP is dominated by frequencies below 10 kHz. Thus, drilling rig DP sound sources are out of range for the high-frequency group.

For mid-frequency cetaceans exposed to a non-impulsive source (like drilling operations), PTS is estimated to occur when a marine mammal has received a SEL_{cum} of 198 dB re 1 µPa^2 s over a 24-hour period (NMFS, 2018b). Similarly, temporary threshold shifts are estimated to occur when a mammal has received a SEL_{cum} of 178 dB re 1 µPa^2·s over a 24-hour period. Based on transmission loss calculations (see Urick, 1983), open water propagation of noise produced by typical sources with DP thrusters in use during drilling, are not expected to produce SPLs greater than 160 dB re 1 µPa beyond 105 ft (32 m) from the source. Due to the short propagation distance of high SPLs, the transient nature of marine mammals and the stationary nature of drilling activities, it is not expected that any marine mammals will receive exposure levels necessary for the onset of auditory threshold shifts. NMFS (2019) presents criteria that are used in the interim to determine behavioral disturbance thresholds for marine mammals and are applied equally across all functional hearing groups. Received SPL of 120 dB re 1 µPa from non-impulsive sources are considered high enough to elicit a behavioral reaction in some marine mammal species. The SPL 120 dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. There are other OCS facilities and activities near the project area, and the region as a whole has a large number of similar sources. Marine mammal species in the northern Gulf of Mexico have been exposed to noise from anthropogenic sources for a long period of time and over large geographic areas and likely do not represent a naïve population with regard to sound (National Research Council, 2003b). Due to the limited scope, timing, and geographic extent of installation activities, this project would represent a small, temporary contribution to the overall noise regime, and any short-term behavioral impacts are not expected to be biologically significant to marine mammal populations. Support vessel lighting and presence are not identified as IPFs for marine mammals by BOEM (2017a). Drilling rig lighting and rig presence are not identified as IPFs for marine mammals by BOEM (2017a).

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb marine mammals, and there is also a risk of vessel strikes. Data concerning the frequency of vessel strikes are presented by BOEM (2012a). To reduce the potential for vessel strikes, BOEM issued NTL 2016-G01, which recommends protected species identification training for vessels operators and that vessels slow down or stop to avoid striking protected species. The NTL also requires that operators and crews maintain a vigilant watch for marine mammals and report sightings of any injured or dead protected species. Vessel operators and crews are required to attempt to maintain a distance of 328 ft (100 m) for toothed whales and 1,640 ft (500 m) for baleen whales or greater when sighted and 164 ft (50 m) when small cetaceans are sighted (NMFS, 2020a). When cetaceans are sighted while a vessel is underway, vessels must attempt to remain parallel to the animal's course and avoid excessive speed or abrupt changes in direction until the cetacean has left the area. Vessel operators are required to reduce vessel speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. Although vessel strike avoidance measures described in NMFS (2020a) are only applicable to ESA-listed species, complying with them may provide additional indirect protections to non-listed species as well. Use of these measures will minimize the likelihood of vessel strikes as well as reduce the chance for disturbing marine mammals, and therefore no significant impacts are expected.

Helicopter traffic also has the potential to disturb marine mammals (Würsig et al., 1998). However, while flying offshore, helicopters maintain altitudes above 700 ft (213 m) during transit to and from the working area. In addition, guidelines and regulations specify that helicopters maintain an altitude of 1,000 ft (305 m) within 328 ft (100 m) of marine mammals NMFS, 2020a). Maintaining this altitude will minimize the potential for disturbing marine mammals, and no significant impacts are expected (BOEM, 2017a).

The current PBR level for several non-endangered cetacean species in the Gulf of Mexico are less than 3 individuals (e.g., rough-toothed dolphin = 2.5, Clymene dolphin = 0.6, killer whale = 0.1, pygmy killer whale = 0.8, dwarf and pygmy sperm whales = 0.9) (Hayes et al. 2020). Mortality of individuals equal to or in excess of their PBR level would constitute a significant impact to the local (Gulf of Mexico) stocks of these species.

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals are discussed by BOEM (2012a, 2015, 2016b). Oil impacts on marine mammals in general are discussed by Geraci and St. Aubin (1990). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

The probability of a fuel spill is expected to be minimized by Anadarko's preventative measures during fuel transfer. In the unlikely event of a spill, implementation of Anadarko's OSRP is expected to lessen the potential for impacts on marine mammals. EP Section H provides detail on spill response measures, and those measures are summarized in the EIA. Given the open ocean location of the project area, the limited duration of a small spill, and response efforts, it is expected that any impacts would be brief and minimal.

A small fuel spill in offshore waters would produce a thin slick on the water surface and introduce the concentrations of petroleum hydrocarbons and their degradation products. Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and noise of response vessels and aircraft (MMC, 2011). The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. A small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating (**Section A.9.1**). Therefore, due to the limited areal extent and short duration of water quality impacts from a small fuel spill as well as the mobility of marine mammals, no significant impacts would be expected.

Impacts of a Large Oil Spill

Potential spill impacts on marine mammals are discussed by BOEM (2017a). For this EP, there are no unique site-specific issues. Impacts of oil spills on marine mammals can include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, marine sound, dispersants) (MMC, 2011). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil (and dispersants) directly or via contaminated prey. Complications of the above may lead to dysfunction of immune and reproductive systems (De Guise et al., 2017), physiological stress, declining physical condition, and death. Indirect impacts could include stress from the activities and noise of response vessels and aircraft. Behavioral responses can include displacement of animals from prime habitat (McDonald et al., 2017), disruption of social structure, change in prey availability and foraging distribution or patterns, change in reproductive behavior/productivity, and change in movement patterns or migration (MMC, 2011).

In the event of a large spill, response activities that may impact marine mammals include increased vessel traffic and remediation activities (e.g., use of dispersants, controlled burns, skimmers, boom) (BOEM, 2017a). The increased level of vessel and aircraft activity associated with spill response could disturb marine mammals, potentially resulting in behavioral changes. The large number of response vessels could result in vessel strikes, entanglement or other injury, or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 to reduce the potential for striking or disturbing these animals, and therefore no significant impacts are expected. The application of dispersants greatly reduces exposure risks to marine mammals as the dispersants would remove oil from the surface thereby reducing the risk of contact and rendering it less likely to adhere to skin, baleen plates, or other body surfaces (BOEM, 2017a).

In the event of a large spill, it is expected that impacts resulting in the injury or death of individual marine mammals could be significant at the population level depending on the level of oiling and the species affected. Based on the current PBR level for several non-endangered cetacean species in the Gulf of Mexico that are less than 3 individuals (e.g., rough-toothed dolphin = 2.5, Clymene dolphin = 0.6, killer whale = 0.1, pygmy killer whale = 0.8, dwarf and pygmy sperm whales = 0.9) (Hayes et al., 2020), mortality of individuals equal to or in excess of their PBR level would constitute a significant impact to the local (Gulf of Mexico) stocks of these species.

C.3.5 Sea Turtles (Endangered/Threatened)

Five species of Endangered or Threatened sea turtles may be found near the project area. Endangered species include the leatherback, Kemp's ridley, and hawksbill turtles. As of 6 May 2016, the entire North Atlantic DPS of the green turtle is listed as threatened (81 *FR* 20057). The DPS of loggerhead turtles that occurs in the Gulf of Mexico is listed as Threatened, although other DPSs are Endangered.

Critical habitat has been designated for the loggerhead turtle in the Gulf of Mexico as shown in **Figure 3**. Loggerhead turtles in the Gulf of Mexico are part of the Northwest Atlantic Ocean DPS (76 *FR* 58868). In July 2014, NMFS and the USFWS designated critical habitat for this DPS (NMFS, 2014a). The USFWS designation (79 *FR* 39756) includes nesting beaches in Jackson County, Mississippi; Baldwin County, Alabama; and Bay, Gulf, and Franklin Counties in the Florida Panhandle as well as several counties in southwest Florida and the Florida Keys (and other areas along the Atlantic coast). The NMFS designation (79 *FR* 39856) includes nearshore reproductive habitat within 0.99 mi (1.6 km) seaward of the mean high-water line along these same nesting beaches. NMFS also designated a large area of shelf and oceanic waters, termed *Sargassum* habitat, in the Gulf of Mexico (and Atlantic Ocean) as critical habitat. *Sargassum* is a brown algae (Class Phaeophyceae) that takes on a planktonic, often pelagic existence after being removed from reefs during rough weather. Rafts of *Sargassum* serve as important foraging and developmental habitat for numerous fishes, and young sea turtles, including loggerhead turtles. NMFS designated three other categories of critical habitat; of these, two (migratory habitat and overwintering habitat) are along the Atlantic coast and the third (breeding habitat) is found in the Florida Keys and along the Florida east coast (NMFS, 2014a).

The nearest designated nearshore reproductive critical habitat for loggerhead sea turtles is approximately 84 mi (135 km) from the project area. The project area is located approximately 35 mi (56 km) from the designated *Sargassum* critical habitat for loggerhead sea turtles (**Figure 3**).

Leatherback and loggerhead turtles are the most likely species to be present near the project area as adults. Green, hawksbill, and Kemp’s ridley turtles are typically inner shelf and nearshore species, unlikely to occur near the project area as adults. Hatchlings or juveniles of any of the sea turtle species may be present in deepwater areas, including the project area, where they may be associated with floating mats of *Sargassum* and other flotsam.

All five sea turtle species in the Gulf of Mexico are migratory and use different marine habitats according to their life stage. These habitats include high-energy beaches for nesting females and emerging hatchlings and pelagic convergence zones for hatchling and juvenile turtles. As adults, green, hawksbill, and loggerhead turtles forage primarily in shallow, benthic habitats. Leatherback turtles are the most pelagic of the sea turtles, feeding primarily on jellyfish.

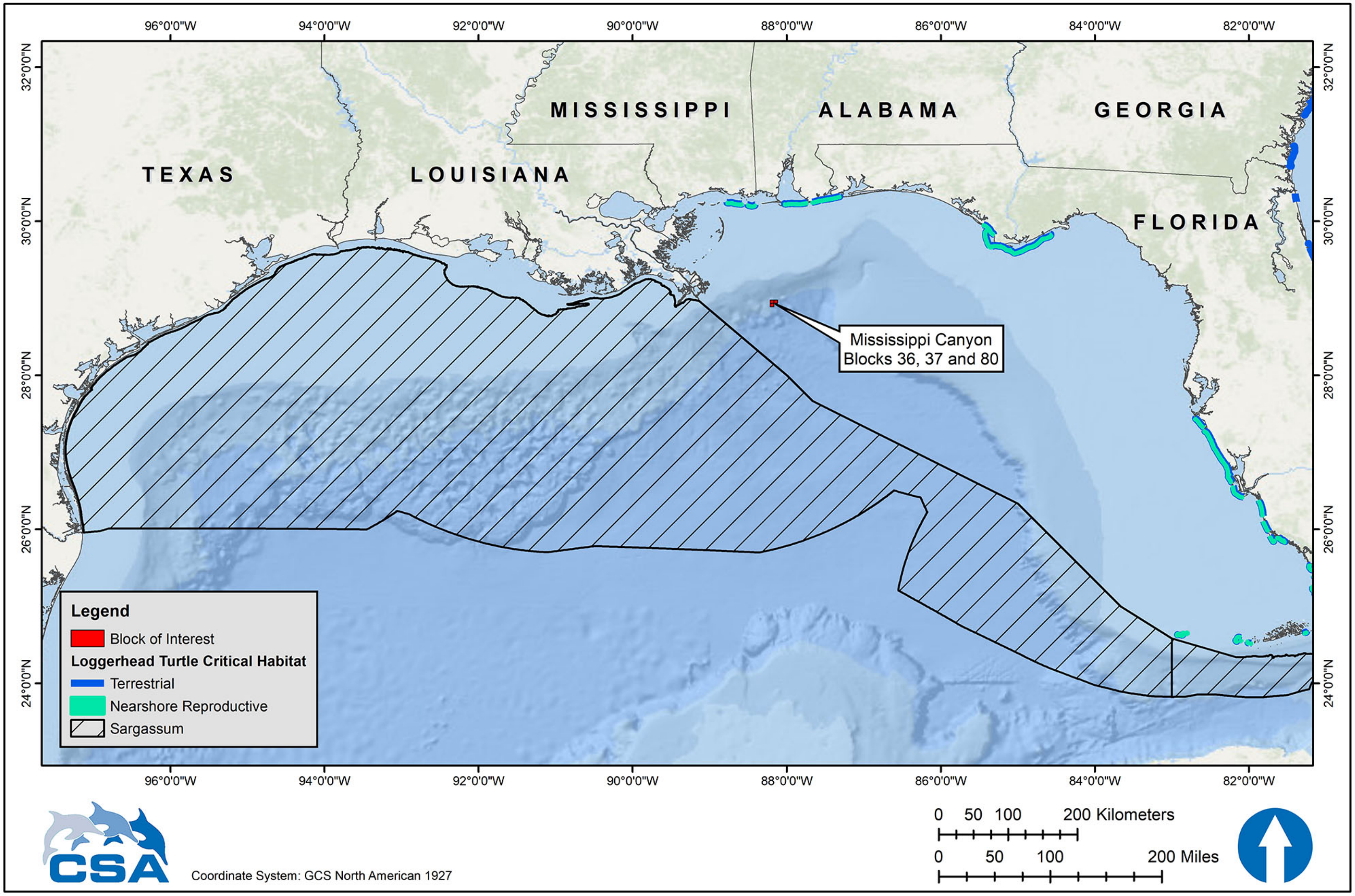

Figure 3. Location of loggerhead turtle designated critical habitat in relation to the project area.

Sea turtle nesting in the northern Gulf of Mexico can be summarized by species as follows:

- Loggerhead turtles – loggerhead turtles nest in significant numbers along the Florida Panhandle (Florida Fish and Wildlife Conservation Commission, 2018a) and, to a lesser extent, from Texas through Alabama (NMFS and USFWS, 2008).
- Green and leatherback turtles – green and leatherback turtles infrequently nest on Florida Panhandle beaches (Florida Fish and Wildlife Conservation Commission, 2018b,c).
- Kemp's ridley turtles – the critically endangered Kemp's ridley turtle nests almost exclusively on a 16-mile (26-km) stretch of coastline near Rancho Nuevo in the Mexican state of Tamaulipas (NMFS et al., 2011). A much smaller population nests in Padre Island National Seashore, Texas, mostly as a result of reintroduction efforts (NMFS et al., 2011). A total of 262 Kemp's ridley turtle nests were counted on Texas beaches for the 2020 nesting season. A total of 190 Kemp's ridley turtle nests were counted on Texas beaches during the 2019 nesting season and a total of 250 Kemp's ridley turtle nests were counted on Texas beaches in 2018 (Turtle Island Restoration Network, 2020). Padre Island National Seashore along the coast of Willacy, Kenedy, and Kleberg Counties in southern Texas, is the most important nesting location for this species in the United States, although there have been occasional reports of Kemp's ridleys nesting in Alabama (Share the Beach, 2016).
- Hawksbill turtles – hawksbill turtles typically do not nest anywhere near the project area, with most nesting in the region located in the Caribbean Sea and on the beaches of the Yucatán Peninsula (U.S. Fish and Wildlife Service, 2016a).

IPFs that could potentially affect sea turtles include drilling rig presence, marine sound, and lights; support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges are likely to have negligible impacts on sea turtles due to rapid dispersion, the small area of ocean affected, and the intermittent nature of the discharges.

Though NMFS (2020a) stated marine debris as an IPF, compliance with NTL BSEE 2015-G013 (See **Table 1**) and NMFS (2020a) Appendix B will minimize the potential for marine debris-related impacts on sea turtles. NMFS (2020a) estimated a small proportion of individual sea turtles would be adversely affected from exposure to marine debris. Therefore, marine debris is likely to have negligible impacts on sea turtles and is not discussed further.

Impacts of Drilling Rig Presence, Marine Sound, and Lights

Drilling activities produce a broad array of sounds at frequencies and intensities that may be detected by sea turtles (Samuel et al., 2005, Popper et al., 2014). Potential impacts may include behavioral disruption and temporary or permanent displacement from the area near the sound source. There is scarce information regarding hearing and acoustic thresholds for marine turtles.

Sea turtles can hear low to mid-frequency sounds and they appear to hear best between 200 and 750 Hz; they do not respond well to sounds above 1,000 Hz (Ketten and Bartol, 2005). The currently accepted hearing and response estimates are derived from fish hearing data rather than from marine mammal hearing data in combination with the limited experimental data available (Popper et al., 2014). NMFS Biological Opinion (NMFS, 2020a) lists the sea turtle underwater acoustic injury threshold as a zero to peak sound pressure level ($SPL_{0\text{-}pk}$) of 232 dB re 1 µPa and an SEL_{cum} of 204 dB re 1 μPa^2 s; Blackstock et al. (2018) identified the sea turtle underwater acoustic SPL_{rms} level injury threshold as 207 dB re 1 µPa. The behavioral threshold used is from Blackstock et al. (2018) which identified the sea turtle underwater acoustic SPL_{rms} behavioral threshold as 175 dB re 1 µPa. No distinction is made between impulsive and non-impulsive sources for these thresholds. Certain sea turtles, especially loggerheads, may be attracted to offshore structures (Lohoefener et al., 1990; Gitschlag et al., 1997) and thus may be more susceptible to impacts from sounds produced during routine drilling activities. However, given the estimated SLs produced by drilling activities (**Section A.2**), and the required 24-hour accumulation period for SEL_{cum} levels to be realized it is unlikely acoustic injury will occur. Any impacts would likely be short-term behavioral changes such as diving and evasive swimming, disruption of activities, or departure from the area. Because of the limited scope and short duration of drilling activities, these short-term impacts are not expected to be biologically significant to sea turtle populations.

Artificial lighting can disrupt the nocturnal orientation of sea turtle hatchlings (Tuxbury and Salmon, 2005; Berry et al., 2013; Simões et al., 2017). However, hatchlings may rely less on light cues when they are offshore than when they are emerging on the beach (Salmon and Wyneken, 1990). NMFS (2007) concluded that the effects of lighting from offshore structures on sea turtles are insignificant.

NMFS (2020a) stated sea turtles have the potential to be entangled or entrapped in moon pools, and though many sea turtles could exit the moon pool under their own volition, sublethal effects could occur. Based on the moon pool entrapment cases of sea turtles reported and successful rescues and releases that have occurred, NMFS (2020a) estimated approximately about one sea turtle will be sub lethally entrapped in moon pools every year. Therefore, no significant impacts are expected.

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb sea turtles, and there is also a risk of vessel strikes. Data show that vessel traffic is one cause of sea turtle mortality in the Gulf of Mexico (Lutcavage et al., 1997; NMFS, 2020a). While adult sea turtles are visible at the surface during the day and in clear weather, they can be difficult to spot from a moving vessel when resting below the water surface, during nighttime, or during periods of inclement weather. To reduce the potential for vessel strikes, BOEM issued NTL BOEM-2016-G01, which recommends protected species identification training and that vessel operators and crews maintain a vigilant watch for sea turtles and slow down or stop their vessel to avoid striking protected species, and requires operators to report sightings of any injured or dead protected species. When sea turtles are sighted, vessel operators and crews are required to maintain a distance of 164 ft (50 m) or greater whenever possible. Compliance with these mitigation measures is expected to minimize the likelihood of vessel strikes during periods of daylight and during sea and weather conditions that permit sighting of turtles on the sea surface (NMFS, 2020a).

Noise generated from support helicopter traffic also has the potential to disturb sea turtles. However, while flying offshore, helicopters maintain altitudes above 700 ft (213 m) during transit to and from the working area. This altitude is intended to minimize the potential for disturbing sea turtles, and no significant impacts are expected (NMFS, 2020a; BOEM, 2012a).

Impacts of a Small Fuel Spill

Potential spill impacts on sea turtles are discussed by NMFS (2020a) and BOEM (2017a). For this EP, there are no unique site-specific issues with respect to spill impacts on sea turtles.

The probability of a fuel spill is expected to be minimized by Anadarko's preventative measures during fuel transfer. In the unlikely event of a spill, implementation of Anadarko's OSRP is expected to minimize potential impacts on sea turtles. EP Section H provides details on spill response measures. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a thin slick on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey, and stress from the activities and noise of response vessels and aircrafts (NMFS, 2020b). The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours (NOAA, 2016a). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions. Therefore, due to the limited areal extent and short duration of water quality impacts from a small fuel spill, no significant impacts to sea turtles from direct or indirect exposure would be expected.

<u>Loggerhead Critical Habitat – Nesting Beaches</u>. A small fuel spill in the project area would be unlikely to affect sea turtle nesting beaches due to the distance from the nearest shoreline. Loggerhead turtle nesting beaches and nearshore reproductive habitat designated as critical habitat are located in Mississippi, Alabama, and the Florida Panhandle, at least 84 mi (135 km) from the project area. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to natural dispersion.

<u>Loggerhead Critical Habitat – *Sargassum*.</u> The project area is approximately 35 mi (56 km) from the designated *Sargassum* critical habitat for the loggerhead turtles (**Figure 3**). Due to the distance from the project area, a small diesel fuel spill is unlikely to affect *Sargassum* and juvenile turtles in this habitat. However, if juvenile sea turtles come into contact with or ingest diesel oil, impacts could include death, injury, or other sublethal effects. Effects of a small spill on *Sargassum* critical habitat for loggerhead turtles would be limited to the small area (0.5 to 5 ha [1.2 to 12 ac]) likely to be impacted by a small spill. An impact area of 5 ha (12 ac) would represent a negligible portion of the approximately 40,662,810 ha (100,480,000 ac) designated *Sargassum* critical habitat for loggerhead turtles in the northern Gulf of Mexico. However, if juvenile sea turtles are present in the area impacted, significant impacts to the regional population could occur.

Impacts of a Large Oil Spill

Impacts of oil spills on sea turtles can include direct impacts from oil exposure as well as indirect impacts due to response activities (e.g., vessel traffic, marine sound, dispersant use). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes and smoke (e.g., from *in situ* burning of oil); ingestion of oil (and dispersants) directly or via contaminated food; and stress from the activities and marine sound of response vessels and aircraft. Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals from prime habitat, disruption of social structure, changing food availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (NOAA, 2010; NMFS, 2020b). In the unlikely event of a spill, implementation of Anadarko's OSRP is expected to minimize the potential for these types of impacts on sea turtles. EP Section H provides further details on spill response measures.

Studies of oil effects on loggerhead turtles in a controlled setting (NOAA, 2010, Lutcavage et al., 1995) suggest that sea turtles show no avoidance behavior when they encounter an oil slick, and any sea turtle in an affected area would be expected to be exposed. Sea turtles' diving behaviors also put them at risk. Sea turtles rapidly inhale a large volume of air before diving and continually resurface over time, which may result in repeated exposure to volatile vapors and oiling (NMFS, 2020a).

<u>Loggerhead Critical Habitat – Nesting Beaches</u>. If spilled oil reaches sea turtle nesting beaches, nesting sea turtles and egg development could be affected (NMFS, 2020a). An oiled beach could affect nest site selection or result in no nesting at all (e.g., false crawls). Upon hatching and successfully reaching the water, hatchlings are subject to the same types of oil spill exposure hazards as adults. Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects, from acute toxicity to impaired movement and normal bodily functions (NMFS, 2007).

Based on the 30-day OSRA modeling (**Table 3**), indicates nearshore waters and embayments in Plaquemines Parish, Louisiana is the coastal area most likely to be affected (4% probability within 3 days, 14% probability within 10 days, and 21% probability within 30 days). Other shorelines from Cameron Parish, Louisiana to Bay County, Florida could be affected within 30 days ranging from 1% to 3% probability contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Matagorda County, Texas to Levy County, Florida (up to 24% conditional probability within 60 days). The nearest nearshore reproductive critical habitat for the loggerhead turtle is located in Jackson County, Mississippi approximately 87 mi (140 km) from the project area (**Figure 3**), and is predicted by the 60-day OSRA model to have up to 14% or less conditional probability of contact within 60 days of a spill.

<u>Loggerhead Critical Habitat – *Sargassum*</u>. The project area is approximately 35 mi (56 km) from the loggerhead turtle critical habitat designated as *Sargassum* habitat, which includes most of the Western and Central Planning Areas in the Gulf of Mexico and parts of the southern portion of the Eastern Planning Area (**Figure 3**) (NMFS, 2014a). Because of the large area covered by the designated *Sargassum* critical habitat for loggerhead turtles, a large spill could result in a substantial part of the *Sargassum* critical habitat in the northern Gulf of Mexico being oiled. However, the 2010 *Deepwater Horizon* spill affected approximately one-third of the *Sargassum* habitat in the northern Gulf of Mexico (BOEM, 2014). It is unlikely that the entire 40,662,810 ha (100,480,000 ac) of *Sargassum* critical habitat would be affected by a large spill. Because *Sargassum* spp. is a floating, pelagic species, it would only be affected by impacts that occur near the surface.

The effects of oiling on *Sargassum* spp. vary with spill severity, but moderate to heavy oiling that could occur during a large spill could cause complete mortality to *Sargassum* and its associated communities (BOEM, 2017a). *Sargassum* spp. also has the potential to sink during a large spill, thus temporarily removing the habitat and possibly being an additional pathway of exposure to the benthic environment (Powers et al., 2013). Lower levels of oiling may cause sub-lethal affects, including a reduction in growth, productivity, and recruitment of organisms associated with *Sargassum* spp*.* The *Sargassum* spp. algae itself could be less impacted by light to moderate oiling than associated organisms because of a waxy outer layer that might help protect it from oiling (BOEM, 2016b). *Sargassum* spp. has a yearly seasonal cycle of growth and a yearly cycle of migration from the Gulf of Mexico to the western Atlantic. A large spill could affect a large portion of the annual crop of the algae; however, because of its ubiquitous distribution and seasonal cycle, recovery of the *Sargassum* spp. community would be expected to occur within a short time (BOEM, 2017a).

In the event of a large spill, the level of vessel and aircraft activity associated with spill response could disturb sea turtles and potentially result in vessel strikes, entanglement, or other injury or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 to reduce the potential for striking or disturbing sea turtles therefore no significant impacts are expected.

C.3.6 Piping Plover (Threatened)

The Piping Plover is a migratory shorebird that overwinters along the southeastern U.S. and Gulf of Mexico coasts. This Threatened species experienced declines in population as a result of hunting, habitat loss and modification, predation, and disease (U.S. Fish and Wildlife Service, 2003). However, as a result of intensive conservation and management, populations of Piping Plover appear to have been increasing since 1991 throughout its range (BirdLife International, 2018). Critical overwintering habitat has been designated, including beaches in Texas, Louisiana, Mississippi, Alabama, and Florida (**Figure 4**). Piping Plovers inhabit coastal sandy beaches and mudflats, feeding by probing for invertebrates at or just below the surface. They use beaches adjacent to foraging areas for roosting and preening (U.S. Fish and Wildlife Service, nd).

A large oil spill is the only IPF that potentially may affect Piping Plovers. There are no IPFs associated with routine project activities that could affect these birds. A small fuel spill in the project area would be unlikely to affect Piping Plovers because a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating (see explanation in **Section A.9.1**). Noise from helicopters would be unlikely to significantly affect piping plover populations, because it is assumed that helicopters will maintain an altitude of 1,000 ft (305 m) over unpopulated areas or across coastlines.

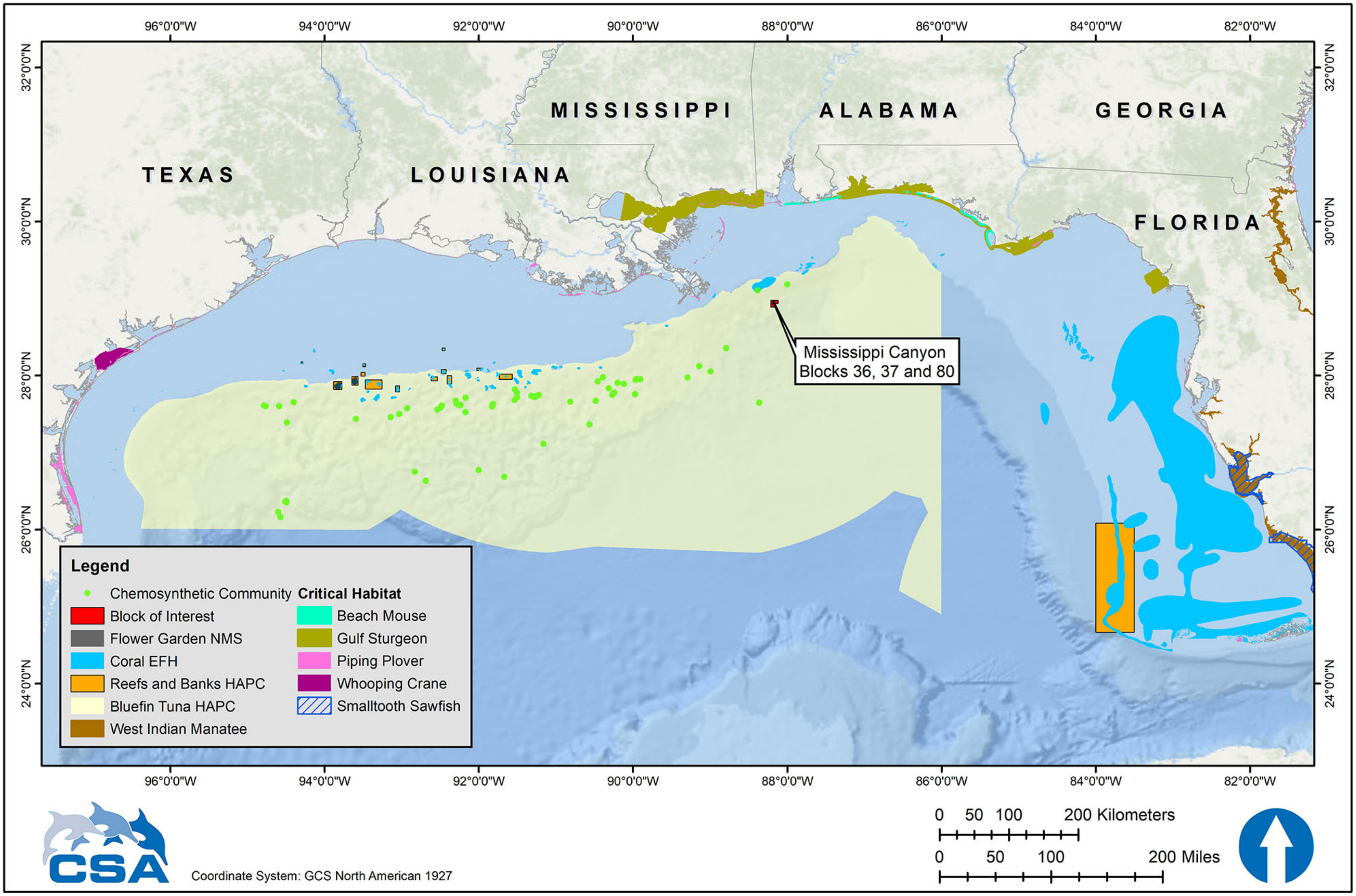

Figure 4. Location of selected environmental features in relation to the project area.

Impacts of a Large Oil Spill

The project area is approximately 55 mi (89 km) from the nearest shorelines designated as critical habitat for the Piping Plover (**Figure 4**). Based on the 30-day OSRA modeling (**Table 3**), indicates nearshore waters and embayments in Plaquemines Parish, Louisiana is the coastal area most likely to be affected (4% probability within 3 days, 14% probability within 10 days, and 21% probability within 30 days). Other shorelines from Cameron Parish, Louisiana to Bay County, Florida could be affected within 30 days ranging from 1% to 3% probability contact. The 60-day OSRA modeling (**Table 4**) predicts a 24% or less probability of shoreline contact within 60 days of a spill between Matagorda County, Texas to Levy County, Florida, a stretch of shoreline that includes numerous areas of Piping Plover critical habitat.

Plovers could physically oil themselves while foraging on oiled shores or secondarily contaminate themselves through ingestion of oiled intertidal sediments and prey (BOEM, 2017a). Piping Plovers congregate and feed along tidally-exposed banks and shorelines, following the tidal boundary and foraging at the water's edge. It is possible that some deaths of Piping Plovers could occur, especially if spills occur during winter months when plovers are most common along the coastal Gulf or if spills contacted critical habitat. Impacts could also occur from vehicular traffic on beaches and other activities associated with spill cleanup. Anadarko has extensive resources available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the OSRP. Deaths of numerous Piping Plovers from a large spill or spill response activities could be significant at the species level.

C.3.7 Whooping Crane (Endangered)

The Whooping Crane (*Grus americana*) is a large omnivorous wading bird listed as an endangered species. Three wild populations live in North America (National Wildlife Federation, 2016). One population overwinters along the Texas coast at Aransas NWR and summers at Wood Buffalo National Park in Canada. This population represents the majority of the world's population of free-ranging Whooping Cranes, reaching a record estimated population of 506 at Aransas NWR during the 2019 to 2020 winter (USFWS, 2020). A non-migrating population was reintroduced in central Florida, and another reintroduced population summers in Wisconsin and migrates to the southeastern U.S. for the winter. Whooping Cranes breed, migrate, winter, and forage in a variety of habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields (U.S. Fish and Wildlife Service, 2007). About 9,000 ha (22,240 ac) of salt flats on Aransas NWR and adjacent islands comprise the principal wintering grounds of the Whooping Crane. Aransas NWR is designated as critical habitat for the species.

A large oil spill is the only IPF that potentially may affect Whooping Cranes. A small fuel spill in the project area would be unlikely to affect Whooping Cranes, due to the distance from Aransas NWR. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior natural dispersion.

Impacts of a Large Oil Spill

A large oil spill is unlikely to affect Whooping Cranes as the project area is approximately 502 mi (808 km) from the Aransas NWR, which is the nearest designated critical habitat. The 30-day OSRA modeling (**Table 3**) predicts a <0.5% or less chance of oil contacting Whooping Crane critical habitat within 30 days of a spill. The 60-day OSRA model (**Table 4**) predicts that there is a <0.5% or less chance oil contacting Whooping Crane critical habitat within 60 days of a spill.

In the event of oil exposure, Whooping Cranes could physically oil themselves while foraging in oiled areas or secondarily contaminate themselves through ingestion of contaminated shellfish, frogs, and fishes. It is possible that some Whooping Crane deaths could occur, especially if a spill occurred during winter months when Whooping Cranes are most common along the Texas coast and if the spill contacts their critical habitat in Aransas NWR. Impacts could also occur from vehicular traffic on beaches and other activities associated with spill cleanup. Due to low population numbers, deaths of individual Whooping Cranes would likely be significant at the species level. In the event of a spill, Anadarko would work with the applicable state and federal agencies to prevent impacts on Whooping Cranes. Anadarko has extensive resources available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the OSRP.

C.3.8 Oceanic Whitetip Shark (Threatened)

The oceanic whitetip shark was listed as Threatened under the ESA on 30 January 2018 (effective 30 March 2018) by NMFS (83 *FR* 4153). Oceanic whitetip sharks are found worldwide in offshore waters between approximately 30° N and 35° S latitude, and historically were one of the most widespread and abundant species of shark (Rigby et al., 2019). However, based on reported oceanic whitetip shark catches in several major long-line fisheries, the global population appears to have suffered substantial declines (Camhi et al., 2008) and the species is now only occasionally reported in the Gulf of Mexico (Rigby et al., 2019).

A comparison of historical shark catch rates in the Gulf of Mexico by Baum and Myers (2004) noted that most recent papers dismissed the oceanic whitetip shark as rare or absent in the Gulf of Mexico. NMFS (2018b) noted that there has been an 88% decline in abundance of the species in the Gulf of Mexico since the mid-1990s due to commercial fishing pressure.

IPFs that could affect the oceanic whitetip shark include drilling rig presence, noise, and lights, and a large oil spill. Though NMFS (2020a) lists a small diesel fuel spill as an IPF, in the project area, a small diesel fuel spill would be unlikely to affect oceanic whitetip sharks due to rapid natural dispersion of diesel fuel and the low density of oceanic whitetip sharks potentially present. Therefore, no significant impacts are expected from small diesel fuel spills and they are not discussed further.

Impacts of Drilling Rig Presence, Marine Sound, and Lights

Offshore drilling activities produce a broad array of sounds at frequencies and intensities that may be detected by sharks including the threatened oceanic whitetip shark. The general frequency range for elasmobranch hearing is approximately between 20 Hz and 1 kHz (Ladich and Fay, 2013) which includes frequencies exhibited by individual species such as nurse shark (*Ginglymostoma cirratum*; 300 and 600 Hz) and the lemon shark (*Negaprion brevirostris*; 20 Hz to 1 kHz) (Casper and Mann, 2006). These frequencies overlap with SPLs associated with drilling activities (typically 10 Hz to 10 kHz) (Hildebrand, 2005). Impacts from offshore drilling activities (i.e., non-impulsive sound) could include masking or behavioral changes (Popper et al., 2014). However, because of the limited propagation distances of high SPLs from the drilling rig, impacts would be limited in geographic scope and no population level impacts on oceanic whitetip sharks are expected.

Impacts of a Large Oil Spill

Information regarding the direct effects of oil on elasmobranchs, including the oceanic whitetip shark are largely unknown. However, in the event of a large oil spill, oceanic whitetip sharks could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Because oceanic whitetip sharks may be found in surface waters, they could be more likely to be impacted by floating oil than other species which only reside at depth.

It is possible that a large oil spill could affect individual oceanic whitetip sharks and result in injuries or deaths. However, due to the low density of oceanic whitetip sharks thought to exist in the Gulf of Mexico, it is unlikely that a large spill would result in population level effects.

C.3.9 Giant Manta Ray (Threatened)

The giant manta ray is a Threatened elasmobranch species that is a slow-growing, migratory, planktivorous species than inhabits tropical, subtropical, and temperate bodies of water worldwide (NOAA, 2018). The giant manta ray became listed as Threatened under the ESA in 2018.

Commercial fishing is the primary threat to giant manta rays (NOAA, 2018). The species is targeted and caught as bycatch in several global fisheries throughout its range. Although protected in U.S. waters, protection of populations is difficult as they are highly migratory with sparsely distributed and fragmented populations throughout the world. Some estimated regional population sizes are small (between 100 to 1,500 individuals) (Marshall et al., 2018; NOAA, 2018). Stewart et al. (2018) recently reported that the Flower Garden Banks serves as nursery habitat for aggregations of juvenile manta rays. At least 74 unique individuals have been positively identified at the Flower Garden Banks based on unique underbelly coloration (Flower Garden Banks National Marine Sanctuary, 2018). Genetic and photographic evidence in the Flower Garden Banks over 25 years of monitoring showed that 95% of identified giant manta ray male individuals were smaller than mature size (Stewart et al., 2018).

IPFs that may impact giant manta rays include drilling rig presence, marine sound, and lights, and a large oil spill. Though NMFS (2020a) lists a small diesel fuel spill as an IPF, in the project area a small diesel fuel spill would be unlikely to affect giant manta rays due to rapid natural dispersion of diesel fuel and the low density of giant manta rays potentially present. Therefore, no significant impacts are expected from small diesel fuel spills and they are not discussed further.

Impacts of Drilling Rig Presence, Marine Sound, and Lights

Offshore drilling activities produce a broad array of sounds at frequencies and intensities that may be detected by elasmobranchs including the threatened giant manta ray. The general frequency range for elasmobranch hearing is approximately between 20 Hz and 1 kHz (Ladich and Fay, 2013). Studies indicate that the most sensitive hearing ranges for individual species were 300 and 600 Hz (yellow stingray [*Urobatis jamaicensis*]) and 100 to 300 Hz (little skate [*Erinacea raja*]) (Casper et al., 2003; Casper and Mann, 2006). These frequencies overlap with SPLs associated with drilling activities (typically 10 Hz to 10 kHz) (Hildebrand, 2005). Impacts from offshore drilling activities (i.e., non-impulsive sound) could include masking or behavioral changes (Popper et al., 2014). However, because of the limited propagation distances of high

SPLs from the drilling rig, impacts would be limited in geographic scope and no population level impacts on giant manta rays are expected.

Impacts of a Large Oil Spill

A large oil spill in the project area could reach coral reefs at the Flower Garden Banks which is the only known location of giant manta ray aggregations in the Gulf of Mexico, although individuals may occur anywhere in the Gulf. In the unlikely event of a large oil spill impacting areas with giant manta rays, individual rays could be affected by direct ingestion of oil which could cover their gill filaments or gill rakers, or by ingestion of oiled plankton. Giant manta rays typically feed in shallow waters of less than 33 ft (10 m) depth (NOAA, 2018). Because of this shallow water feeding behavior, giant manta rays would be more likely to be impacted by floating oil than other species which only reside at depth.

In the event of a large oil spill, due to the distance between the project area and the Flower Garden Banks, it is unlikely that oil would impact the threatened giant manta ray nursery habitat. It is possible that a large oil spill could contact individual giant manta rays, but due to the low density of individuals thought to occur in the Gulf of Mexico, there would not likely be any population-level impacts.

C.3.10 Gulf Sturgeon (Threatened)

The Gulf sturgeon is a Threatened fish species that inhabits major rivers and inner shelf waters from the Mississippi River to the Suwannee River, Florida (Barkuloo, 1988; Wakeford, 2001). Sturgeon are anadromous fish that migrate from the ocean upstream into coastal rivers to spawn in freshwater.

The historic range of the species extended from the Mississippi River to Charlotte Harbor, Florida (Wakeford, 2001). This range has contracted to encompass major rivers and inner shelf waters from the Mississippi River to the Suwannee River, Florida. Populations have been depleted or even extirpated throughout this range by fishing, shoreline development, dam construction, water quality changes, and other factors (Barkuloo, 1988; Wakeford, 2001). These declines prompted the listing of the Gulf sturgeon as a threatened species in 1991. The best-known populations occur in the Apalachicola and Suwannee Rivers in Florida (Carr, 1996; Sulak and Clugston, 1998), the Choctawhatchee River in Alabama (Fox et al., 2000), and the Pearl River in Mississippi/Louisiana (Morrow et al., 1998). Rudd et al. (2014) reconfirmed the spatial distribution and movement patterns of Gulf Sturgeon by surgically implanting acoustic telemetry tags. Critical habitat in the Gulf extends from Lake Borgne, Louisiana (St. Bernard Parish), to Suwannee Sound, Florida (Levy County) (NMFS, 2014b) (**Figure 4**). A species description is presented by BOEM (2012a) and in the recovery plan for this species (USFWS et al., 1995).

A large oil spill is the only IPF that potentially may affect Gulf sturgeon. There are no IPFs associated with routine project activities that could affect these fish. A small fuel spill in the project area would be unlikely to affect Gulf sturgeon because a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating (see explanation in **Section A.9.1**). Vessel strikes to Gulf sturgeon would be unlikely based on the location of the shorebase and that NMFS (2020a) estimated one non-lethal Gulf sturgeon strike in the 50 years of proposed action. Due to the distance of the project area from the nearest Gulf Sturgeon critical habitat (84 miles [135 km]) and the shorebase being in Port Fourchon, Louisiana, it is anticipated impacts from vessel strikes due to project activities will be negligible.

Impacts of a Large Oil Spill

Potential spill impacts on Gulf sturgeon are discussed by NMFS (2020a) and BOEM (2012a, 2017a). For this EP, there are no unique site-specific issues with respect to this species.

The project area is approximately 84 mi (135 km) from the nearest Gulf sturgeon critical habitat. The 30-day OSRA modeling (**Table 3**) predicts that a spill in the project area has a 1% conditional probability of contacting any coastal areas containing Gulf sturgeon critical habitat within 10 days of a spill and 3% conditional probability within 30 days of a spill. The 60-day OSRA modeling (**Table 4**) predicts that a spill in the project area has up to a 14% or less conditional probability of contacting any coastal areas containing Gulf sturgeon critical habitat within 60 days of a spill.

In the event of oil reaching Gulf sturgeon habitat, the fish could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Based on the life history of this species, subadult and adult Gulf sturgeon would be most vulnerable to an estuarine or marine oil spill, and would be vulnerable from approximately October through April when this species is foraging in estuarine and shallow marine habitats (NMFS, 2020a). If oil contacted Gulf sturgeon habitat, deaths of individual fish could be significant at the species level.

C.3.11 Nassau Grouper (Threatened)

The Nassau grouper is a Threatened, long-lived reef fish typically associated with hard bottom structures such as natural and artificial reefs, rocks, and underwater ledges (NOAA, nd). Once one of the most common reef fish species in the coastal waters of the United States and Caribbean (Sadovy, 1997), the Nassau grouper been subject to overfishing and is considered extinct in much of its historical range. Observations of current spawning aggregations compared with historical landings data suggest that the Nassau grouper population is substantially smaller than its historical size (NOAA, nd). The Nassau Grouper was listed as Threatened under the ESA in 2016 (81 *FR* 42268).

Nassau groupers are found mainly in the shallow tropical and subtropical waters of eastern Florida, the Florida Keys, Bermuda, the Yucatan Peninsula, and the Caribbean, including the U.S. Virgin Island and Puerto Rico (NOAA, nd). There has been one confirmed sighting of Nassau grouper from the Flower Garden Banks in the Gulf of Mexico at a water depth of 118 ft (36 m) (Foley et al., 2007). Three additional unconfirmed reports (i.e., lacking photographic evidence) of Nassau grouper have also been documented from mooring buoys and the coral cap region of the West Flower Garden flats (Foley et al., 2007).

There are no IPFs associated with routine project activities that could affect Nassau grouper. A small fuel spill would not affect Nassau grouper because the fuel would float and dissipate on the sea surface and would not be expected to reach the Flower Garden Banks or Florida Keys. A large hydrocarbon spill is the only relevant IPF.

Impacts of a Large Oil Spill

Based on the 60-day OSRA modeling results (**Table 4**), a large hydrocarbon spill would be unlikely (<0.5% probability) to reach Nassau grouper habitat in the Florida Keys (Monroe County, Florida). A spill would be unlikely to contact the corals of the Flower Garden Banks based on the distance between the project area and the Flower Garden Banks and the difference in water depth between the project area the Banks. While on the surface, hydrocarbons would not be expected to contact subsurface fish.

In the unlikely event that hydrocarbons contact Nassau grouper habitat, hydrocarbon droplets or contaminated sediment particles could come into contact with Nassau grouper present on the reefs. Individual fish could be affected by direct ingestion of hydrocarbons which could cover their gill filaments or gill rakers, result in ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Due to low population numbers, deaths of individual fish could be significant at the species level.

C.3.12 Smalltooth Sawfish (Endangered)

The smalltooth sawfish, named due to their flat, saw-like rostrum, is an elasmobranch ray which lives in shallow coastal tropical seas and estuaries where they feed on fish and invertebrates such as shrimp and crabs (NOAA Fisheries, nd). Once found along most of the northern Gulf of Mexico coast from Texas to Florida, their current range in Gulf of Mexico is restricted to areas primarily in southwest Florida (Brame et al., 2019) where several areas of critical habitat have been designated (**Figure 4**). A species description is presented in the recovery plan for this species (NMFS, 2009b).

Listed as Endangered under the ESA in 2003, population numbers have drastically declined over the past century primarily due to accidental bycatch (Seitz and Poulakis, 2006). Although there are no reliable estimates for smalltooth sawfish population numbers throughout its range (NMFS, 2018c), data from 1989 to 2004 indicated a slight increasing trend in population numbers in Everglades National Park during that time period (Carlson et al., 2007). More recent data resulted in a similar conclusion, with indications that populations were stable or slightly increasing in southwest Florida (Carlson and Osborne, 2012).

There are no IPFs associated with routine project activities that could affect smalltooth sawfish. A small fuel spill would not affect smalltooth sawfish because the fuel would float and dissipate on the sea surface and would not be expected to reach smalltooth sawfish habitat in coastal areas (see **Section A.9.1**). A large oil spill is the only relevant IPF.

Impacts of a Large Oil Spill

The project area is approximately 386 mi (621 km) from the nearest smalltooth sawfish critical habitat in Charlotte County, Florida. Based on the 30-day OSRA modeling (**Table 3**), coastal areas containing smalltooth sawfish critical habitat are unlikely to be affected within 30 days of a spill (<0.5% conditional probability). The 60-day OSRA modeling (**Table 4**) predicts a <0.5% probability of shoreline contact within 60 days of a spill between to coastal areas containing smalltooth sawfish critical habitat in Collier and Monroe counties, Florida.

Information regarding the direct effects of oil on elasmobranchs, including the smalltooth sawfish are largely unknown. A recent study by Cave and Kajiura (2018) reported that when exposed the crude oil, the Atlantic stingray (*Hypanus sabinus*) experienced impaired olfactory function which could lead to decreased fitness. In the event of oil reaching smalltooth sawfish habitats, the smalltooth sawfish could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Based on the shallow, coastal habitats preferred by smalltooth sawfish, individuals in areas subject to coastal oiling could be more likely to be impacted than other species that reside at depth. Due to low population numbers, deaths of individual fish could be significant at the species level.

C.3.13 Beach Mice (Endangered)

Four subspecies of endangered beach mouse occur on the barrier islands of Alabama and the Florida Panhandle. They are the Alabama (*Peromyscus polionotus ammobates*), Choctawhatchee (*Peromyscus polionotus allophrys*), Perdido Key (*Peromyscus polionotus trissyllepsis*), and St. Andrew beach mouse (*Peromyscus polionotus peninsularis*). Critical habitat has been designated for all four subspecies; **Figure 4** shows the critical habitat combined for all four subspecies. One additional species of beach mouse in habiting dunes on the western Florida Panhandle, the Santa Rosa beach mouse (*Peromyscus polionotus leucocephalus*), is not listed under the ESA.

A large oil spill is the only IPF that potentially may affect beach mice. There are no IPFs associated with routine project activities that could affect these animals due to the distance from shore and the lack of any onshore support activities near their habitat. A small fuel spill in the project area would not affect beach mice because a small fuel spill would not be expected to reach beach mice habitat prior to dissipating (see **Section A.9.1**).

Impacts of a Large Oil Spill

Potential spill impacts on beach mice are discussed by BOEM (2017a). For this EP, there are no unique site-specific issues with respect to these species that were not analyzed in these documents.

Beach mouse critical habitat in Baldwin County, Alabama, is approximately 86 mi (138 km) from the project area. The 30-day OSRA results (**Table 3**) predicts 1% conditional probability of oil contact with beach mouse critical habitat within 30 days of a spill. The 60-day OSRA modeling (**Table 4**) predicts that a spill in the project area has a 18% or less conditional probability of reaching either the Alabama or Florida shorelines inhabited by beach mice within 60 days of a spill.

In the event of oil contacting these beaches, beach mice could experience several types of direct and indirect impacts. Contact with spilled oil could cause skin and eye irritation and subsequent infection; matting of fur; irritation of sweat glands, ear tissues, and throat tissues; disruption of sight and hearing; asphyxiation from inhalation of fumes; and toxicity from ingestion of oil and contaminated food. Indirect impacts could include reduction of food supply, destruction of habitat, and fouling of nests. Impacts could also occur from vehicular traffic and other activities associated with spill cleanup. However, any such impacts are unlikely due to the distance from shore and response actions that would occur in the event of a spill.

C.3.14 Florida Salt Marsh Vole (Endangered)

The Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*) is a small, dark brown or black rodent found only in saltgrass (*Distichlis spicata*) meadows in the Big Bend region of

Florida that was listed as Endangered under the ESA in 1991. Only two populations of Florida salt marsh vole are known to exist: one near Cedar Key in Levy County, Florida and one in the Lower Suwanee National Wildlife Refuge in Dixie County, Florida (Florida Fish and Wildlife Conservation Commission, nd). No critical habitat has been established for the Florida salt marsh vole in part due to concerns over illegal trapping or trespassing if the location of the populations were publicly disclosed (U.S. Fish and Wildlife Service, 2001b).

A large oil spill is the only IPF that potentially may affect the Florida salt marsh vole. There are no IPFs associated with routine project activities that could affect these animals due to the distance from the project area to their habitat and the lack of any onshore support activities near their habitat. A small fuel spill in the project area would not affect the Florida salt marsh vole because a small fuel spill would not be expected to reach their habitat prior to dissipating (see **Section A.9.1**).

Impacts of a Large Oil Spill

Florida salt marsh vole habitat in Levy and Dixie counties, Florida is approximately 296 mi (476 km) from the project area. The 30-day OSRA modeling (**Table 3**) predicts that a spill in the project area has 1% or less conditional probability of contacting any coastal areas containing Florida salt marsh voles within 30 days. The 60-day OSRA modeling (**Table 4**) predicts that a spill in the project area has 1% conditional probability of contacting any coastal areas containing beach mouse critical habitat within 60 days of a spill.

In the event of oil contacting beaches containing these animals, Florida salt marsh voles could experience several types of direct and indirect impacts. Contact with spilled oil could cause skin and eye irritation and subsequent infection; matting of fur; irritation of sweat glands, ear tissues, and throat tissues; disruption of sight and hearing; asphyxiation from inhalation of fumes; and toxicity from ingestion of oil and contaminated food. Indirect impacts could include reduction of food supply, destruction of habitat, and fouling of nests. Impacts could also occur from vehicular traffic and other activities associated with spill cleanup. Impacts associated with an extensive oiling of coastal habitat containing Florida salt marsh voles from a large oil spill are expected to be significant. Due to the extremely low population numbers, extensive oiling of Florida salt marsh vole habitat could result in the extinction of the species.

However, any such impacts are unlikely due to the distance from the project area to Florida salt marsh vole habitat and response actions that would occur in the event of a spill.

C.3.15 Threatened Coral Species

Seven threatened coral species are known from the northern Gulf of Mexico: elkhorn coral, staghorn coral, lobed star coral, mountainous star coral, boulder star coral, pillar coral, and rough cactus coral. Elkhorn coral, lobed star coral, mountainous star coral, and boulder star coral have been reported from the coral cap region of the Flower Garden Banks (NOAA, 2014), but are unlikely to be present with a widespread distribution in the northern Gulf of Mexico because they typically inhabit coral reefs in shallow, clear tropical, or subtropical waters. Staghorn coral, pillar coral, and rough cactus coral are only known from the Florida Keys and Dry Tortugas (Florida Fish and Wildlife Conservation Commission, 2018d). Other Caribbean coral species evaluated by NMFS in 2014 (79 *FR* 53852) either do not meet the criteria for ESA listing or are not known from the Flower Garden Banks, Florida Keys, or Dry Tortugas. Critical habitat has been designated for elkhorn coral and staghorn coral in the Florida Keys (Monroe County, Florida) and Dry Tortugas, but none has been designated for the other threatened coral species included here. A species description of elkhorn coral is presented in the recovery plan for the species (NMFS, 2015).

There are no IPFs associated with routine project activities that could affect threatened corals in the northern Gulf of Mexico. A small fuel spill would not affect threatened coral species because the oil would float and dissipate on the sea surface. A large oil spill is the only relevant IPF.

Impacts of a Large Oil Spill

Based on the 60-day OSRA modeling results (**Table 4**), a large oil spill would be unlikely (<0.5% probability) to reach elkhorn coral critical habitat in the Florida Keys (Monroe County, Florida). A spill would be unlikely to contact the corals of the Flower Garden Banks based on the distance between the project area and the Flower Garden Banks (approximately 349 mi [562 km]), and the difference in water depth between the project area (3,473 to 4,187 ft [1,059 to 1,276 m]) and the Banks (approximately 17 to 145 m [56 to 476 ft]). While on the surface, oil would not be expected to contact corals on the seafloor. Natural or chemical dispersion of oil could cause a subsurface plume which would have the possibility of contacting seafloor corals.

If a subsurface plume were to occur, impacts on the Flower Garden Banks would be unlikely due to the distance between the project area and corals within the Flower Garden Banks (approximately 349 mi [562 km]), and the shallow location of the coral cap of the Banks. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume up onto the continental shelf edge. Valentine et al. (2014) observed the spatial distribution of excess hopane, a crude oil tracer from *Deepwater Horizon* spill sediment core samples, to be in the deeper waters and not transported up the shelf, thus confirming that near-bottom currents flow along the isobaths.

In the unlikely event that an oil slick reached reefs at the Flower Garden Banks or other Gulf of Mexico reefs, oil droplets or oiled sediment particles could come into contact with reef organisms or corals. As discussed by BOEM (2017a), impacts could include loss of habitat, biodiversity, and live coral coverage; destruction of hard substrate; change in sediment characteristics; and reduction or loss of one or more commercial and recreational fishery habitats. Sub-lethal effects could be long-lasting and affect the resilience of coral colonies to natural disturbances (e.g., elevated water temperature, diseases) (BOEM, 2017a).

Due to the distance between the project area and coral habitats, there is a low chance of oil contacting threatened coral habitat in the event of a spill, and no significant impacts on threatened coral species are expected.

C.4 Coastal and Marine Birds

C.4.1 Marine Birds

Marine birds include seabirds and other species that may occur in the pelagic environment of the project area (Clapp et al., 1982a; Clapp et al., 1982b; 1983; Davis and Fargion, 1996; Davis et al., 2000). Seabirds spend much of their lives offshore over the open ocean, except during breeding season when they nest along the coast (on the mainland and on barrier islands). In addition, other birds such as waterfowl, marsh birds, and shorebirds may occasionally be present over open ocean areas. No Endangered or Threatened bird species are likely to occur at the project area due to the distance from shore. For a discussion of shorebirds and coastal nesting birds, see **Section C.4.2**.

Seabirds of the northern Gulf of Mexico were surveyed from ships during the GulfCet II program (Davis et al., 2000) which reported that terns, storm-petrels, shearwaters, and jaegers were the most frequently sighted seabirds in deepwater areas of the Gulf of Mexico. From these surveys, four ecological categories of seabirds were documented in the deepwater areas of the Gulf: summer migrants (shearwaters, storm petrels, boobies); summer residents that breed in the Gulf (Sooty Tern [*Onychoprion fuscatus*], Least Tern [*Sternula antillarum*], Sandwich Tern [*Thalasseus sandvicensis*], Magnificent Frigatebird [*Fregata magnificens*]); winter residents (gannets, gulls, jaegers); and permanent resident species (Laughing Gulls [*Leucophaeus atricilla*], Royal Terns [*Thalasseus maximus*], Bridled Terns [*Onychoprion anaethetus*]) (Davis et al., 2000).

Common marine bird species include Wilson's Storm-Petrel (*Oceanites oceanicus*), Magnificent Frigatebird, Northern Gannet (*Morus bassanus*), Masked Booby (*Sula dactylatra*), Brown Booby (*Sula leucogaster*), Cory's Shearwater (*Calonectris diomedea*), Greater Shearwater (*Puffinus gravis*), and Audubon's Shearwater (*Puffinus lherminieri*). Seabirds are distributed Gulf-wide and are not specifically associated with the project area.

Relationships with hydrographic features were found for several marine bird species, possibly due to effects of hydrography on nutrient levels and productivity of surface waters where birds forage. The GulfCet II study did not estimate bird densities; however, Haney et al. (2014) indicated that marine bird densities over the open ocean were estimated to be 1.6 birds km^{-2}.

Trans-Gulf migrant birds including shorebirds, wading birds, and terrestrial birds may also be present in the project area. Migrant birds may use offshore structures, including platforms and semisubmersibles for resting, feeding, or as temporary shelter from inclement weather (Russell, 2005). Some birds may be attracted to offshore structures because of the lights and the fish populations that aggregate around these structures.

IPFs that potentially may affect marine birds include drilling rig presence, marine sound, and lights; support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges permitted under the NPDES are likely to have negligible impacts on the birds due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of these animals. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on birds. The IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Drilling Rig Presence, Marine Sound, and Lights

Marine birds that frequent offshore drilling operations may be exposed to contaminants including air pollutants and routine discharges, but significant impacts are unlikely due to rapid dispersion. Birds migrating over water have been known to strike offshore structures, resulting in injury and/or death (Wiese et al., 2001; Russell, 2005). Mortality of migrant birds at tall towers and other land-based structures has been reviewed extensively, and the mechanisms involved in rig collisions appear to be similar. In some cases, migrants simply do not see a part of the rig until it is too late to avoid it. In other cases, navigation may be disrupted by marine sound (Russell, 2005). On the other hand, offshore structures are suitable stopover perches for most trans-Gulf migrant species, and most of the migrants that stop over on rigs probably benefit from their stay, particularly in spring (Russell, 2005). Due to the limited scope and short duration of drilling activities described in this EP, any impacts on populations of either seabirds or trans-Gulf migrant birds are not expected to be significant.

A study in the North Sea indicated that rig lighting causes circling behavior in various birds, especially on cloudy nights; apparently the birds' geomagnetic compass is upset by the red part of the spectrum from the lights currently in use (Van de Laar, 2007; Poot et al., 2008). The numbers varied greatly, from none to some tens of thousands of birds per night per rig, with an apparent effect radius of up to 3 mi (5 km) (Poot et al., 2008). A study in the Gulf of Mexico also noted the phenomenon but did not recommend mitigation (Russell, 2005). One factor to consider in evaluating this impact in the Gulf of Mexico would include the lower incidence of cloudy and foggy days in the Gulf of Mexico versus the North Sea. In laboratory experiments, Poot et al. (2008) found the magnetic compass of migratory birds to be wavelength dependent. Migratory birds require light from the blue-green part of the spectrum for magnetic compass orientation, whereas red light (visible long-wavelength) disrupts their magnetic orientation. They designed a field study to test if and how changing light color influenced migrating birds under field conditions. During field studies they found that nocturnally migrating birds were disoriented and attracted by red and white light (containing visible long-wavelength radiation), whereas they were clearly less disoriented by blue and green light (containing less or no visible long-wavelength radiation) (Poot et al., 2008). Overall, potential negative impacts to birds from drilling rig lighting, collisions, or other adverse effects are highly localized (considering the single structure) and may affect individual birds during migration periods. Therefore, these potential impacts are not expected to affect marine birds at the population or species level and are not significant.

Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters are unlikely to significantly disturb marine birds in open, offshore waters. Schwemmer et al. (2011) showed that several marine bird species showed behavioral responses and altered distribution patterns in response to ship traffic, which could potentially cause loss of foraging time and resting habitat. However, it is likely that individual birds would experience, at most, only short-term behavioral disruption, and the impact would not be significant.

Impacts of a Small Fuel Spill

Potential spill impacts on marine birds are discussed by BOEM (2017a). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

The probability of a fuel spill is expected to be minimized by Anadarko's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of Anadarko's OSRP is expected to reduce the potential for impacts on marine birds. EP Section H provides detail on spill response measures. Given the open ocean location of the project area and the expected short duration of a small fuel spill, the potential exposure period for marine birds would be brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours (NOAA, 2016a). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

Marine birds exposed to oil on the sea surface could experience direct physical and physiological effects including skin irritation; chemical burns of skin, eyes, and mucous membranes; and inhalation of VOCs. Due to the limited areal extent and short duration of water quality impacts from a small fuel spill, secondary impacts due to ingestion of oil via contaminated prey or reductions in prey abundance are unlikely. Due to the low densities of birds in open ocean areas, the small area affected, and the brief duration of the surface slick, no significant impacts on pelagic birds would be expected.

Impacts of a Large Oil Spill

Potential spill impacts on marine and pelagic birds are discussed by BOEM (2017a). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

Pelagic seabirds could be exposed to oil from a spill at the project area. Davis et al. (2000) reported that terns, storm-petrels, shearwaters, and jaegers were the most frequently sighted seabirds in the deepwater (>200 m) Gulf of Mexico. Haney et al. (2014) estimated that seabird densities over the open ocean were approximately 1.6 birds km^{-2}. The number of pelagic birds that could be affected in open, offshore waters would depend on the extent and persistence of the oil slick.

Data following the *Deepwater Horizon* incident provide relevant information about the species of pelagic birds that may be affected in the event of a large oil spill. Birds that were treated for oiling include several pelagic species such as the Northern Gannet, Magnificent Frigatebird, and Masked Booby (U.S. Fish and Wildlife Service, 2011). The Northern Gannet is among the species with the largest numbers of birds affected by the spill. Exposure of marine birds to oil can result in adverse health with severity, depending on the level of oiling. Effects can range from plumage damage and loss of buoyancy from external oiling to more severe effects, such as organ damage, immune suppression, endocrine imbalance, reduced aerobic capacity, and death as a result of oil inhalation or ingestion (NOAA, 2016b). In the event of large-scale oiling, significant impacts at the species level are not expected due to the non-endangered status of most species of marine birds.

C.4.2 Coastal Birds

Threatened and Endangered bird species (Piping Plover and Whooping Crane) have been discussed previously in **Sections C.3.6** and **C.3.7**. Various species of non-endangered birds are also found along the northern Gulf Coast, including diving birds, shorebirds, marsh birds, wading birds, and waterfowl. Gulf Coast marshes and beaches also provide important feeding and nesting habitats. Species that nest on beaches, flats, dunes, bars, barrier islands, and similar coastal and nearshore habitats include the Sandwich Tern, Wilson’s Plover (*Charadrius wilsonia*), Black Skimmer (*Rynchops niger*), Forster’s Tern (*Sterna forsteri*), Gull-Billed Tern (*Gelochelidon nilotica*), Laughing Gull, Least Tern, and Royal Tern (U.S. Fish and Wildlife Service, 2010).

The Brown Pelican (*Pelecanus occidentalis*) was delisted from Federal Endangered status in 2009 (U.S. Fish and Wildlife Service, 2016b). However, this species remains listed as endangered by Mississippi (Mississippi Natural Heritage Program, 2018). The Brown Pelican was delisted as a species of special concern by the State of Florida in 2017 and Louisiana in 2020 (Louisiana Wildlife & Fisheries, 2020). Brown Pelicans inhabit coastal habitats and forage within both coastal waters and waters of the inner continental shelf. Aerial and shipboard surveys, including GulfCet and GulfCet II, indicate that Brown Pelicans do not occur in deep offshore waters (Fritts and Reynolds, 1981; Davis and Fargion, 1996; Davis et al., 2000). Nearly half the southeastern population of Brown Pelicans lives in the northern Gulf Coast, generally nesting on protected islands (U.S. Fish and Wildlife Service, 2010).

The Southern Bald Eagle (*Haliaeetus leucocephalus*) was delisted from its Threatened status in the lower 48 states on 28 June 2007, but still receives protection under the Migratory Bird Treaty Act of 1918 and the Bald and Golden Eagle Protection Act of 1940. The Bald Eagle is a terrestrial raptor widely distributed across the southern U.S., including coastal habitats along the Gulf of Mexico. The Gulf Coast is inhabited by both wintering migrant and resident Bald Eagles (Johnsgard, 1990; Ehrlich et al., 1992).

IPFs that potentially may affect shorebirds and coastal nesting birds include support vessel and helicopter traffic and a large oil spill. A small fuel spill in the project area would be unlikely to affect shorebirds or coastal nesting birds, as the project area is 51.6 mi (81.6 km) from the nearest shoreline. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on shorebirds.

Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters will transit coastal areas near Port Fourchon and Houma, Louisiana, where shorebirds and coastal nesting birds may be found. These activities could periodically disturb individuals or groups of birds within coastal habitats (e.g., wetlands that may support feeding, resting, or breeding birds).

Vessel traffic may disturb some foraging and resting birds. Flushing distances vary among species and among individuals (Rodgers and Schwikert, 2002; Schwemmer et al., 2011). The disturbances will be limited to flushing birds away from vessel pathways; known distances are from 65 to 160 ft (20 to 49 m) for personal watercrafts and 75 to 190 ft (23 to 58 m) for outboard-powered boats (Rodgers and Schwikert, 2002). Support vessels will not approach nesting or breeding areas on the shoreline, so disturbances to nesting birds, eggs, and chicks is not expected. Vessel operators are expected to use designated navigation channels and comply with posted speed and wake restrictions while transiting sensitive inland waterways. Due to the limited scope and short duration of drilling activities, any short-term impacts are not expected to be significant to coastal bird populations.

Helicopter traffic can cause some disturbance to birds onshore and offshore. Responses are highly dependent on the type of aircraft, the bird species, the activities that the animals were previously engaged in, and previous exposures to overflights (Efromyson et al., 2003). Helicopters seem to cause the most intense responses over other human disturbances (Bélanger and Bédard, 1989). The Federal Aviation Administration recommends (Advisory Circular No. 91-36D) that pilots maintain a minimum altitude of 2,000 ft (610 m) when flying over marine sound-sensitive areas such as parks, forest, primitive areas, wilderness areas, National Seashores, or National Wildlife Refuges, and maintain flight paths to reduce aircraft marine sound in these marine sound-sensitive areas. The 2,000 ft (610 m) altitude minimum is greater than the distance (slant range) at which aircraft overflights have been reported to cause behavioral effects on most species of birds studied by Efroymson et al. (2000). It is assumed that adherence to these guidelines would reduce potential behavioral disturbances (such as temporary displacement or avoidance behavior) of individual birds in coastal and inshore areas. The potential impacts from helicopter traffic are not expected to be significant to coastal bird populations or species in the project area.

Impacts of Large Oil Spill

Based on the 30-day OSRA modeling (**Table 3**), indicates nearshore waters and embayments in Plaquemines Parish, Louisiana is the coastal area most likely to be affected (4% probability within 3 days, 14% probability within 10 days, and 21% probability within 30 days). Other shorelines from Cameron Parish, Louisiana to Bay County, Florida could be affected within 30 days ranging from 1% to 3% probability contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Matagorda County, Texas to Levy County, Florida (up to 24% conditional probability within 60 days).

Coastal birds can be exposed to oil as they float on the water surface, dive during foraging, or wade in oiled coastal waters. Oiled birds can lose the ability to fly, dive for food, or float on the water, which could lead to drowning (U.S. Fish and Wildlife Service, 2010). Oil interferes with the water repellency of feathers and can cause hypothermia in the right conditions. As birds groom themselves, they can ingest and inhale the oil on their bodies. Scavengers such as Bald Eagles and gulls can be exposed to oil by feeding on carcasses of contaminated fish and wildlife. While ingestion can kill animals immediately, more often it results in lung, liver, and kidney damage, which can lead to death (BOEM, 2017a). Bird eggs may be damaged if an oiled adult sits on the nest.

Brown and White Pelicans (*Pelecanus erythrorhynchos*) are especially at risk from direct and indirect impacts from spilled oil within inner shelf and inshore waters, such as embayments. The range of these species is generally limited to these waters and surrounding coastal habitats. Brown Pelicans feed on mid-sized fish that they capture by diving from above ("plunge diving") and then scooping the fish into their expandable gular pouch, while White Pelicans feed from the surface by dipping their beaks in the water. These behaviors make pelicans susceptible to plumage oiling if they feed in areas with surface oil or an oil sheen. They may also capture prey that has been physically contaminated with oil or has ingested oil. Issues for Brown and White Pelicans include direct contact with oil, disturbance by cleanup activities, and long-term habitat contamination (BOEM, 2017a).

The Bald Eagle may also be at risk from direct and indirect impacts from spilled oil. This species often captures fish within shallow water areas (snatching prey from the surface or wading into shallow areas to capture prey with their bill) and so may be susceptible to plumage oiling and, as with the Brown and White Pelicans, they may also capture prey that has been physically contaminated with oil or has ingested oil (BOEM, 2017a). It is expected that impacts to coastal birds from a large oil spill resulting in the death of individual birds would be adverse but not significant at population levels.

C.5 Fisheries Resources

C.5.1 Pelagic Communities and Ichthyoplankton

Biggs and Ressler (2000) reviewed the biology of pelagic communities in the deepwater environment of the northern Gulf of Mexico. The biological oceanography of the region is dominated by the influence of the Loop Current, whose surface waters are among the most oligotrophic in the world's oceans. Superimposed on this low-productivity condition are productive "hot spots" associated with entrainment of nutrient-rich Mississippi River water and mesoscale oceanographic features. Anticyclonic and cyclonic hydrographic features play an important role in determining biogeographic patterns and controlling primary productivity in the northern Gulf of Mexico (Biggs and Ressler, 2000).

Most fishes inhabiting shelf or oceanic waters of the Gulf of Mexico have planktonic eggs and larvae (Ditty, 1986; Ditty et al., 1988; Richards et al., 1989; Richards et al., 1993). A study by Ross et al. (2012) on midwater fauna to characterize vertical distribution of mesopelagic fishes in selected deepwater areas in the Gulf of Mexico substantiated high species richness but general domination by relatively few families and species.

IPFs that potentially may affect pelagic communities and ichthyoplankton include drilling rig presence, marine sound, and lights; effluent discharges; water intake; and two types of accidents (a small fuel spill and a large oil spill). These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Drilling Rig Presence, Marine Sound, and Lights

The drilling rig, as a floating structure in the deepwater environment, will act as a fish aggregating device (FAD). In oceanic waters, the FAD effect would be most pronounced for epipelagic fishes such as tunas, dolphin, billfishes, and jacks, which are commonly attracted to fixed and drifting surface structures (Holland, 1990; Higashi, 1994; Relini et al., 1994). Positive fish associations with offshore rigs and platforms in the Gulf of Mexico are well documented (Gallaway and Lewbel, 1982; Wilson et al., 2003; Wilson et al., 2006). The FAD effect could possibly enhance the feeding of epipelagic predators by attracting and concentrating smaller fish species. Drilling rig noise could potentially cause masking in fishes, thereby reducing their ability to hear biologically relevant sounds (Radford et al., 2014). The only defined acoustic threshold levels for non-impulsive noise are given by Popper et al. (2014) and apply only to species of fish with swim bladders that provide some hearing (pressure detection) function. Popper et al. (2014) estimated SEL_{cum} threshold levels of 170 dB re 1 μPa^2 s over a 48-hour period for onset of recoverable injury and 158 dB re 1 μPa^2 s over a 12-hour period for onset temporary auditory threshold shifts. However, no consistent behavioral thresholds for fish have been established (Hawkins and Popper, 2014). Noise may also influence fish behaviors, such as predator-avoidance, foraging, reproduction, and intraspecific interactions (Picciulin et al., 2010; Bruintjes and Radford, 2013; McLaughlin and Kunc, 2015). Fish aggregating is likely to occur to some degree due to the presence of the drilling rig, but the impacts would be limited in geographic scope and no population level impacts are expected.

Few data exist regarding the impacts of noise on pelagic larvae and eggs. Generally, it is believed that larval fish will have similar hearing sensitivities as adults, but may be more susceptible to barotrauma injuries associated with impulsive noise (Popper et al., 2014). Larval fish were experimentally exposed to simulated impulsive sounds by Bolle et al. (2012). The controlled playbacks produced SEL_{cum} of 206 dB re 1 μPa^2 s but resulted in no increased mortality between the exposure and control groups. Non-impulsive noise sources (such as drilling rig operations) are expected to be far less injurious than impulsive noise. Because of the periodic and transient nature of ichthyoplankton, they are not expected to remain within the ensonified area for a full 24-hour period to realize SEL_{cum} necessary to result in injury, and no impacts to these life stages are expected.

Impacts of Effluent Discharges

Muds and cuttings discharges may have a slight effect on the benthic environment near the wellsite, including a localized increase in water turbidity, the limited blanketing of seafloor sediments and slightly increased concentrations of hydrocarbons and metals. Treated cuttings are monitored for visible sheen prior to discharge. Contaminants released into the water column will be diluted rapidly within the open ocean environment. Minimal impacts on water quality, plankton, and nekton are anticipated.

Treated sanitary and domestic wastes may have a slight effect on the pelagic environment in the immediate vicinity of these discharges. These wastes may have elevated levels of nutrients, organic matter, and chlorine, but should be diluted rapidly to undetectable levels within tens to hundreds of meters from the source. Minimal impacts on water quality, plankton, and nekton are anticipated.

Deck drainage may have a slight effect on the pelagic environment in the immediate vicinity of these discharges. Deck drainage from contaminated areas will be passed through an oil-and-water separator prior to release, and discharges will be monitored for visible sheen. The discharges may have slightly elevated levels of hydrocarbons but should be diluted rapidly to undetectable levels within tens to hundreds of meters from the source. Minimal impacts on water quality, plankton, and nekton are anticipated.

Other discharges in accordance with the NPDES permit, such as desalination unit brine and uncontaminated cooling water, fire water, and ballast water, are expected to be diluted rapidly and have little or no impact on water column biota.

Impacts of Water Intake

Seawater will be drawn from the ocean for once-through, non-contact cooling of machinery on the drilling rig. The intake of seawater for cooling water will entrain plankton. The low intake velocity should allow most strong-swimming juvenile fishes and smaller adults to escape entrainment or impingement (Electric Power Research Institute, 2000). However, drifting plankton would not be able to escape entrainment with the exception of a few fast-swimming larvae of certain taxonomic groups. Those organisms entrained may be stressed or killed (Cada, 1990; Mayhew et al., 2000), primarily through changes in water temperature during the route from cooling intake structure to discharge structure and mechanical damage (turbulence in pumps and condensers). Due to the limited scope and short duration of drilling activities, any short-term impacts of entrainment are not expected to be significant to plankton or ichthyoplankton populations (BOEM, 2017a). The drilling rig ultimately chosen for this project is expected to be in compliance with all cooling water intake requirements.

Impacts of a Small Fuel Spill

Potential spill impacts on fisheries resources are discussed by BOEM (2017a). For this EP, there are no unique site-specific issues with respect to spill impacts.

The probability of a fuel spill is expected to be minimized by Anadarko's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of Anadarko's OSRP is expected to mitigate the potential for impacts on pelagic communities, including ichthyoplankton. EP Section H provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would dissipate naturally within 24 hours (NOAA, 2016a). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

A small fuel spill could have localized impacts on phytoplankton, zooplankton, and nekton. Due to the limited areal extent and short duration of water quality impacts, a small fuel spill would be unlikely to produce detectable impacts on pelagic communities and ichthyoplankton.

Impacts of a Large Oil Spill

Potential spill impacts on pelagic communities and ichthyoplankton are discussed by BOEM (2017a). A large oil spill could affect water column biota including phytoplankton, zooplankton, ichthyoplankton, and nekton. A large spill that persisted for weeks or months would be more likely to affect these communities. While adult and juvenile fishes may actively avoid a large spill, planktonic eggs and larvae would be unable to avoid contact. Eggs and larvae of fishes are especially vulnerable to oiling because they inhabit the upper layers of the water column, and they will die if exposed to certain toxic fractions of spilled oil. Impacts potentially would be greater if local-scale currents retained planktonic larval assemblages (and the floating oil slick) within the same water mass. Impacts to ichthyoplankton from a large spill would be greatest during spring and summer when shelf concentrations peak (BOEM, 2016b).

C.5.2 Essential Fish Habitat

Essential Fish Habitat (EFH) is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, and growth to maturity. Under the Magnuson-Stevens Fishery Conservation and Management Act, as amended, federal agencies are required to consult on activities that may adversely affect EFH designated in Fishery Management Plans developed by the regional Fishery Management Councils.

The Gulf of Mexico Fishery Management Council has prepared Fishery Management Plans for corals and coral reefs, shrimps, spiny lobster, reef fishes, coastal migratory pelagic fishes, and red drum (*Sciaenops ocellatus*). In 2005, the EFH for these managed species was redefined in Generic Amendment No. 3 to the various Fishery Management Plans (Gulf of Mexico Fishery Management Council, 2005). The EFH for most of these Gulf of Mexico Fishery Management Council managed species is on the continental shelf in waters shallower than 600 ft (183 m). The shelf edge is the outer boundary for coastal migratory pelagic fishes, reef fishes, and shrimps. EFH for corals and coral reefs includes some shelf-edge topographic features on the Texas-Louisiana OCS located approximately 12 mi (19 km) from the project area (**Figure 4**).

Highly migratory pelagic fishes, which occur as transients in the project area, are the only remaining group for which EFH has been identified in the deepwater Gulf of Mexico. Species in this group, including tunas, swordfishes, billfishes, and sharks, are managed by NMFS. **Table 7** lists the highly migratory fish species and their life stages with EFH at or near the project area.

Research indicates the central and western Gulf of Mexico may be important spawning habitat for Atlantic bluefin tuna (*Thunnus thynnus*), and (NMFS, 2009c) has designated a Habitat Area of Particular Concern (HAPC) for this species. The HAPC covers much of the deepwater Gulf of Mexico, including the project area (**Figure 4**). The areal extent of the HAPC is approximately 300,000 km^2 (115,831 mi^2). Atlantic bluefin tuna follow an annual cycle of foraging in June through March off the eastern U.S. and Canadian coasts, followed by migration to the Gulf of Mexico to spawn in April, May, and June (NMFS, 2009c). The Atlantic bluefin tuna has also been designated as a species of concern (NMFS, 2011). An amendment to the original EFH Generic Amendment was finalized in 2005 (Gulf of Mexico Fishery Management Council, 2005). One of the most significant proposed changes in this amendment reduced the extent of EFH relative to the 1998 Generic Amendment by removing the EFH description and identification from waters between 100 fathoms and the seaward limit of the Exclusive Economic Zone. The Highly Migratory Species Fisheries Management Plan was amended in 2009 to update EFH and HAPC to include the bluefin tuna spawning area (NMFS, 2009c).

Table 7. Migratory fish species with designated Essential Fish Habitat (EFH) at or near Mississippi Canyon Blocks 36, 37, and 80, including life stage(s) potentially present within the project area (Adapted from National Marine Fisheries Service [NMFS], 2009b).

Common Name	Scientific Name	Life Stage(s) Potentially Present Within or Near the Project Area
Atlantic bluefin tuna	*Thunnus thynnus*	Spawning, eggs, larvae
Bigeye thresher shark	*Alopias superciliosus*	All
Blue marlin	*Makaira nigricans*	Juveniles, adults
Common thresher shark	*Alopias vulpinus*	All
Longfin mako shark	*Isurus paucus*	All
Oceanic whitetip shark	*Carcharhinus longimanus*	All
Scalloped hammerhead shark	*Sphyrna lewini*	Juveniles, adults
Shortfin mako shark	*Isurus oxyrinchus*	All
Silky shark	*Carcharhinus falciformis*	All
Skipjack tuna	*Katsuwonus pelamis*	Spawning, adults
Smooth dogfish	*Mustelus canis*	All
Swordfish	*Xiphias gladius*	Larvae, juveniles
Whale shark	*Rhincodon typus*	All
White marlin	*Tetrapturus albidus*	Juveniles, adults
Yellowfin tuna	*Thunnus albacares*	Spawning, juveniles, adults

NTLs 2009-G39 and 2009-G40 that provide guidance and clarification of the regulations with respect to biologically sensitive underwater features and areas and benthic communities that are considered EFH. As part of an agreement between BOEM and NMFS to complete a new programmatic EFH consultation for each new Five-Year Program, an EFH consultation was initiated between BOEM's Gulf of Mexico Region and NOAA's Southeastern Region during the preparation, distribution, and review of BOEM's 2017-2022 WPA/CPA Multisale EIS (BOEM, 2017a). The EFH assessment was completed and there is ongoing coordination among NMFS, BOEM, and BSEE, including discussions of mitigation (BOEM, 2016c).

Other HAPCs have been identified by the Gulf of Mexico Fishery Management Council (2005). These include the Florida Middle Grounds, Madison-Swanson Marine Reserve, Tortugas North and South Ecological Reserves, Pulley Ridge, and several individual reefs and banks of the northwestern Gulf of Mexico. Madison Swanson Marine Reserve is the HAPC located nearest to the project area (approximately 138 mi [222 km]).

IPFs that potentially may affect EFH include drilling rig presence, marine sound, and lights; effluent discharges; water intake; and two types of accidents (a small fuel spill and a large oil spill).

Impacts of Drilling Rig Presence, Marine Sound, and Lights

The drilling rig, as a floating structure in the deepwater environment, will act as a FAD. In oceanic waters, the FAD effect would be most pronounced for epipelagic fishes such as tunas, dolphin, billfishes, and jacks, which are commonly attracted to fixed and drifting surface structures (Holland, 1990; Higashi, 1994; Relini et al., 1994). The FAD effect would possibly enhance feeding of epipelagic predators by attracting and concentrating smaller fish species.

Drilling rig vessel noise could potentially cause acoustic masking for fishes, thereby reducing their ability to hear biologically relevant sounds (Radford et al., 2014). Noise may also influence fish behaviors such as predator avoidance, foraging, reproduction, and intraspecific interactions (Picciulin et al., 2010; Bruintjes and Radford, 2013; McLaughlin and Kunc, 2015). The only defined acoustic threshold levels for non-impulsive noise are given by Popper et al. (2014) and apply only to species of fish with swim bladders that provide some hearing (pressure detection) function. Popper et al. (2014) estimated SEL_{cum} threshold levels of 170 dB re 1 μPa^2 s over a 48-hour period for onset of recoverable injury and SEL_{cum} of 158 dB re 1 μPa^2 s over a 12-hour period for onset temporary auditory threshold shifts. No reliable behavioral thresholds for fish have been established. Because the drilling rig is a temporary structure, any impacts on EFH for managed species are considered minor.

Impacts of Effluent Discharges

Other effluent discharges affecting EFH by diminishing ambient water quality include drilling muds and cuttings, treated sanitary and domestic wastes, deck drainage, and miscellaneous discharges such as desalination unit brine and uncontaminated cooling water, fire water, and ballast water. Impacts on water quality have been discussed previously. No significant impacts on EFH for managed species are expected from these discharges.

Impacts of Water Intake

As noted previously, cooling water intake will cause entrainment and impingement of plankton, including fish eggs and larvae (ichthyoplankton). Due to the limited scope and short duration of drilling activities, any short-term impacts on EFH for highly migratory pelagic fishes are not expected to be biologically significant. The recent lease sale EIS (BOEM, 2017a) discusses cooling water discharge. Water with an elevated temperature may accumulate around the discharge pipe. However, the warmer water should be diluted rapidly to ambient temperature levels within 328 ft (100 m) of the discharge pipe. Any impacts to pelagic species would be extremely localized and brief (BOEM, 2014).

Impacts of a Small Fuel Spill

Potential spill impacts on EFH are discussed by BOEM (2017a). For this EP, there are no unique site-specific issues with respect to spill impacts.

The probability of a fuel spill is expected to be minimized by Anadarko's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of Anadarko's OSRP is expected to help diminish the potential for impacts on EFH. EP Section H provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be dissipated naturally within 24 hours (NOAA, 2016a). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

A small fuel spill could have localized impacts on EFH for highly migratory pelagic fishes, including tunas, swordfishes, billfishes, and sharks. These species occur as transients in the project area. A spill would also produce short-term impact on water quality in the HAPC for spawning bluefin tuna, which covers much of the deepwater Gulf of Mexico. The areal extent of the affected area would represent a negligible portion of the HAPC.

A small fuel spill would likely not affect EFH for corals and coral reefs, the nearest EFH being the topographic features located approximately 12 mi (19 km) from the project area. A small fuel spill would float and dissipate on the sea surface and would not contact these features.

Impacts of a Large Oil Spill

Potential spill impacts on EFH are discussed by BOEM (2017a). For this EP, there are no unique site-specific issues with respect to EFH.

An oil spill in offshore waters would temporarily increase hydrocarbon concentrations on the water surface and potentially in the subsurface as well. Given the extent of EFH designations in the Gulf of Mexico (Gulf of Mexico Fishery Management Council, 2005; NMFS, 2009c), some impact on EFH would be unavoidable.

A large spill could affect EFH for many managed species including shrimps, stone crab, spiny lobster, reef fishes, coastal migratory pelagic fishes, and red drum. It would result in adverse impacts on water quality and water column biota including phytoplankton, zooplankton, and nekton. In coastal waters, sediments could be contaminated and result in persistent degradation of the seafloor habitat for managed demersal fish and shellfish species.

The project area is within the HAPC for spawning Atlantic bluefin tuna (NMFS, 2009c). A large spill could temporarily degrade the HAPC due to increased hydrocarbon concentrations in the water column, with the potential for lethal or sublethal impacts on spawning tuna. Potential impacts would depend in part on the timing of a spill, as this species migrates to the Gulf of Mexico to spawn in April, May, and June (NMFS, 2009c).

The topographic features located 12 mi (19 km) from the project area are designated as EFH under the corals and coral reefs management plan (Gulf of Mexico Fishery Management Council, 2005). An accidental spill would be unlikely to affect this area, since a surface slick would be unlikely to reach these features due to their depth.

C.6 Archaeological Resources

C.6.1 Shipwreck Sites

The project area is on the list of archaeology survey blocks with a high potential for historic shipwrecks (BOEM, 2011). The archeological assessment identified no archaeologically significant artifacts or shipwrecks within 2,000 ft (610 m) of the proposed wellsites (C&C Technologies, 2014.). Anadarko will abide by the applicable requirements of NTL 2005-G07 and 30 CFR 550.194(c), which stipulate that work be stopped at the project site if any previously undetected archaeological resource is discovered after work has begun until appropriate surveys and evaluations have been completed.

Because there are no known shipwreck sites within 2,000 ft (610 m) of the proposed wellsite, there are no routine IPFs that are likely to affect shipwrecks. Impacts of a large oil spill are the only IPFs considered. A small fuel spill would not affect shipwrecks because the oil would float and dissipate on the sea surface. These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of a Large Oil Spill

The 2017-2025 Lease Sale EIS (BOEM, 2017a) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 984-ft (300-m) radius. Because there are no historic shipwrecks within a 984-ft (300-m) radius of the proposed wellsite, this impact would not be relevant. Should there be any indication that potential shipwreck sites could be affected, in accordance with NTL 2005-G07, Anadarko will immediately halt drilling or other project operations, take steps to ensure that the site is not disturbed in any way, and contact the BOEM Regional Supervisor, Leasing and Environment, within 48 hours of its discovery. Anadarko would cease all operations within 1,000 ft (305 m) of the site until the Regional Supervisor provides instructions on steps to take to assess the site's potential historic significance and protect it.

Beyond this radius, there is the potential for impacts from oil, dispersants, and depleted oxygen levels. These impacts could include chemical contamination, alteration of the rates of microbial activity (BOEM, 2017a), and reduced biodiversity at shipwreck-associated sediment microbiomes (Hamdan et al., 2018). During the *Deepwater Horizon* incident, subsurface plumes were reported at a water depth of about 3,600 ft (1,100 m), extending at least 22 mi (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010). While the behavior and impacts of subsurface plumes are not well known, a subsurface plume could have the potential to contact shipwreck sites beyond the 984-ft (300-m) radius estimated by BOEM (2012a), depending on its extent, trajectory, and persistence.

A spill entering shallow coastal waters could conceivably contaminate an undiscovered or known coastal shipwreck site. Based on the 30-day OSRA modeling (**Table 3**), indicates nearshore waters and embayments in Plaquemines Parish, Louisiana is the coastal area most likely to be affected (4% probability within 3 days, 14% probability within 10 days, and 21% probability within 30 days). Other shorelines from Cameron Parish, Louisiana to Bay County, Florida could be affected within 30 days ranging from 1% to 3% probability contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Matagorda County, Texas to Levy County, Florida (up to 24% conditional probability within 60 days). BOEM (2012a) stated that if an oil spill contacted a coastal historic site, such as a fort or a lighthouse, the major impact would be a visual impact from oil contact and contamination of the site and its environment.

C.6.2 Prehistoric Archaeological Sites

With water depths at the locations of the proposed wellsites ranging from approximately 3,473 to 4,187 ft (1,059 to 1,276 m), the proposed wellsites are well beyond the 197-ft (60-m) depth contour used by BOEM as the seaward extent for potential prehistoric archaeological sites in the Gulf of Mexico. Because prehistoric archaeological sites are not found in the project area, the only relevant IPF is a large oil spill. A small fuel spill would not affect prehistoric archaeological resources because the oil would float and dissipate on the sea surface.

Impacts of a Large Oil Spill

Because prehistoric archaeological sites are not found in the project area, they would not be affected by the physical effects of a subsea blowout. BOEM (2012a) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 984-ft (300-m) radius.

Along the northern Gulf Coast, prehistoric sites exist along the barrier islands and mainland coast and along the margins of bays and bayous (BOEM, 2017a). Based on the 30-day OSRA modeling (**Table 3**), indicates nearshore waters and embayments in Plaquemines Parish, Louisiana is the coastal area most likely to be affected (4% probability within 3 days, 14% probability within 10 days, and 21% probability within 30 days). Other shorelines from Cameron Parish, Louisiana to Bay County, Florida could be affected within 30 days ranging from 1% to 3% probability contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Matagorda County, Texas to Levy County, Florida (up to 24% conditional probability within 60 days).

If a spill did reach a prehistoric site along these shorelines, it could coat fragile artifacts or site features and compromise the potential for radiocarbon dating organic materials in a site (although other dating methods are available and it is possible to decontaminate an oiled sample for radiocarbon dating). Coastal prehistoric sites could also be damaged by spill cleanup operations (e.g., destroying fragile artifacts, disturbing the provenance of artifacts and site features).

C.7 Coastal Habitats and Protected Areas

Coastal habitats in the northeastern Gulf of Mexico that may be affected by oil and gas activities are described by BOEM (2017a). Coastal habitats inshore of the project area include barrier beaches and dunes, wetlands, oyster reefs, and submerged seagrass beds. Generally, most of the northeastern Gulf is fringed by barrier beaches, with wetlands, oyster reefs and/or submerged seagrass beds occurring in sheltered areas behind the barrier islands and in estuaries.

Due to the distance from shore, the only IPF associated with routine activities in the project area that potentially may affect beaches and dunes, wetlands, oyster reefs, seagrass beds, coastal wildlife refuges, wilderness areas, or any other managed or protected coastal area is support vessel traffic. The support bases at Port Fourchon and Houma, Louisiana, are not in wildlife refuges or wilderness areas. Potential impacts of support vessel traffic are addressed briefly below.

Impacts of support vessel traffic and a large oil spill are the only IPFs analyzed for coastal habitats and protected areas. A small fuel spill in the project area would be unlikely to affect coastal habitats, as the project area is 51.6 mi (81.6 km) from the nearest shoreline (Louisiana). As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating. These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Support Vessel Traffic

Support operations, including crew boats and supply boats as detailed in EP Section K, may have a minor incremental impact on barrier beaches and dunes, wetlands, oyster reefs and protected areas. Over time, with a large number of vessel trips, vessel wakes can erode shorelines along inlets, channels, and harbors, resulting in localized land loss. Impacts to barrier beaches and dunes, wetlands, oyster reefs and protected areas will be minimized by following the speed and wake restrictions in harbors and channels.

Support operations, including crew boats and supply boats are not anticipated to have a significant impact on submerged seagrass beds. While submerged seagrass beds could be uprooted, scarred, or lost due to direct contact from vessels, use of navigation channels and adherence to local requirements and implemented programs will decrease the likelihood of impacts to these resources (BOEM, 2017a).

Impacts of a Large Oil Spill

Potential spill impacts on coastal habitats are discussed by BOEM (2017a). Coastal habitats inshore of the project area include barrier beaches and dunes, wetlands, oyster reefs and submerged seagrass beds. For this EP, there are no unique site-specific issues with respect to coastal habitats.

Based on the 30-day OSRA modeling (**Table 3**), indicates nearshore waters and embayments in Plaquemines Parish, Louisiana is the coastal area most likely to be affected (4% probability within 3 days, 14% probability within 10 days, and 21% probability within 30 days). Other shorelines from Cameron Parish, Louisiana to Bay County, Florida could be affected within 30 days ranging from 1% to 3% probability contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Matagorda County, Texas to Levy County, Florida (up to 24% conditional probability within 60 days).

The shorelines within the geographic range predicted by the OSRA modeling (**Tables 3** and **4**) include extensive barrier beaches and wetlands, oyster reefs with submerged seagrass beds occurring in sheltered areas behind the barrier islands and in estuaries. NWRs and other protected areas along the coast are discussed in BOEM (2017a) and Anadarko's OSRP. Coastal and near-coastal wildlife refuges, wilderness areas, and state and national parks within the geographic range of the potential shoreline contacts based on the 30-day OSRA model (**Table 3**) are presented in **Table 8**.

The level of impacts from oil spills on coastal habitats depends on many factors, including the oil characteristics, the geographic location of the landfall, and the weather and oceanographic conditions at the time (BOEM, 2017a, b).

Table 8. Wildlife refuges, wilderness areas, and state and national parks within the geographic range of the potential shoreline contacts after 30 days of a hypothetical spill from Launch Area 57 based on the 30-day OSRA model.

County or Parish, State	Wildlife Refuge, Wilderness Area, or State/National Park
Cameron, Louisiana	Peveto Woods Sanctuary
	Rockefeller State Wildlife Refuge and Game Preserve
	Sabine National Wildlife Refuge
Vermilion, Louisiana	Paul J. Rainey Wildlife Refuge and Game Preserve
	Rockefeller State Wildlife Refuge and Game Preserve
	State Wildlife Refuge
Terrebonne, Louisiana	Isles Dernieres Barrier Islands Refuge
	Pointe aux Chenes Wildlife Management Area
Lafourche, Louisiana	East Timbalier Island National Wildlife Refuge
	Pointe aux Chenes Wildlife Management Area
	Wisner WMA (Includes Picciola Tract)
Plaquemines, Louisiana	Breton National Wildlife Refuge
	Delta National Wildlife Refuge
	Pass a Loutre Wildlife Management Area
St. Bernard, Louisiana	Biloxi Wildlife Management Area
	Breton National Wildlife Refuge
Hancock, Mississippi	Buccaneer State Park
	Grand Bayou Preserve
	Jourdan River Preserve
	Hancock County Marshes Preserve
Harrison, Mississippi	Bayou Portage Preserve
	Biloxi River Marshes Preserve
	Cat Island Preserve
	Deer Island Preserve
	Gulf Islands National Seashore
	Hiller Park Recreation Area
	Jourdan River Preserve
	Sandhill Crane Refuge Preserve
	Ship Island Preserve
	Wolf River Preserve

Table 8. (Continued).

County or Parish, State	Wildlife Refuge, Wilderness Area, or State/National Park
Jackson, Mississippi	Bellefontaine Marsh Preserve
	Davis Bayou Preserve
	Escatawpa River Marsh Preserve
	Grand Bay National Estuarine Research Reserve
	Grand Bay Savanna Preserve
	Graveline Bay Preserve
	Gulf Islands National Seashore
	Gulf Islands Wilderness
	Horn Island Preserve
	Old Fort Bayou Preserve
	Pascagoula River Marsh Preserve
	Petit Bois Island Preserve
	Round Island Preserve
	Shepard State Park
Mobile, Alabama	Grand Bay National Wildlife Refuge
	Grand Bay Savanna State Nature Preserve
	Mobile-Tensaw Delta WMA
	Penalver Park
	The Grand Bay Savanna Tract (and Addition Tract)
	W.L. Holland WMA
Baldwin, Alabama	Betty and Crawford Rainwater Perdido River Nature Preserve
	Bon Secour NWR
	Gulf State Park
	Meaher State Park
	Mobile-Tensaw Delta CIAP Parcel State Habitat Area
	Mobile-Tensaw Delta WMA
	Perdido River Water Management Area
	W.L. Holland WMA
	Weeks Bay Harris and Worcester Tracts
	Weeks Bay National Estuarine Research Reserve
	Weeks Bay Reserve Addition - Beck Tract
Escambia, Florida	Bayou Marcus Wetlands
	Big Lagoon State Park
	Blue Angel Recreation Park
	Bay Bluffs Park
	Ft. Pickens Aquatic Preserve
	Gulf Islands National Seashore
	Mallory Heights Park #3
	Perdido Bay/Crown Pointe Preserve
	Perdido Key State Park
	Tarkiln Bayou Preserve State Park
	USS Massachusetts (BB-2) Underwater Archaeological Preserve
	Wayside Park

Table 8. (Continued).

County or Parish, State	Wildlife Refuge, Wilderness Area, or State/National Park
Okaloosa, Florida	Eglin Beach Park
	Fred Gannon Rocky Bayou State Park
	Gulf Islands National Seashore
	Henderson Beach State Park
	Rocky Bayou Aquatic Preserve
	Yellow River Wildlife Management Area
Walton, Florida	Choctawhatchee River Delta Preserve
	Choctawhatchee River Water Management Area
	Deer Lake State Park
	Grayton Beach State Park
	Point Washington State Forest
	Topsail Hill Preserve State Park
Bay, Florida	Camp Helen State Park
	SS Tarpon Underwater Archaeological Preserve
	St. Andrews Aquatic Preserve
	St. Andrews State Park
	Vamar Underwater Archaeological Preserve

Coastal wetlands are highly sensitive to oiling and can be significantly affected because of the inherent toxicity of hydrocarbon and non-hydrocarbon components of the spilled substances (Beazley et al., 2012; Lin and Mendelssohn, 2012; Mendelssohn et al., 2012). Numerous variables such as oil concentration and chemical composition, vegetation type and density, season or weather, preexisting stress levels, soil types, and water levels may influence the impacts of oil exposure on wetlands. Light oiling could cause plant die back, followed by recovery in a fairly short time. Vegetation exposed to oil that persists in wetlands could take years to recover (BOEM, 2017a). In addition to the direct impacts of oil, cleanup activities in marshes may accelerate rates of erosion and retard recovery rates (BOEM, 2017a). Impacts associated with an extensive oiling of coastal wetland habitat from a large oil spill are expected to be significant.

A review of studies by BOEM (2012a) determined that effects of oil on marsh vegetation depend on the type of oil, the type of vegetation, and environmental factors of the area. Impacts to slightly oiled vegetation are considered short term and reversible as recent studies suggest that they will experience plant die-back, followed by recovery without replanting (BOEM, 2012a). Vegetation coated with oil experiences the highest mortality rates due to decreased photosynthesis (BOEM, 2012a). A recent review of the literature and new studies indicated that oil spill impacts to seagrass beds are often limited and may be limited to when oil is in direct contact with these plants (Fonseca et al., 2017).

C.8 Socioeconomic and Other Resources

C.8.1 Recreational and Commercial Fishing

Potential impacts to recreational and commercial fishing are analyzed by BOEM (2017a). The main commercial fishing activity in deep waters of the northern Gulf of Mexico is pelagic longlining for tunas, swordfishes, and other billfishes (Continental Shelf Associates, 2002; Beerkircher et al., 2009). Pelagic longlining has occurred historically in the project area, primarily during spring and summer. In August 2000, the federal government closed two areas in the northeastern Gulf of Mexico to longline fishing (65*FR* 47214). The lease is outside of the closure areas.

Longline gear consists of monofilament line deployed from a moving vessel and generally allowed to drift for 4 to 5 hours (Continental Shelf Associates, 2002). As the mainline is put out, baited leaders and buoys are clipped in place at regular intervals. It takes 8 to 10 hours to deploy a longline and about the same time to retrieve it. Longlines are often set near oceanographic features such as fronts or downwellings, with the aid of sophisticated on-board temperature sensors, depth finders, and positioning equipment. Vessels typically are 33 to 98 ft (10 to 30 m) long, and their trips last from about 1 to 3 weeks.

It is unlikely that any commercial fishing activity other than longlining occurs at or near the project area. Benthic species targeted by commercial fishers occur on the upper continental slope, well inshore of the project area. Royal red shrimp (*Pleoticus robustus*) are caught by trawlers in water depths of about 820 to 1,804 ft) (250 to 550 m) (Stiles et al., 2007). Tilefishes (primarily *Lopholatilus chamaeleonticeps*) are caught by bottom longlining in water depths from about 540 to 1,476 ft (165 to 450 m) (Continental Shelf Associates, 2002).

Most recreational fishing activity in the region occurs in water depths less than 656 ft (200 m) (Continental Shelf Associates, 1997; 2002; Keithly and Roberts, 2017). In deeper water, the main attraction to recreational fishers would be petroleum platforms offshore Texas and Louisiana. Due to the distance from shore, it is unlikely that recreational fishing activity is occurring in the project area.

The only IPFs associated with routine operations that potentially may affect fisheries is drilling rig presence (including marine sound and lights). Two types of potential accidents are also addressed below (a small fuel spill and a large oil spill). These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Drilling Rig Presence, Marine Sound, and Lights

There is a slight possibility of pelagic longlines becoming entangled in the drilling rig. For example, in January 1999, a portion of a pelagic longline snagged on the acoustic Doppler current profiler of a drillship working in the Gulf of Mexico (Continental Shelf Associates, 2002). The line was removed without incident. Generally, longline fishers use radar and are aware of offshore structures and ships when placing their sets. Therefore, little or no impact on pelagic longlining is expected.

Because it is unlikely that any recreational fishing activity is occurring in the project area, no adverse impacts are anticipated. Other factors such as effluent discharges are likely to have negligible impacts on commercial or recreational fisheries due to rapid dispersion, the small area of ocean affected, and the intermittent nature of the discharges.

Impacts of a Small Fuel Spill

The probability of a fuel spill is expected to be minimized by Anadarko's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Anadarko's OSRP is expected to potentially mitigate and reduce the potential for impacts. EP Section H provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very brief.

Pelagic longlining activities in the project area, if any, could be interrupted in the event of a small fuel spill. The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions (see **Section A.9.1**). Fishing activities could be interrupted due to the activities of response vessels operating in the project area. A small fuel spill would not affect coastal water quality because the spill would not be expected to make landfall or reach coastal waters prior to dissipating (see **Section A.9.1**).

Impacts of a Large Oil Spill

Potential spill impacts on fishing activities are discussed by BOEM (2017a). For this EP, there are no unique site-specific issues with respect to this activity.

Pelagic longlining activities in the project area and other fishing activities in the northern Gulf of Mexico could be interrupted in the event of a large oil spill. A spill may or may not result in fishery closures, depending on the duration of the spill, the oceanographic and meteorological conditions at the time, and the effectiveness of spill response measures. The *Deepwater Horizon* incident provides information about the maximum potential extent of fishery closures in the event of a large oil spill in the Gulf of Mexico (NMFS, 2010a). At its peak on 12 July 2010, closures encompassed 84,101 mi^2 (217,821 km^2), or 34.8% of the U.S. Gulf of Mexico Economic Exclusion Zone.

According to BOEM (2012a, 2017a), the potential impacts on commercial and recreational fishing activities from an accidental oil spill are anticipated to be minimal because the potential for oil spills is very low, the most typical events are small and of short duration, and the effects are so localized that fishes are typically able to avoid the affected area. Fish populations may be affected by an oil spill event should it occur, but they would be primarily affected if the oil reaches the productive shelf and estuarine areas where many fishes spend a portion of their life cycle (BOEM, 2012a). The probability of an offshore spill affecting these nearshore environments is also low. Should a large oil spill occur, economic impacts on commercial and recreational fishing activities would likely occur but are difficult to predict because impacts would differ by fishery and season (BOEM, 2016b).

C.8.2 Public Health and Safety

There are no IPFs associated with routine operations that are expected to affect public health and safety. Impacts of a large oil spill are addressed below. A small fuel spill would be unlikely to cause any impacts on public health and safety because it would affect only a small area of the open ocean. The project area is approximately 51.6 mi (81.6 km) from the nearest shoreline, and nearly all of the diesel fuel would evaporate or disperse naturally within 24 hours (see **Section A.9.1**).

Impacts of a Large Oil Spill

In the event of a large spill from a blowout, the main safety and health concerns are those of the offshore personnel involved in the incident and those responding to the spill. Once released into the water column, crude oil weathers rapidly (National Research Council, 2003a). Depending on many factors such as spill rate and duration, the physical/chemical characteristics of the oil, meteorological, and oceanographic conditions at the time, and the effectiveness of spill response measures, weathered oil may remain present on the sea surface and reach coastal shorelines.

Based on data collected during the *Deepwater Horizon* Incident, the health risks resulting from a large oil spill appear to be minimal (Centers for Disease Control and Prevention, 2010). Health risks for spill responders and wildlife rehabilitation workers responding to a major oil spill are similar to the health risks incurred by response personnel during any large-scale emergency or disaster response (U.S. Department of Homeland Security, 2014), which includes the following:

- Possible accidents associated with response equipment;
- Hand, shoulder, or back pain, along with scrapes and cuts;
- Itchy or red skin or rashes due to potential chemical exposure;
- Heat or cold stress depending upon the working environment; and
- Possible upper respiratory symptoms due to potential dust inhalation, allergies, or potential chemical exposure.

C.8.3 Employment and Infrastructure

There are no IPFs associated with routine operations that are expected to affect employment and infrastructure. The project involves drilling with support from existing shorebase facilities in Louisiana. No new or expanded facilities will be constructed, and no new employees are expected to move permanently into the area. The project will have a negligible impact on socioeconomic conditions such as local employment, existing offshore and coastal infrastructure (including major sources of supplies, services, energy, and water), and minority and lower income groups. Impacts of a large oil spill are addressed below. A small fuel spill that dissipates within a few days would have little or no economic impact as the spill response would use existing facilities, resources, and personnel.

Impacts of a Large Oil Spill

Potential socioeconomic impacts of an oil spill are discussed by BOEM (2017a). For the EIA, there are no unique site-specific issues with respect to employment and coastal infrastructure. A large spill could cause economic impacts in several ways: it could result in extensive fishery closures that put fishermen out of work; it could result in temporary employment as part of the response effort (including the establishment of spill response staging areas); it could result in adverse publicity that affects employment in coastal recreation and tourism industries; and it could result in suspension of OCS drilling activities, including service and support operations that are an important part of local economies.

C.8.4 Recreation and Tourism

There are no known recreational uses of the project area. Recreational resources and tourism in coastal areas would not be affected by any routine activities due to the distance from shore. Compliance with NTL BSEE-2015-G03 is intended to minimize the chance of trash or debris being lost overboard from the drilling rig and subsequently washing up on beaches. A small fuel spill in the project area would be unlikely to affect recreation and tourism because, as explained in **Section A.9.1**, it would not be expected to make landfall or reach coastal waters prior to dispersing naturally.

Impacts of a Large Oil Spill

Potential impacts of an oil spill on recreation and tourism are discussed by BOEM (2017a). For this EP, there are no unique site-specific issues with respect to these impacts.

Impacts on recreation and tourism would vary depending on the duration of the spill and its fate including the effectiveness of response measures. A large spill that reached coastal waters and shorelines could adversely affect recreation and tourism by contaminating beaches and wetlands, resulting in negative publicity that encourages people to stay away.

Based on the 30-day OSRA modeling (**Table 3**) indicates nearshore waters and embayments in Plaquemines Parish, Louisiana is the coastal area most likely to be affected (4% probability within 3 days, 14% probability within 10 days, and 21% probability within 30 days). Other shorelines from Cameron Parish, Louisiana to Bay County, Florida could be affected within 30 days ranging from 1% to 3% probability contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Matagorda County, Texas to Levy County, Florida (up to 24% conditional probability within 60 days).

According to BOEM (2017a), should an oil spill occur and contact a beach area or other recreational resource, it could cause some disruption during the impact and cleanup phases of the spill. In the unlikely event that a spill occurs that is sufficiently large to affect large areas of the coast and, through public perception, have effects that reach beyond the damaged area, effects to recreation and tourism could be significant (BOEM, 2012a).

C.8.5 Land Use

Land use along the northern Gulf coast is discussed by BOEM (2017a). There are no routine IPFs that potentially may affect land use. The project will use existing onshore support facilities in Louisiana. The land use at the existing shorebase sites is industrial. The project will not involve any new construction or changes to existing land use and, therefore, will not have any impacts. Levels of boat and helicopter traffic as well as demand for goods and services including scarce coastal resources, will represent a small fraction of the level of activity occurring at the shorebases.

A large oil spill is the only relevant IPF. A small fuel spill should not have any impacts on land use, as the response would be staged out of existing shorebases and facilities.

Impacts of a Large Oil Spill

The initial response for a large oil spill would be staged out of existing facilities, with no expected effects on land use. A large spill could have limited temporary impacts on land use along the coast if additional staging areas were needed. For example, during the *Deepwater Horizon* incident, temporary staging areas were established in Louisiana, Mississippi, Alabama, and Florida for spill response and cleanup efforts. In the event of a large spill in the project area, similar temporary staging areas could be needed. These areas would eventually return to their original use as the response is demobilized. It is not expected that a large oil spill and subsequent cleanup would substantially reduce available space in nearby landfills or decrease their usable life (BOEM, 2014).

An accidental oil spill is not likely to significantly affect land use and coastal infrastructure in the region, in part because an offshore spill would have a small probability of contacting onshore resources. BOEM (2016b) states that landfill capacity would probably not be an issue at any phase of an oil spill event or the long-term recovery. In the case of the *Deepwater Horizon* incident and response, the USEPA reported that existing landfills receiving oil spill waste had plenty of capacity to handle waste volumes; the wastes that were disposed of in landfills represented less than 7% of the total daily waste normally accepted at these landfills (USEPA, 2016).

C.8.6 Other Marine Uses

The project area is not located within any USCG-designated fairway, shipping lane, or Military Warning Area. Anadarko will comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft. The site clearance letters for the proposed wellsites identified no existing seafloor infrastructure within 2,000 ft (610 m) of the proposed wellsites but no impacts on existing infrastructure are expected. The archaeological survey reported no archaeologically significant sonar contacts were identified within 2,000 ft (610 m) of the proposed wellsites (Ocean Geo Solutions, 2020a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w).

There are no IPFs from routine project activities that are likely to affect other marine uses of the project area. A large oil spill is the only relevant accident IPF. A small fuel spill would not have any impacts on other marine uses because spill response activities would be mainly within the project area and the duration would be brief.

Impacts of a Large Oil Spill

An accidental spill would be unlikely to significantly affect shipping or other marine uses. In the event of a large spill requiring numerous response vessels, coordination would be required to manage the vessel traffic for safe operations. Anadarko will comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft.

In the event of a large spill requiring numerous vessels in the area, coordination would be required to ensure that no anchoring or seafloor-disturbing activities occur near the existing infrastructure.

C.9 Cumulative Impacts

For purposes of the National Environmental Policy Act, a cumulative impact is defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7). Any single activity or action may have a negligible impact(s) by itself, but when combined with impacts from other activities in the same area and/or time period, substantial impacts may result.

Prior Studies. BOEM prepared a multi-lease sale EIS in which it analyzed the environmental impact of activities that might occur in the multi-lease sale area. The level and types of activities planned in Anadarko's EP are within the range of activities described and evaluated by BOEM in the 2017 to 2022 Programmatic Environmental Impact Statement for the OCS Oil and Gas Leasing Program (BOEM, 2016a), and the Final Programmatic EIS for Gulf of Mexico OCS Oil and Gas Lease Sales 2017-2022 (BOEM, 2017a). Past, present, and reasonably foreseeable activities were identified in the cumulative effects scenario of these documents, which are incorporated by reference. The proposed action should not result in any additional impacts beyond those evaluated in the multi-lease sale and Final EISs (BOEM, 2012a, 2013, 2014, 2015, 2016b, 2017a).

<u>Description of Activities Reasonably Expected to Occur in the Vicinity of Project Area</u>. Other exploration and development activities may occur in the vicinity of the project area. Anadarko does not anticipate other projects in the vicinity of the project area beyond the types of projects analyzed in the lease sale and Supplemental EISs (BOEM, 2012a, 2013, 2014, 2015, 2016b, 2017a).

<u>Cumulative Impacts of Activities in this EP</u>. The BOEM (2017a) Final EIS included a discussion of cumulative impacts, which analyzed the incremental environmental and socioeconomic impacts of the 10 proposed lease sales, in addition to all activities (including non-OCS activities) projected to occur from past, proposed, and future lease sales. The EISs considered exploration, delineation, and development wells; platform installation; service vessel trips; and oil spills. The EISs examined the potential cumulative effects on each specific resource for the entire Gulf of Mexico.

The level and type of activity proposed in Anadarko's EP are within the range of activities described and evaluated in the recent lease sale EISs. The EIA incorporates and builds on these analyses by examining the potential impacts on physical, biological, and socioeconomic resources from the work planned in this EP, in conjunction with the other reasonably foreseeable activities expected to occur in the Gulf of Mexico. For all impacts, the incremental contribution of Anadarko's proposed actions to the cumulative impacts analysis in these prior analyses are not expected to be significant.

D. Environmental Hazards

D.1 Geologic Hazards

The site clearance letters provided by Anadarko concluded that the proposed wellsites are generally favorable for exploratory drilling (Ocean Geo Solutions, 2020a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w). See EP Section C for supporting geological and geophysical information.

D.2 Severe Weather

Under most circumstances, weather is not expected to have any effect on the proposed activities. Extreme weather, including high winds, strong currents, and large waves, was considered in the design criteria for the drilling rig under consideration for this project. High winds and limited visibility during a severe storm could disrupt support activities (vessel and helicopter traffic) and make it necessary to suspend some activities for safety reasons until the storm or weather event passes. In the event of a hurricane, procedures as outlined in the Hurricane Evacuation Plan would be adhered to. Evacuation in the event of a hurricane or other severe weather would increase the number and frequency of support vessel and helicopter trips to and from the project area.

D.3 Currents and Waves

Metocean conditions such as sea states, wind speed, ocean currents, etc. will be continuously monitored. Under most circumstances, physical oceanographic conditions are not expected to have any effect on the proposed activities. Strong currents (e.g., caused by Loop Current eddies and intrusions) and large waves were considered in the design criteria for the drilling rig selected for this project. High waves during a severe storm could disrupt support activities (i.e., vessel and helicopter traffic), and risks to the drilling program brought on by such conditions would be closely monitored and managed by the team managing the project. In some cases, it may be necessary to suspend some activities on the drilling rig for safety reasons until the storm or weather event passes.

E. Alternatives

No formal alternatives were evaluated in the EIA for the proposed project. However, various technical and operational options, including the location of the wellsite and the selection of a potential drilling unit, were considered by Anadarko.

F. Mitigation Measures

The proposed action includes numerous mitigation measures required by laws, regulations, and BSEE and BOEM lease stipulations and NTLs. The project will comply with all applicable federal, state, and local requirements concerning air pollutant emissions, discharges to water, and solid waste disposal. All project activities will be conducted under guidance by Anadarko's OSRP and Safety and Environmental Management System. Additional information can be found in EP Section H.

G. Consultation

No persons or agencies other than those listed as Preparers (**Section H**) were consulted during the preparation of the EIA.

H. Preparers

The EIA was prepared by CSA Ocean Sciences Inc. Contributors included:

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SECTION O
ADMINISTRATIVE INFORMATION

(a) Proprietary Information

Proprietary copies of this Initial EP contain information not available to the public and include structure maps, seismic information, cross sections, depths of wells, etc.

(b) Bibliography

- Initial Exploration Plan, Control No. N-10029 and N-10117
- Shallow Hazards Reports denoted in **Section C**
- Archaeological Assessments denoted in **Section E**
- Final Sale Package for Gulf of Mexico Sale Number 231

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Application Name: BOEM Exploration Plan - BF

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Payment Type: Debit or credit card

Payment Amount: $22,038.00

Transaction Date: 12/01/2020 08:47:43 AM EST

Payment Date: 12/01/2020

Region: Gulf of Mexico

Contact: Bridget O'Farrell 832-636-1694

Company Name/No: Anadarko Petroleum Corporation, 00981

Lease Number(s): 35308, , , ,

Area-Block: Mississippi Canyon MC, 36: , : , : , : ,

Surface Locations: 6

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Form Name: BOEM Exploration Plan

Application Name: BOEM Exploration Plan - BF

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Payment Type: Debit or credit card

Payment Amount: $7,346.00

Transaction Date: 12/03/2020 04:35:52 PM EST

Payment Date: 12/03/2020

Region: Gulf of Mexico

Contact: Bridget O'Farrell 832-636-1694

Company Name/No: Anadarko Petroleum Corporation, 00981

Lease Number(s): 35308, , , ,

Area-Block: Mississippi Canyon MC, 36: , : , : , : ,

Surface Locations: 2

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Agency Tracking ID: 76055956180

Form Name: BOEM Exploration Plan

Application Name: BOEM Exploration Plan - BF

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Payment Type: Debit or credit card

Payment Amount: $22,038.00

Transaction Date: 12/02/2020 08:17:58 PM EST

Payment Date: 12/02/2020

Region: Gulf of Mexico

Contact: Bridget O'Farrell 832-636-1694

Company Name/No: Anadarko Petroleum Corporation, 00981

Lease Number(s): 35309, , , ,

Area-Block: Mississippi Canyon MC, 37: , : , : , : ,

Surface Locations: 6

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Agency Tracking ID: 76056133700

Form Name: BOEM Exploration Plan

Application Name: BOEM Exploration Plan - BF

Payment Information

Payment Type: Debit or credit card

Payment Amount: $7,346.00

Transaction Date: 12/03/2020 04:47:57 PM EST

Payment Date: 12/03/2020

Region: Gulf of Mexico

Contact: Bridget O'Farrell 832-636-1694

Company Name/No: Anadarko Petroleum Corporation, 00981

Lease Number(s): 35309, , , ,

Area-Block: Mississippi Canyon MC, 37: , : , : , : ,

Surface Locations: 2

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Agency Tracking ID: 76051729889

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Application Name: BOEM Exploration Plan - BF

Payment Information

Payment Type: Debit or credit card

Payment Amount: $18,365.00

Transaction Date: 11/19/2020 07:41:36 PM EST

Payment Date: 11/19/2020

Region: Gulf of Mexico

Contact: Bridget O'Farrell 832-636-1694

Company Name/No: Anadarko Petroleum Corporation, 00981

Lease Number(s): 35311, , , ,

Area-Block: Mississippi Canyon MC, 80: , : , : , : ,

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