

OCS-G-5998

#S-2160

In Reply Refer To: FO-2-1

August 2, 1988

Anadarko Petroleum Corporation
Attention: Mr. Ronald A. Bain
16801 Greenspoint Park Drive
Houston, Texas 77060

Gentlemen:

Reference is made to your Supplemental Plan of Exploration and accompanying information received July 19, 1988, for Lease OCS-G 5998, Block 788, Mustang Island Area. This plan includes the activities proposed for Wells B, C, D, and E.

In accordance with 30 CFR 250.33, this plan is hereby deemed submitted and is now being considered for approval.

Your plan control number is S-2160 and should be referenced in your communication and correspondence concerning this plan.

Sincerely yours,

(Orig. Sgd.) A. Donald Giroir

For

D. J. Bourgeois
Regional Supervisor
Field Operations

bcc: Lease OCS-G 5998 (OPS-3-2) (FILE ROOM)
OPS-3-4 w/ Public Info. Copy of the plan
and accomp. info. (PUBLIC RECORDS)

WWilliamson:eck:07/21/88:poecom

Office of
Program Services
AUG 4 1988
Information Services
Section



**PUBLIC INFORMATION
COPY**



RONALD A. BAIN
DIVISION EXPLORATION MANAGER

July 18, 1988

Mr. Don Solanas
Minerals Management Service
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394

Re: Revised Plan of Exploration
OCS-G 5998 Block 788
Mustang Island

Gentlemen:

The Mustang Island Block 788, OCS-G 5998, Plan of Exploration was submitted on November 15, 1983, by Mr. Ron Bain, Division Exploration Manager. Subsequent to its approval, the Anadarko Production Company No. 1 well was drilled at location 'A' of the original plan. Geological and geophysical information obtained from this well indicate the necessity to revise locations B, C, and D on the original Plan of Exploration and add one additional location, E, to the positions shown below. Consequently, we are submitting the Revised Plan of Exploration for your approval so that we may continue to evaluate this lease expeditiously.

The revised locations include:

B - 5150' FSL and 8200' FWL
C - 6700' FNL and 3800' FEL
D - 5700' FSL and 4700' FEL
*E - 6900' FNL and 5450' FEL

*New location

Accompanying this report are:

- 1) a revised well location map
- 2) a revised seismic structure map (Siph Davisi)
- 3) a "Site Specific Shallow Hazards Assessment" for all four locations prepared by Mr. Robert Talley, Division Geophysicist
- 4) index map
- 5) air quality calculations for the additional proposed well 'E'
- 6) list of mud additives and components.

PLAN-OF EXPLORATION
OCS-G 5998 BLOCK 788
MUSTANG ISLAND

-2-

July 18, 1988

Anadarko Petroleum Corporation's base of operations is located in Corpus Christi, Texas. As an active member of the Clean Gulf Associates, Anadarko has immediate access capability to the C.G.A. Oil Spill Equipment stockpiled in Corpus Christi. The C.G.A. base is located approximately forty miles from Mustang Island 788. Therefore, the oil spill equipment could be on site within four hours of notification. Anadarko has an Oil Spill Contingency Plan on file with your offices.

Exploration and any future production activity within the Mustang Island 788 area will be conducted in a manner consistent with state and federal requirements for coastal zone operations. The activities associated with this plan will be executed in compliance with all OCS orders and memoranda, and any required permits will be filed in a timely manner.

Anadarko, as an operator in the Gulf of Mexico and a member of the Clean Gulf Associates with the approved Oil Spill Contingency Plan on file with the M.M.S., intends to exercise all diligence towards protection of the environment while implementing this Revised Plan of Exploration.

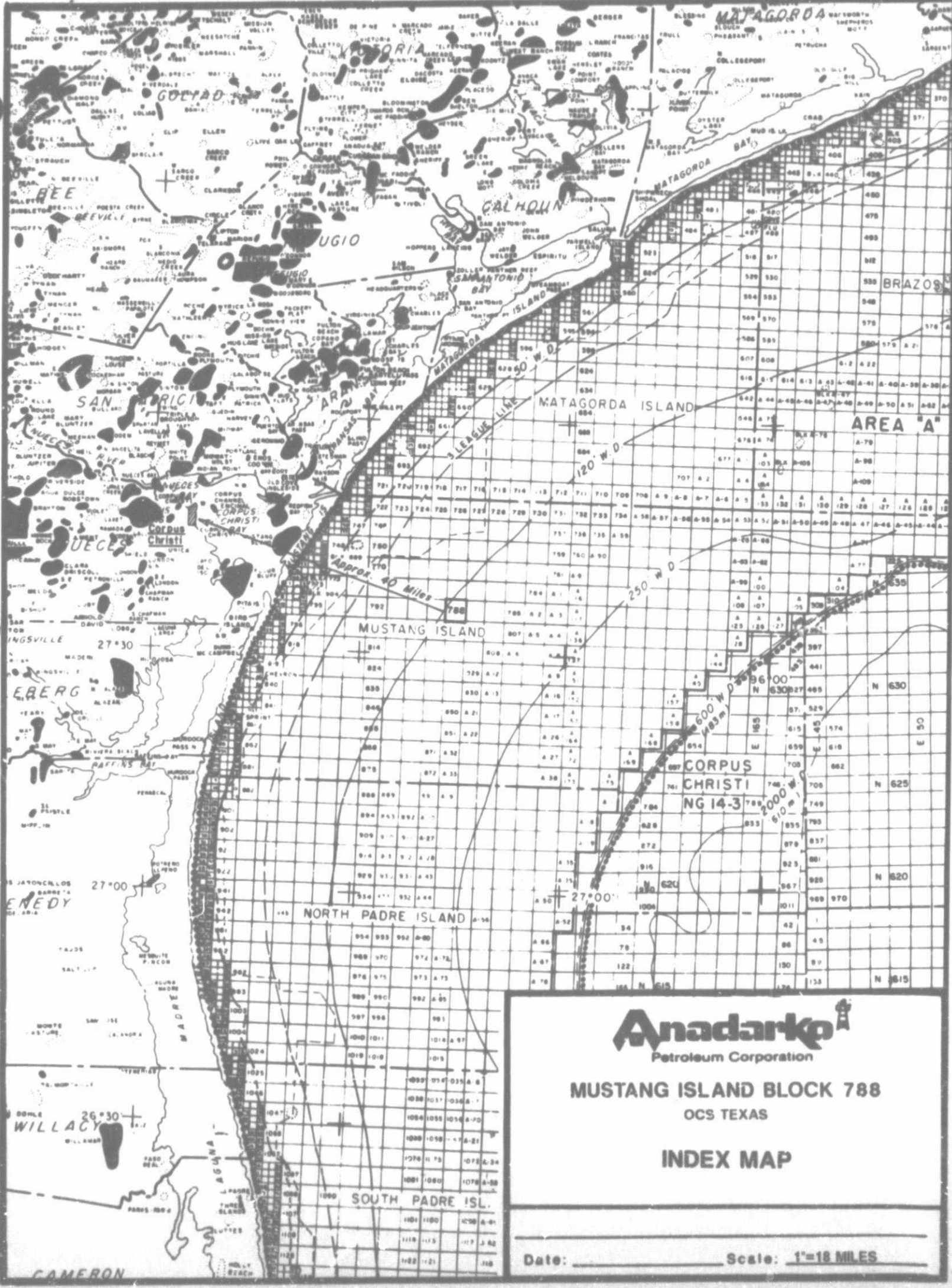
Very truly yours,

ANADARKO PETROLEUM CORPORATION

Ronald A. Bain

Ronald A. Bain
Exploration Manager
Offshore/Houston Division

PL:jg
Enclosures

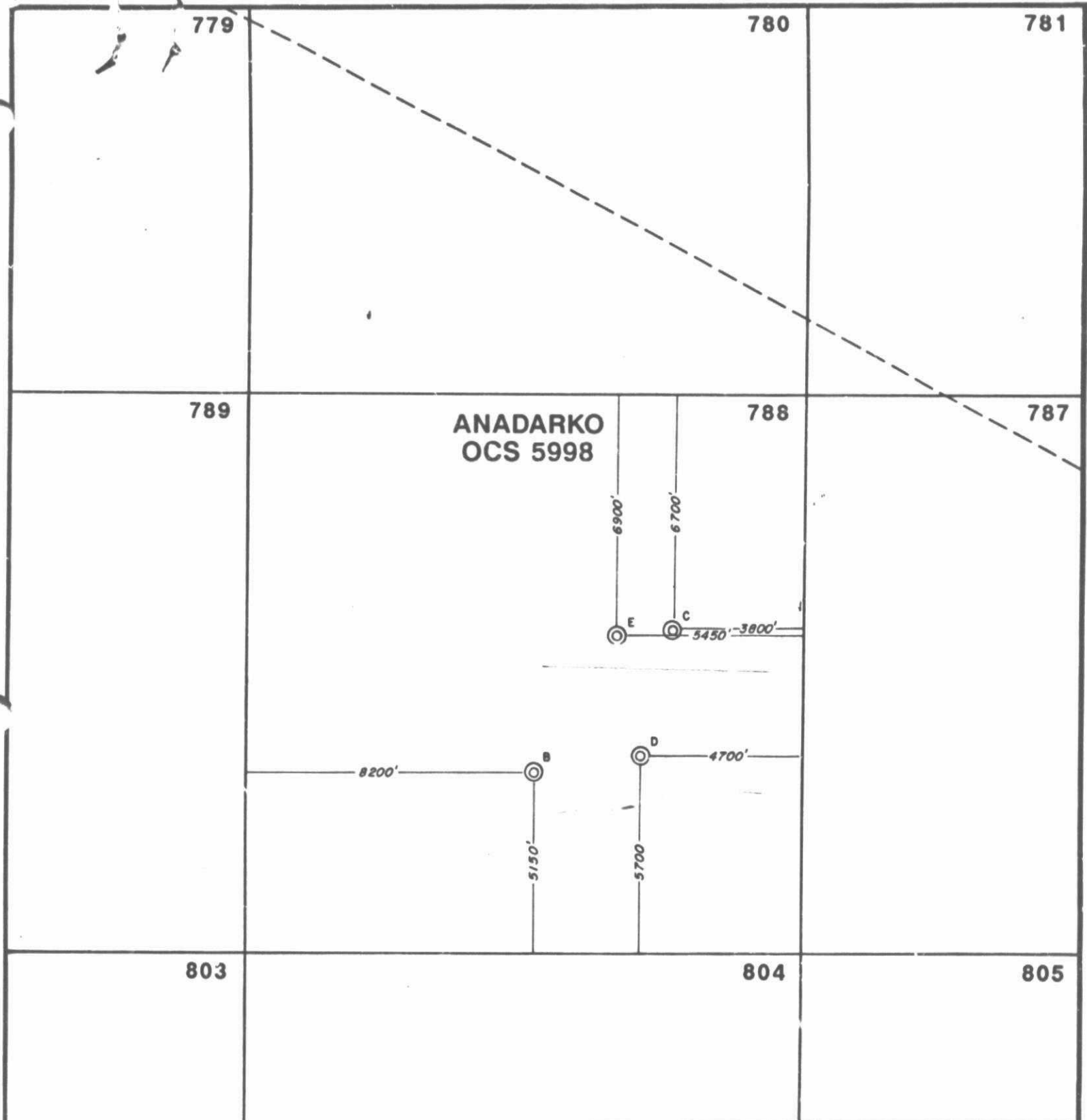


Anadarko
Petroleum Corporation

MUSTANG ISLAND BLOCK 788
OCS TEXAS

INDEX MAP

Date: _____ Scale: 1"=18 MILES



MUSTANG ISLAND BLOCK 788
OCS TEXAS

PLAN OF EXPLORATION

REVISED

Interpretation By: _____

Date: 7/88 Scale: 1' = 4000'

PLAN OF EXPLORATION - MUSTANG ISLAND BLOCK 788

SITE SPECIFIC SHALLOW HAZARDS & ARCHAEOLOGICAL REPORT

The revised proposed drill sites on Mustang Island 788 are as follows:

Mustang Is. 788	"B"	- 5150' FSL, 8200' FWL
Mustang Is. 788	"C"	- 6700' FNL, 3800' FEL
Mustang Is. 788	"D"	- 5700' FSL, 4700' FEL
Mustang Is. 788	"E"	- 6900' FNL, 5450' FEL

During January 1984, COMAP Geosurveys, Inc., conducted a high resolution geophysical survey over Mustang Island 788 for Anadarko Petroleum Corporation. The survey included sidescan sonar, sub-bottom profiler, magnetometer, fathometer, single trace analog and 12-fold digital seismic recordings with an 8 KJ sparker as the energy source. Copies of the final report were submitted to Mr. Solanas of the M.M.S.

The marine archaeological assessment of the data gathered concludes that there is no evidence of cultural resources which might be affected by oil and gas exploration in the area. The only magnetic anomaly noted relates to an abandoned well site and will be avoided in future operations.

An Anadarko geophysicist has examined the data gathered by Comap and made the following observations:

Water depths range from about 120' to 140' with the seafloor sloping gently to the southeast at about 3-4 ft. per mile.

Sidescan sonar reveals numerous small pock marks but no other significant features on the seafloor.

A single magnetic anomaly was noted in the north central portion of the block, well removed from any planned exploratory activity.

Sub-bottom profiler and sparker data suggest N-S channeling and shallow gas in several areas. Location "B" is at least 1200' away from any of these features while location "C" is 1100' away from an amplitude anomaly at 100 msec. Location "D" is at least 1750' away from an amplitude anomaly at 100 msec. and location "E" is at least 1000' away from an amplitude anomaly at 240 msec. The amplitude anomalies previously mentioned are probably gas accumulations.

Flat lying, uninterrupted seismic events exhibited by the analog sparker data indicate the four locations included in the plan to be free of faulting to depths of at least 3000'. There does appear to be a vertical discontinuity from 0.1 to 0.4 seconds that suggests a fault near the C location on a single line (255). However, Comap does not indicate a fault in the report and I can find no other evidence of a shallow fault on the adjacent lines.

MUSTANG ISLAND BLOCK 788
SITE SPECIFIC SHALLOW HAZARDS & ARCHAEOLOGICAL ASSESSMENT

In conclusion, high resolution data gathered by Comap in Mustang Island 788 suggests that oil and gas exploration can be conducted in the area with little chance of damage to cultural resources. The data further suggests that the four locations selected are free of shallow gas and/or faulting or seafloor features which might constitute a drilling or construction hazard.

Robert F. Talley

Robert F. Talley
ANADARKO PETROLEUM CORPORATION
Division Geophysicist
Offshore/Houston Division

PLAN OF EXPLORATION

MUSTANG ISLAND BLOCK 788

OCS-G-5998

INFORMATION AND CALCULATIONS ON

AIR QUALITY

AS REQUIRED BY

30 CFR 250.57

INFORMATION & CALCULATIONS
AIR QUALITY
MUSTANG ISLAND BLOCK 788

Exemption Formula

The distance to Mustang Island Block 788 from the closest onshore area of a state is approximately 45 miles. The center of Mustang Island Block 788 is approximately 27.3° north and longitude 94.4° west. The closest onshore area of a state is the coastline of Mustang Island, Texas at approximately latitude 27.7° north and longitude 97.2° west. This distance produces exemption amounts of 1499 tons/year for particulates, sulphur dioxide, nitrogen oxides and volatile organic compounds and 43,010 tons/year for carbon monoxide.

Projected Emissions

The additional well proposed in the Plan of Exploration is as follows:

<u>Proposed wells</u>	<u>Proposed Measured Depth</u>
Block 788 'E'	<u>11,500'</u>
TOTAL FEET DRILLED	11,500'

Assuming 60 horsepower hours required to drill one foot ⁽¹⁾ on an offshore oil and gas drilling rig, this plan will require 690,000 horsepower hours to complete. Using the emission factors for diesel-powered industrial equipment from Table 3.3.3-1 of EPA publication AP-42, Compilation of Air Pollutant Emission Factors, expected emissions are as follows:

<u>Pollutant</u>	<u>Total Tons</u>
Carbon Monoxide	= 2.30
Nitrogen Oxides	= 10.65
Hydrocarbons	= 0.85
Sulphur Dioxide	= 0.71
Particulates	= 0.76

Emissions due to support boats and helicopters are tabulated below:

<u>Pollutant</u>	<u>Total Tons</u> ⁽²⁾
Carbon Monoxide	71.21
Nitrogen Oxides	34.22
Hydrocarbons	5.64
Sulphur Dioxide	2.26
Particulates	2.44

Combining the anticipated emissions from the preceding tables yields the following total emissions expected from this plan:

<u>Pollutant</u>	<u>Total Tons</u>
Carbon Monoxide	73.1
Nitrogen Oxides	44.87
Hydrocarbons	6.49
Sulphur Dioxide	2.97
Particulates	3.20

Since none of these amounts approach 1499 tons (43,010 tons for carbon monoxide), we request that you determine under Section 250.57(d) that the Plan of Exploration for Mustang Island Block 788 be exempt from further air quality review.

- (1) Atmospheric emissions from offshore oil and gas development and production (EPA-450/3-77-206, June 1977).
- (2) See attached detailed emission calculations.

DETAILED EMISSION CALCULATIONS FOR SUPPORT

BOATS AND HELICOPTERS

Crew Boat

Powered by three 12V-71N General Motors diesel engines.

Emissions for one General Motors 12V-71N engine:

Fuel Consumption = 0.385 lb/BHP/HR

Horsepower = 340

Diesel = 7.3 lb/gal

Consumption = $\frac{385 (340)}{7.3} = 17.93 \text{ gal/hr}$

Conversion Factor = $\frac{17.93}{1000} \times \frac{24 \times 365 \times .75}{2000} = 0.0589 \frac{1000 \text{ gal-tons}}{\text{lb-yr}}$

Frequency of use - 6 hours per trip, 15 trips per month = 0.125 years

		<u>Tons/Yr</u>	<u>(Full Time)</u>	<u>Tons/Yr</u>
		<u>1 Engine</u>	<u>3 Engines</u>	<u>(Actual)</u>
Carbon Monoxide	= 102 lb/1000 gal X 0.0589 =	6.01	18.03	2.25
Nitrogen Oxides	= 469 lb/1000 gal X 0.0589 =	27.67	82.86	10.36
Hydrocarbons	= 37.5 lb/1000 gal X 0.0589 =	2.21	6.63	0.83
Sulphur Dioxide	= 31.2 lb/1000 gal X 0.0589 =	1.84	5.52	0.69
Particulates	= 33.5 lb/1000 gal X 0.0589 =	1.97	5.91	0.74

(Factors from AP-42 Table 3.3.3-1)

Work Boat

Powered by two D 398 Caterpillar engines

Emissions for one D 398 Caterpillar engine:

Fuel Consumption = 45 gal/hr

Conversion Factor = $\frac{45}{1000} \times \frac{24 \times 365 \times .75}{2000} = 0.148 \frac{1000 \text{ gal-tons}}{\text{lb-yr}}$

Frequency of use - 12 hours per trip, 8 trips per month - 0.13 years

		<u>Tons/Yr</u> <u>1 Engine</u>	<u>(Full Time)</u> <u>3 Engines</u>	<u>Tons/Yr</u> <u>(Actual)</u>
Carbon Monoxide	= 102 lb/1000 gal X 0.148 =	15.10	30.20	3.93
Nitrogen Oxides	= 469 lb/1000 gal X 0.148 =	69.41	138.82	18.05
Hydrocarbons	= 37.5 lb/1000 gal X 0.148 =	5.55	16.65	2.16
Sulphur Dioxide	= 31.2 lb/1000 gal X 0.148 =	4.62	9.24	1.20
Particulates	= 33.5 lb/1000 gal X 0.148 =	4.96	9.92	1.29

(Factors from AP-42 Table 3.3.3-1)

Helicopters

Fuel Usage = 45 gal/hr (gasoline)

Frequency of use - 2 hours per trip, 9 trips per week = 0.11 years

$$\text{Conversion Factor} = \frac{45}{1000} \times \frac{24 \times 365 \times .75}{2000} = 0.148 \frac{1000 \text{ gal-tons}}{\text{lb-yr}}$$

		<u>Tons/Yr</u> <u>(Full Time)</u>	<u>Tons/Yr</u> <u>(Actual)</u>
Carbon Monoxide	= 3940 lb/1000 gal X 0.148 =	583	64.13
Nitrogen Oxides	= 102 lb/1000 gal X 0.148 =	15.01	1.65
Hydrocarbons	= 132 lb/1000 gal X 0.148 =	19.54	2.15
Sulphur Dioxide	= 5.31 lb/1000 gal X 0.148 =	0.79	0.09
Particulates	= 6.47 lb/1000 gal X 0.148 =	0.96	0.11

(Factors from AP-42 Table 3.3.3-1)

Total emissions due to support boats and helicopters during the Plan of Exploration:

<u>Pollutant</u>	<u>Tons/Yr</u>
Carbon Monoxide	= 2.25 + 4.83 + 64.13 = 71.21
Nitrogen Oxides	= 10.36 + 22.21 + 1.65 = 34.22
Hydrocarbons	= 0.83 + 2.66 + 2.15 = 5.64
Sulphur Dioxide	= 0.69 + 1.48 + 0.09 = 2.26
Particulates	= 0.74 + 1.59 + 0.11 = 2.44

PLAN OF EXPLORATION

MUSTANG ISLAND AREA
BLOCK 788

OCS-G-5998

MUD ADDITIVES

The attached list of mud additives is anticipated to be used in drilling the wells outlined in this Plan of Exploration.

COMPARABLE MUD PRODUCTS BY TRADENAMES

Description	IMCO SERVICES	Baroid	Magecober	Milchem	Primary Application
WEIGHTING AGENTS AND VISCOSIFIERS					
Baryte	IMCO BAR	Baroid	Magecober	Mil-Bar	For increasing mud weight up to 20 ppg.
Calcium Carbonate	IMCO WATE		Lu-Wate	W O. 30 W O. 50	For increasing weight of oil muds up to 10.8 ppg.
Bentonite	IMCO GEL	Aquagel	Mageogel	Milgel	Viscosity and filtration control in water base muds.
Sub-Bentonite	IMCO KLAY	Baroco	High Yield Blended Clay	Green Band Clay	For use when larger particle size is desired for viscosity and filtration control.
Attapulgate	IMCO BRINEGEL	Zeogel	Salt Gel	Salt Water Gel	Viscosifier in salt water muds.
Reticulated Bentonite	IMCO HYB	Quick-Gel	Kwik-Thik	Super-Col	Quick viscosity in fresh water upper hole muds with minimum chemical treatment.
Asbestos Fibers	IMCO BEST	Floal	Floal	Floal	Viscosifier for fresh or salt water muds.
Bacterially Produced Polymer	IMCO XC	XC Polymer	Duovis	XC Polymer	Viscosifier and fluid loss control additive for low solids muds.

DISPERSANTS

Sodium Tetraphosphate	IMCO PHOS	Barafos	Magen-Phos	Oil Fos	Thinner for low pH fresh water muds.
Sodium Acid Pyrophosphate	SAPP	SAPP	SAPP	SAPP	For treating cement contamination.
Quebracho Compound	IMCO QBT	Tannex	M-C Quebracho	Tanco	Thinner for fresh water and lime muds.
Thick Extract	IMCO FLO		Rayflo	Rayflo	Thinner for fresh water muds and in muds containing salt (10,000 to 15,000 ppm).
Modified Tannin	DESCO	Descu	Descu	Descu	Thinner for fresh and salt water muds alkalinized for pH control.
Mined Lignite	IMCO LIG	Carbinox	Tann A Thin	Ligen	Dispersant, emulsifier and supplementary additive for fluid loss control.
Causticized Lignite	IMCO THIN	CC-15	Caustilig	Ligen	1-4 ratio caustic-lignite dispersant, emulsifier and supplementary fluid loss additive.
Calcium Lignosulfonate	IMCO CAL		Kambreak		Thinner for SCR and lime muds.
Modified Lignosulfonate	IMCO VC-10	Q-Broxin	Sperene	Uni-Cal	Dispersant and fluid loss control additive for water base muds.
Blended Lignosulfonate Compound	IMCO RD-111				Blended multi-purpose dispersant, fluid loss agent and inhibitor for IMCO RD-111 mud systems.

FLUID LOSS REDUCERS

Pregelatinized Starch	IMCO LOID	Impermex	My-Lu-Jel	Milstarch	Controls fluid loss in saturated salt water, lime and SCR muds.
Sodium Carboxymethyl Cellulose	IMCO CMC (Regular)	Cellex (Regular)	Magen CMC (Regular)	Milchem CMC (Med-Vis)	For fluid loss control and barite suspension in water base muds.
Sodium Carboxymethyl Cellulose	IMCO CMC (Hi-Vis)	Cellex (Hi-Vis)	Magen CMC (Hi-Vis)	Milchem CMC (Hi-Vis)	For fluid loss control and viscosity building in low solids muds.
Sodium Carboxymethyl Cellulose	IMCO CMC (Tech Grade)	Cellex (Tech Grade)	Magen CMC (Tech Grade)	Milchem CMC (Tech Grade)	For fluid loss control in gyp, sea water and fresh water fluids.
Polyanionic Cellulosic Polymer	DRISPAC	Drispac	Drispac	Drispac	Fluid loss control additive and viscosifier in salt muds.
Sodium Polyacrylate	CYPAN	Cypan	Cypan	Cypan	Fluid loss control in calcium-free low solids and non-dispersed muds.
Sodium Polyacrylate	WL-100	WL-100	WL-100	WL-100	Fluid loss control in calcium-free low solids and non-dispersed muds.

COMPARABLE MUD PRODUCTS BY TRADENAMES — Continued

Description	IMCO SERVICES	Baroid	Magcober	Milchem	Primary Application
LUBRICANTS, DETERGENTS, EMULSIFIERS					
Extreme Pressure Lubricant	IMCO EP LUBE	EP Mud Lube	Bit Lube	Lubri-Film	Used in water base muds to impart extreme pressure lubricity.
Processed Hydrocarbons	SOLTEX	Soltex	Soltex	Soltex	Used in water base muds to lower down-hole fluid loss and minimize heaving shale.
Water Dispersible Asphalts	IMCO HOLECOAT		STABIL-HOLE	ITI-WD	Lubricant and fluid loss reducer for water base muds that contain no diesel or crude oil.
Oil Dispersible Asphalts	IMCO MUD OIL	Baroid Asphalt	Save-A-Hole	Carbo-Seal	Lubricant and fluid loss reducer for water base fluids that contain diesel or crude oil.
Oil Soluble Surfactants	IMCO FREEPIPE	Skot-Free	Pipe Lax	Petrocote	Non-weighted fluid for spotting to free differentially stuck pipe.
Detergent	IMCO MD	Con Det	D-D	Milchem MD	Used in water base muds to aid in dropping sand. Emulsifies oil, reduces torque and minimizes bit-balling.
Non-Ionic Emulsifier	DME	Aktaflo-E	SurFak-E	DME	Emulsifier for surfactant muds.
Blend of Anionic Surfactants	IMCO SWS	Trimulso	Salinex	Atlosol & Atlosol S	Emulsifier for salt and fresh water muds.
An Organic Entry Neutralized with Amines	IMCO LUBRIKLEEN	TorqTrim	DOS-3	Mil-Plate 2	Supplies the lubricating properties of oils without environmental pollution.
Blend of Fatty Acids, Sulfonates, & Asphaltic Materials	IMCO SPOT	SF 100			Invert emulsion which may be weighted to desired density for spotting to free differentially stuck pipe.

DEFOAMERS, FLOCCULANTS, BACTERICIDES

Aluminum Stearate	Aluminum Stearate	Aluminum Stearate	Aluminum Stearate	Aluminum Stearate	Defoamer for lignosulfonate muds.
Sodium Alkyl Aryl Sulfonate	IMCO DEFOAM		Magconol Defoamer		Defoamer for salt saturated muds.
Surface Active, Dispersible Liquid Defoamer	IMCO FOAMBAN	W200 W300		LD-7	All purpose defoamer.
Flocculating Agent	IMCO FLOC	Barafloc	Floxit	Separan	Used to drop drilled solids where clear water is desirable for a drilling fluid.
Paraformaldehyde	IMCO PRESERVALOID	Aldicide	My-Lo-Jel Preservative	Preservative	Prevents starch from fermenting when used in muds of less than saturation or alkalinity less than 1.0 cc.

LOST CIRCULATION MATERIALS

Fibrous Material	IMCO FYBER	Fiberax	Mud Fiber	Mil-Fiber	Filler as well as matting material.
Fibrous Mineral Wool	IMCO WOOL		MagcoWool	Mil-Wool	Often used in areas where acids are later employed to destroy the material.
Walnut Shells:					
Fine	IMCO PLUG	Wall-Nut	Nut-Plug	Mil-Plug	Most often used to prevent lost circulation.
Medium	IMCO PLUG	Wall-Nut	Nut-Plug	Mil-Plug	Used in conjunction with fibers or flakes to regain lost circulation.
Coarse	IMCO PLUG	Wall-Nut	Nut-Plug	Mil-Plug	Used where large crevices or fractures are encountered.
Ground Mica:					
Fine	IMCO MYCA	Micstex	Magco-Mica	Milmica	Used for prevention of lost circulation.
Coarse	IMCO MYCA	Micstex	Magco-Mica	Milmica	Forms a good mat at face of well bore.
Cellophane	IMCO FLAKES	Jel Flake	Cell-O-Seal	Milflake	Used to regain lost circulation.
Combination of granules, flakes, and fibrous materials of various sizes in one sack.	IMCO KWIK SEAL	Kwik-Seal	Kwik-Seal	Kwik-Seal	Used where large crevices or fractures are encountered.
Blended high fluid loss soft plugging material	DIASEAL M	Diaseal M	Diaseal M	Diaseal M	One sack mixture for preparing soft plugs for severe lost circulation.

COMPARABLE MUD PRODUCTS BY TRADENAMES — Continued

Description	IMCO SERVICES	Baroid	Magcober	Milchem	Primary Application
	SPECIALTY PRODUCTS				
Shale Control Reagent	IMCO SCR		T-8	Caltrol	Calcium chloride mud for inhibiting the swelling of bentonitic shales.
Bentonite Extender	IMCO GELEX	Benax	Benax	Benax	Increases yield of bentonite to form very low solids drilling fluid.
Non-Ionic Surfactant	DMS	Aktaflo S	SurFak-M	DMS	Primary surfactant for formulating surfactant muds. May be used in hot holes for viscosity stability.
Filming-Amine	IMCO PT-102	Coat-C1815 Coat-415	Magco Inhibitor No. 6	Ami-Tex	Corrosion inhibitor.
Shale Inhibitor	Diammonium Phosphate	Diammonium Phosphate	Diammonium Phosphate	Diammonium Phosphate	For use in specially prepared DAP muds.
Specially Blended Zinc Compounds	IMCO SULF-X			Mil-Guard	For use as a hydrogen sulfide scavenger in water base muds.

COMMERCIAL CHEMICALS

Sodium Chromate	Sodium Chromate	Sodium Chromate	Sodium Chromate	Sodium Chromate	Used in water base muds to prevent high temperature gelation and as a corrosion inhibitor.
Sodium Hydroxide	Caustic Soda	Caustic Soda	Caustic Soda	Caustic Soda	For pH control in water base muds.
Sodium Carbonate	Soda Ash	Soda Ash	Soda Ash	Soda Ash	For treating out calcium sulfate in low pH muds.
Sodium Bicarbonate	Sodium Bicarbonate	Sodium Bicarbonate	Sodium Bicarbonate	Sodium Bicarbonate	For treating out calcium sulfate or cement in high pH muds.
Barium Carbonate	Barium Carbonate	Anhydros	Barium Carbonate	Barium Carbonate	For treating out calcium sulfate (pH should be above 10 for best results).
Calcium Sulfate	Gypsum	Gypsum	Gypsum	Gypsum	Source of calcium for formulating gypsum muds.
Calcium Hydroxide	Lime	Lime	Lime	Lime	Source of calcium for formulating lime muds.
Sodium Chloride	Salt	Salt	Salt	Salt	For saturated salt muds and resistivity control.
Chrome Alum (chromic chloride)	Chrome Alum	Chrome Alum	Chrome Alum	Chrome Alum	For use in cross-linking XC Polymer systems

OIL BASE AND INVERT EMULSION SYSTEMS

Invert Emulsion System	IMCO KENOL-S and IMCO KEN-X	Invermul	Vertoil	Carbo-Tec	Drilling fluids used where extremely high temperatures are encountered also a drilling, completion or workover fluid applicable where only oil contact with formations is desired.
Low Cost Invert Emulsion System	IMCO OIL-X		LoCOM		Inexpensive invert used where low density muds are used and low temperatures are encountered.
*Oil Base Mud	IMCO KEN-SUPREME		Oilfaze		For drilling water sensitive formations.
Gelatinous Oil Base Fluid	IMCO KEN-PAK	SF-100			A time setting gelatinous oil pack for casing recovery and corrosion control.

OIL MUD ADDITIVES

Primary Emulsifier	IMCO KENOL-S(D) and IMCO KEN-X Conc. #1(L)	Invermul	Vertoil	Carbo-Tec(D) and Carbo-Tec(L)	Primary additives to form stable water-in-oil emulsion.
Viscosifier and Gelling Agent	IMCO KEN-GEL and IMCO KEN-X Conc. #2	Gel-Tone and Petro-Tone	VG-69	Carbo-Gel	Provides viscosity, weight suspension, and filtration control.
High Temperature Stabilizer	IMCO KEN-X Conc. #3	Duratone HT	DV-22 and DV-33		Improves emulsion under high temperature conditions.
Stabilizes Borehole Conditions	IMCO VR				Stabilizes running shale, improves emulsion, weight suspension, and fluid loss under high temperature conditions.
Dispersant	IMCO KEN-THIN	OMC and Dri-treat	Verthin and SE-11		Dispersant for reducing rheological properties.
Calcium Oxide	IMCO KENOX				Calcium source for saponification

COMPARABLE M) PRODUCTS BY TRADENAMES — Continued

Description	IMCO SERVICES	Baroid	Magcober	Milchem	Primary Application
OIL MUD ADDITIVES — Continued					
Fatty Acid Emulsifier	IMCO KEN-SUPREME Conc. A		Oilfare		Primary emulsifier and stabilizer for oil-base drilling fluids
Emulsion Stabilizer	IMCO KEN-SUPREME Conc. B		DG-55		Imparts gels, contributes to viscosity for weight suspension, and provides filtration control
Specifically Modified Saponified Fatty Acid Chemical	IMCO KEN-PAK	SF-100			Gelling agent for formulating high gelation casing packs
Finely Divided Silicate	IMCO KEN-THERM				Contributes to thixotropic properties and reduces thermal conductivity in Hi-Temp Ken-Pak

NOTES