In Reply Refer To: MS-4

MAR 26 1985

ARCO Oil and Gas Company
South Louisiana District
Attention: Mr. W. A. Fischer
Post Office Box 51401, Oil Center Stat
Lafayette, Louisiana 70505

Gentlemen.

Reference is made to your Supplemental Development Operations Coordination Document (DOCD) and Environmental Report received March 19, 1985, for Leases OCS-G 1608 and 2137, Block 60, and Lease OCS-G 2943, Block 59, South Pass Area. This DOCD includes the activities proposed for Platform G and 13 wells.

In accordance with 30 CFR 250.34, revised December 13, 1979, and Notice to Lessees and Operators No. 84-1, this DOCD has been determined to be complete as of March 26, 1985, and is now being considered for approval.

Your control number is S-1585 and should be referenced in your communication and correspondence concerning this DOCD.

Sincerely yours,

Orig. Sgd. A. Donald Giroir

for D. W. Solanas
Regional Supervisor
Rules and Production

bcc: Lease OCS-G 1608 (OPS-3-2) (FILE ROOM)
Lease OCS-G 2137 (OPS-3-2) (FILE ROOM)
Lease OCS-G 2943 (OPS-3-2) (FILE ROOM)
OPS-3-4 w/Public Info. Copy of the DOCD and ER (PUBLIC RECORDS ROOM)
DO-5

ADGobert:gtj:3/21/85:Disk 3b

Office of
Program Services

MAR 28 1985

Records Management
Section

☐ ARCO Exploration Company ◆
☒ ARCO Oil and Gas Company ◆

**Record Of Shipment Of Confidential Information**

District: South Louisiana

To:
Mr. D. W. Solanas
Deputy Minerals Manager
Minerals Management Service
P. O. Box 7944
Metairie, Louisiana 70010-7944

From:
Nelson Robertson
ARCO Oil and Gas Company
P. O. Box 51408
Lafayette, Louisiana

☒ Enclosed ☐ Under separate cover ☐ Via _____

Subject:
Supplemental Development Operations Coordination Documents:

OCS-G 1608 South Pass Block 60 OCS-G 2943 South Pass Block 60
OCS-G 2137 South Pass Block 60 SOUTH PASS BLOCK 61 FIELD

| Quantity | Map number & description | | |
|---|---|---|---|
| 5 | Development Plan Plat | 31-14225 71-75 | (Exhibit 13) |
| 5 | Upper J Sand Structure Map | 31-14226 71-75 | (Exhibit 14) |
| 5 | K Sand Structure Map | 31-14227 71-75 | (Exhibit 15) |
| 5 | Lower L Sand Structure Map | 31-14228 71-75 | (Exhibit 16) |
| 5 | Upper M Sand Structure Map | 31-14229 71-75 | (Exhibit 17) |
| 5 | Middle M Sand Structure Map | 31-14230 71-75 | (Exhibit 18) |
| 5 | Bottom Hole Location | 31-14254 71-75 | (Exhibit 12) |

Note—Please verify and acknowledge receipt, by signing and returning the second copy of this transmittal.

Shipped by: Nelson Robertson Date: 3-18-85

Received by: Angie B. Hallett MINERALS MANAGEMENT SERVICE Date: 3-19-85

Remarks:

MAR 19 1985

RULES AND PRODUCTION

AR3B-1370-F

COASTAL ZONE MANAGEMENT

CONSISTENCY CERTIFICATION

SUPPLEMENTAL DOCD
Type of Plan

| AREA AND BLOCK | LEASE NUMBERS |
|---|---|
| SOUTH PASS BLOCK 61 FIELD | 1608, 1611, 1612, 2137, 2938, 2942, 2943, 3337 |

The proposed activities described in detail in the Plan comply with Louisiana and Mississippi's approved Coastal Management Programs and will be conducted in a manner consistent with such Programs.

ATLANTIC RICHFIELD COMPANY
Lessee or Operator

BY: ARCO OIL AND GAS COMPANY

District Facilities Engineer
Certifying Official

2-25-85
Date

**ARCO Oil and Gas Company**
South Louisiana District
Post Office Box 51408, Oil Center Station
Lafayette, Louisiana 70505
Telephone 318 264 4000

March 15, 1985

MINERALS MANAGEMENT SERVICE

MAR 19 1985

RULES AND PRODUCTION

Mr. D. W. Solanas
Deputy Minerals Manager
Minerals Management Service
Post Office Box 7944
Metairie, Louisiana 70010-7944

Dear Mr. Solanas:

Re: Supplemental Development Operations Coordination Document
OCS-G-1608 South Pass Block 60
OCS-G-2137 South Pass Block 60
OCS-G-2943 South Pass Block 59
South Pass Block 61 Field

Fourteen copies of the Supplemental Development Operations Coordination Document (DOCD) for the OCS-G-1608, OCS-G-2137, OCS-G-2943 leases in South Pass Block 61 Field are hereby submitted in compliance with applicable provisions of 30 CFR 250.34. In accordance with the guidelines presented in your letter OS-7-1 we consider five of the fourteen copies of the Supplemental Development Operations Coordination Document submitted as proprietary copies. These copies include geophysical, geological, and well location data which we request be held confidential as we believe this data to be exempt from disclosure under the Freedom of Information Act.

250.34 - 2(a)(1)(i) & (vii)

The supplemental development on these leases will take place from our proposed South Pass Block 60 platform "G" which will be installed on lease OCS-G-1608. The jacket to be used for this platform is from existing company surplus and is currently undergoing modifications for use in South Pass Block 60. The deck for this platform is the existing deck from our South Pass Block 67 "A" platform with a full complement of production equipment, which will remain in service until the deck is removed. A replacement deck will be installed on South Pass Block 67 "A" platform with a minimal amount of production equipment in order to continue production. A more detailed description of the deck exchange is included in the platform permit application, submitted concurrently with the supplemental DOCD.

Our activities begin with material ordered on October 21, 1984, and extend to about March 12, 1987, when our G-15 well is estimated to be completed. Exhibits 1 and 2 show the approximate schedule of the major activities (design, material procurement, fabrication, and installation of the platform plus drilling and initial production) through the completion of the first well. Exhibit 3 lists an approximate development schedule for the first fifteen prospective wells. This schedule is only an estimate, which may be revised in the future due to loss time for weather and/or unforeseen drilling problems.

250.34 - 2(a)(1)(ii) & (v) & (vi)

Construction methods common to the Gulf of Mexico will be utilized. Simultaneous drilling and production operations are planned. A more detailed description of the platform design and important features is included in our application to install and operate this platform submitted in conjunction with this Supplemental DOCD.

South Pass Block 60 Platform "G"

A self-contained, fixed, 8 pile 35 well-slot drilling and production platform will be installed to develop South Pass Block 60 (OCS-G- 1608 and OCS-G-2137) and Block 59 (OCS-G-2943) in approximately the third quarter, 1985. The location of these leases and proposed platform are shown on exhibit 4 and 5.

Emergency egress is available via two independent boat landings and two escape capsules, one suspended from each deck. Escape ropes will be provided at several locations on the platform deck. A firewall will completely separate the wellhead area form the production vessels on the cellar (production) deck.

The platform will be equipped with a 4000 gpm firewater pump and a deluge system in the well bay area. There are also hose reel stations at six (6) locations on both decks of the platform.

The platform will be equipped with two (2) 2000 lb. dry chemical fire extinguishing systems which will provide protection on the cellar (production) deck of the platform. Four (4) remote reels will be located such that the systems can provide redundancy to each other should one be damaged or inaccessible. In addition, 30 lb. hand-held dry chemical extinguishers will be located at strategic locations on both decks of the platform. The platform will be equipped with an approved automatic shutdown system to shut-in producing wells should conditions warrant.

The platform will be equipped with a vent boom which in the case of emergency or upset will discharge the lighter than air gas at an elevation of 120' above the drilling deck. The gas venting system will be equipped with a scrubber of sufficient size to prevent accidental discharge of liquids out of the gas venting system.

The platform will be set adjacent to and bridge connected with our South Pass Block 60 "D" platform. (See Exhibit 5). Platform "G" will be an extension of the existing South Pass Block 60 "A-D" complex. All process piping, electrical systems and safety shut-down systems on platform "G" will be fully integrated with the "A-D" complex. The interconnected piping on the "A-D-G" complex will allow production from platform "G" to be processed on platforms "A" and "D" and vise versa. Therefore, no subsea pipelines are required for processing the oil and gas. The oil will be transported by surface piping from platform "G" to "D" to "A" where it will enter the existing ARCO Pipeline Company pipeline which transports all oil from the South Pass Block 61 Field. The produced gas will tie into the field low pressure gas system on platforms "D" and "A", which will allow it to be compressed on platforms "B" and "D".

South Pass Block 67 "A" Platform

The replacement deck for Block 67 "A" platform will be a full-sized drilling and production deck with 28 well slots. The platform will be equipped with only a minimal amount of production equipment to continue production from leases South Pass Block 66 OCS-G-1611 and South Pass Block 67 OCS-G-1612. The production stream will be separated into two phases, with the gas going through the existing 12" pipeline (segment line No. 6521) to South Pass Block 60 "B" platform for processing. All liquids (oil, water, emulsions) will be transported through the existing 6" oil pipeline (segment line No. 6493) to South Pass Block 60 "A" platform for processing.

All other pipelines remain in service as previously permitted and no new pipelines are needed to continue production of Block 67 "A" platform. The deck will be able to accommodate a full sized drilling rig if future drilling or workover operations are warranted.

Emergency egress is available via two independent boat landings and one escape capsule, located on the production deck. Additional life rafts or an escape capsule will be installed on the drilling deck prior to the mobilization of a drilling rig. Escape ropes will be provided at several locations on the platform deck. A firewall will completely separate the wellhead area from the production vessels on the cellar (production) deck.

The platform will be equipped with a 2500 gpm firewater pump and a firewater deluge system in the well bay area. There are also hose reel stations at six (6) locations on both decks of the platform.

The platform will be equipped with two (2) fixed 2000 lb. dry chemical fire extinguishing systems which will provide protection on the cellar (production) deck of the platform. Four (4) remote reels will be located such that the systems can provide redundancy to each other should one be damaged or inaccessible. In addition, 30 lb. hand-held dry chemical extinguishers will be located at strategic locations on both decks of the platform.

The platform will be equipped with an approved automatic shutdown system to shut-in producing wells should conditions warrant.

The platform will be equipped with a vent boom which in the case of emergency or upset will discharge the lighter than air gas at an elevation of 50' above the drilling deck. The gas venting line will be equipped with a scrubber of sufficient size to prevent accidental discharge of liquids out of the gas venting system.

General

The instrumentation and safety systems will be installed in accordance with OCS Order No. 5 and API RP 14C. A "Simultaneous Operations Plan" containing Welding and Burning Safe Practices and Procedures as required in OCS Order No. 5 will be in force when platform operations are started. The plans for South Pass Block 60 "G" platform are attached as Exhibit 6. The plans for South Pass Block 67 "A" platform were previously submitted and approved and will be adhered to.

Both platforms will be of solid deck construction with curbs, perimeter troughs, and area deck drains. The deck drain water will be handled by a production sump equipped with an oil skimming pump. Produced water on "G" platform will be treated using a settling tank and air flotation, all in series. Produced water effluent will be passed through the sump. Produced water on Block 67 "A" platform will be treated on the "A-D-G" complex in South Pass Block 60. All walkways and elevated platforms are equipped with handrails and kick plates.

The "G" platform will be equipped with a properly sized sewage disposal unit to treat human waste in accordance with applicable regulations. During the production mode on Block 67 "A" platform, sewage disposal will be directly to the Gulf since there will be less than 10 persons on the platform at any one time. A properly sized sewage disposal system will be installed prior to a drilling rig mobilization.

A self-contained, modular platform rig common to usage in the Gulf of Mexico will be used to drill the development wells on the "G" platform and any additional wells on South Pass Block 67 "A" platform (see Exhibit 7 for a drawing of a typical self-contained drilling platform). All rig equipment which use potentially pollutant type materials in their operation will be equipped with drip pans. All engines, pumps, buildings, and pipe rack areas will have curbing with collection lines tied into the platform's disposal system. To prevent the pollution of the Gulf of Mexico, all necessary prevention and control features such as drip pans, curbs, drain lines, and sumps will be utilized in accordance with OCS Order No. 7.

Cuttings and mud will be disposed of in the prescribed manner outlined in OCS Order No. 7. In the event that oil base muds are used during drilling operations, a cuttings washer will be installed on the platform (see exhibit 8). Also attached is a list of the available mud additives.

During drilling operations, diverter systems, blowout preventers, and well control equipment will be provided and maintained in accordance with OCS Order No. 2 (see exhibits 9 and 10). The platforms production facilities and pipelines will be designed, installed, and maintained according to OCS Order Nos. 5, 8, and 9 and DOT regulations in 49 CFR Parts 192 and 195. They will also have all safety systems and devices as specified in API RP 14C and in the body of this text. In accordance with OCS Order No. 5, all individual wells will have surface controlled and subsurface safety valves installed. Life jackets, life rafts, ring buoys, escape ropes, fire extinguishers, and other safety features such as warning lights and horns, as required by the U. S. Coast Guard's "Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf", will be installed. Spark arrestors will be required on all engine exhausts and, if exhaust temperatures exceed 400°F, insulated shrouding will be installed.

All Atlantic Richfield Company and contractor supervisory personnel will have attended and been certified by a MMS accredited well control school in accordance with GGS-OCS-T 1, "Training and Qualifications of Personnel in Well Control Equipment and Techniques for Drilling on Offshore Locations".

In addition, training for personnel working offshore for the first time shall include orientation and safety and motivational programs as required in OCS Order 5 in addition to their more job related training.

The existing facility at Venice, Louisiana, will serve as the shore base for this operation. The present docking facility, warehouse, yard, parking lot, and office will be used to supply the needed logistic, communication, and supervisory support. Crew boats, supply boats and helicopters that are now using this base will also support this new platform. Private radio and micro-wave channels will be expanded and a regular telephone will be installed. The shore base facility has dispatchers on duty 24 hours per day and a base coordinator. The South Pass Block 60 "G" platform will be staffed with 4-6 production personnel, approximately 25 drilling rig personnel and up to 10 service company personnel at any one time depending on the need. The South Pass Block 67 "A" platform will be operated unmanned, however, the production systems will be monitored daily by 1-2 production personnel from the adjacent Block 60 platforms, approximately a mile away.

During the course of development and production operations should there be an occurrence of pollution at the platform site, control and cleanup procedures will be implemented according to the approved "Oil Spill Contingency Plan" on file with the MMS Area Supervisor by Atlantic Richfield Company. Atlantic Richfield Company is a member of Clean Gulf Associates which has response bases at Venice, Grand Isle, Intracoastal City and Cameron in Louisiana. The response time of Clean Gulf Associates is within approximately 12 hours.

The incremental EPA Air Emissions Data for the additional equipment added to South Pass Block 60 "G" platform and South Pass Block 67 "A" platform is attached as Exhibit 11.

250.34 - 2(a)(1)(iii) - South Pass Block 60 "G" Platform

Exhibit 12 lists the approximate bottom hole coordinates for the first fifteen prospective wells. The bottom hole locations are only an estimate, which may be revised in the future after further evaluation of downhole data and subsequent drilling in an effort to optimize development. The approximate bottom hole locations for the initial fifteen wells are plotted on the Tentative Bottom Hole Location Plat (exhibit 13). We request that exhibits 12 and 13 which are included in the five proprietary copies of the Development Operations Coordination Document be held confidential as we believe the data to be exempt from disclosure under the Freedom of Information Act (5 U.S.C. 552) and implementing regulations (43 CFR Part 2).

250.34 - 2(a)(1)(iv) - South Pass Block 60 "G" Platform

Enclosed are five sets of geological structure maps (Exhibits 14 -18) of sands on the North and West flanks of the South Pass Block 61 Field. These structure maps include the "J", "K", Lower "L", Upper "M" and Middle "M" sands. Representative geological cross-sections were submitted with the May 24, 1983 update to the Block 61 Field Development Plan. Please sign one copy of the Shipment of Confidential Information form and return it to us for our records.

If further data or clarification is required, please call Mr. W. A. DeShazer at 318-264-4283 or M. N. Robertson at 318-264-4295 in Lafayette Louisiana.

Sincerely,

ARCO Oil and Gas Company

W. A. DeShazer
District Engineer
Facilities/Production

M. N. Robertson
District Engineer
Offshore

KPD/clh/4

Attachments

# E X H I B I T  1

## SOUTH PASS BLOCK 60 "G" PLATFORM

## AND

## SOUTH PASS BLOCK 67 "A" PLATFORM

| Activity | Date Commenced | Date Completed |
|---|---|---|
| **Engineering Design** | | |
| Process Equipment (67 A) | 10/01/84 | 04/15/85 |
| Electrical Equipment (67 A) | 10/01/84 | 04/15/85 |
| Decks (67 A Retrofit) | 07/01/84 | 11/15/84 |
| Jacket/Pilings (60 G Retrofit) | 07/01/84 | 11/15/84 |
| **Material Order & Fabrication** | | |
| Process Equipment (67 A) | 10/21/84 | 04/15/85 |
| Electrical Equipment (67 A) | 02/01/85 | 04/15/85 |
| Decks (67 A Retrofit) | 03/01/85 | 06/01/85 |
| Jacket/Pilings (60 G Retrofit) | 12/15/84 | 05/14/85 |
| **Installation** | | |
| Process Equipment | 04/15/85 | 06/01/85 |
| Electrical Equipment | 04/15/85 | 06/01/85 |
| Jacket/Pilings | 05/18/85 | 06/12/85 |
| Drive Conductors (Jacket Mounted Rig) | 06/04/85 | 06/26/85 |
| Decks with Production Equipment (67 A) | 06/16/85 | 06/26/85 |
| Decks with Production Equipment (60 G) | 06/28/85 | 07/02/85 |
| Install Rig | 07/05/85 | 07/12/85 |
| Drill First Well | 07/12/85 | 09/12/85 |
| Production Stream | 09/12/85 (Intermittent) | 11/01/85 (Sustained) |

NOTE: An existing jacket and deck is available for this project. The jacket will be retrofitted for use at South Pass Block 60 "G" Platform. The existing South Pass Block 67 "A" Platform deck with equipment will be transferred to South Pass Block 60 "G" Platform. The surplus deck will be retrofitted, outfitted with minimal equipment and installed on South Pass Block 67 "A" Platform.

* * * * * *

EXHIBIT 2

PROJECT SCHEDULE FOR SOUTH PASS BLOCK 61 FIELD -G PLATFORM

(INCLUDING 67A/60 G DECK SWAP, 67A DECK INSTALLATION)

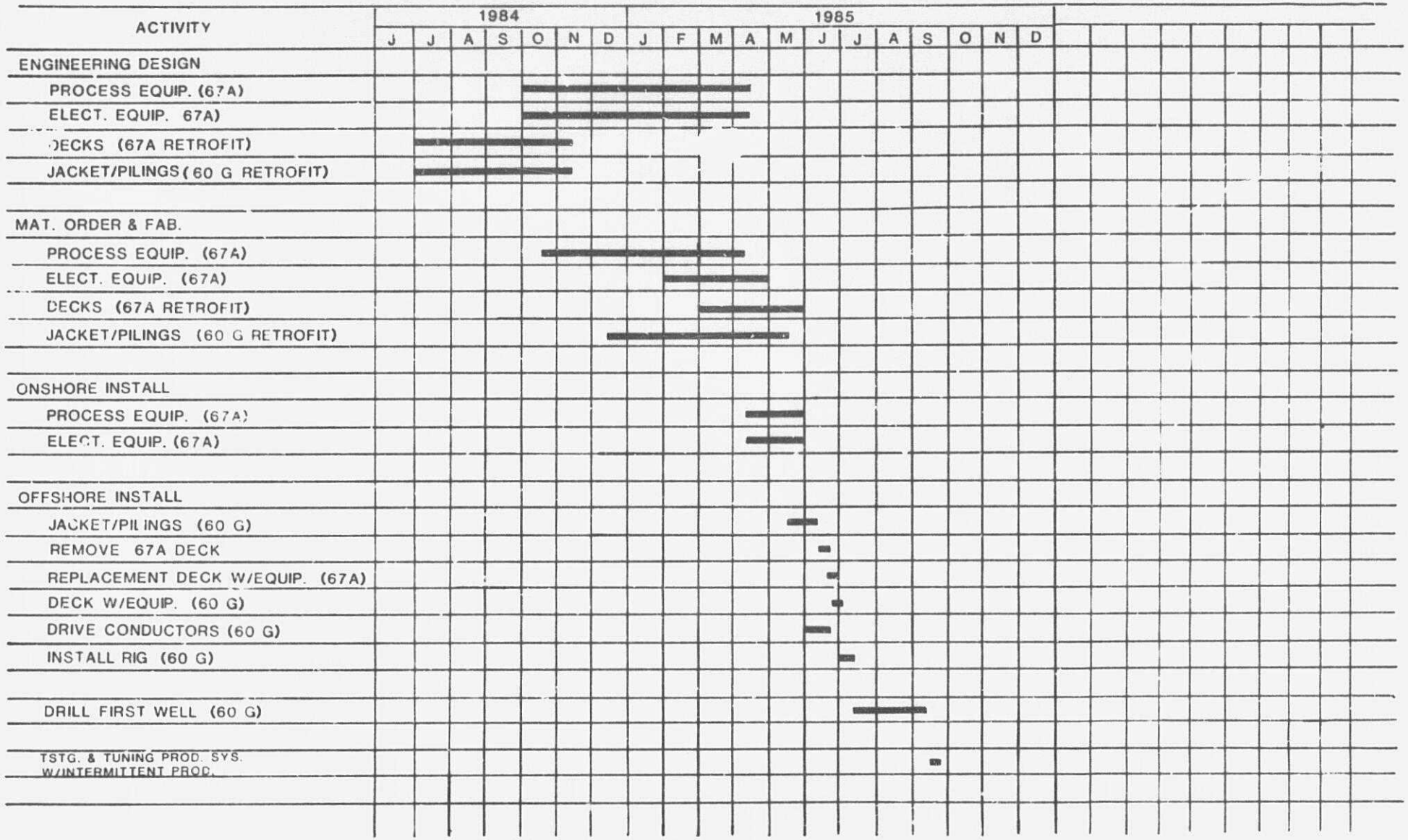
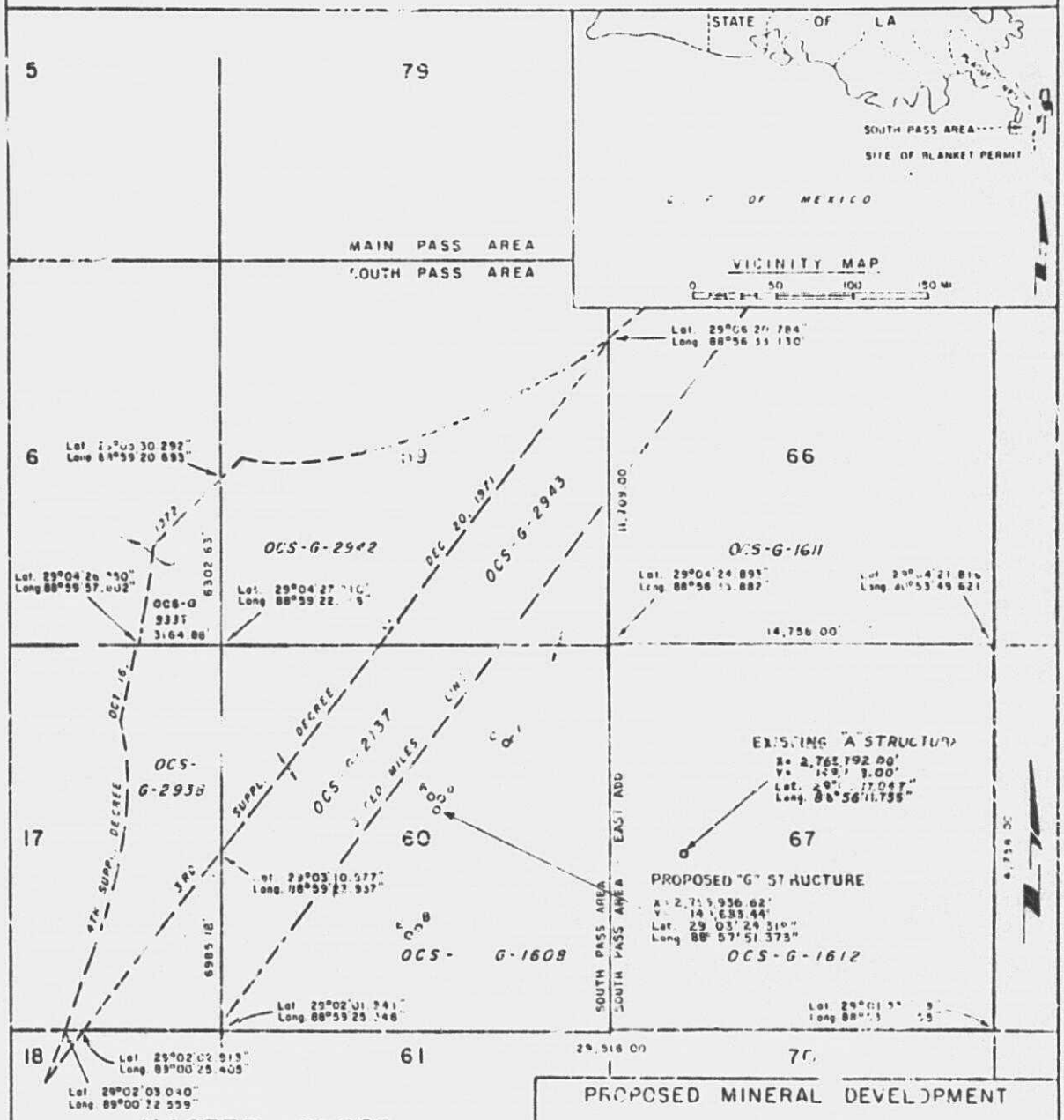


EXHIBIT 3

South Pass Block 60 Platform G
Approximate Well Development Schedule

| WELL | LEASE | ESTIMATED SPUD DATE |
|---|---|---|
| G-1 | OCS-G 2943 | 7/12/85 |
| G-2 | OCS-G 2137 | 9/12/85 |
| G-3 | OCS-G 2137 | 11/12/85 |
| G-4 | OCS-G 2943 | 1/12/86 |
| G-5 | OCS-G 2137 | 3/12/86 |
| G-6 | OCS-G 2137 | 4/12/86 |
| G-7 | OCS-G 2137 | 5/12/86 |
| G-8 | OCS-G 1608 | 6/12/86 |
| G-9 | OCS-G 1608 | 7/12/86 |
| G-10 | OCS-G 1608 | 8/12/86 |
| G-11 | OCS-G 1608 | 9/12/86 |
| G-12 | OCS-G 1608 | 10/12/86 |
| G-13 | OCS-G 1608 | 11/12/86 |
| G-14 | OCS-G 2137 | 12/12/86 |
| G-15 | OCS-G 2137 | 1/26/87 |

EXHIBIT 4




MASTER SHEET

SCALE 0 5000 10,000 FT

PROPOSED MINERAL DEVELOPMENT

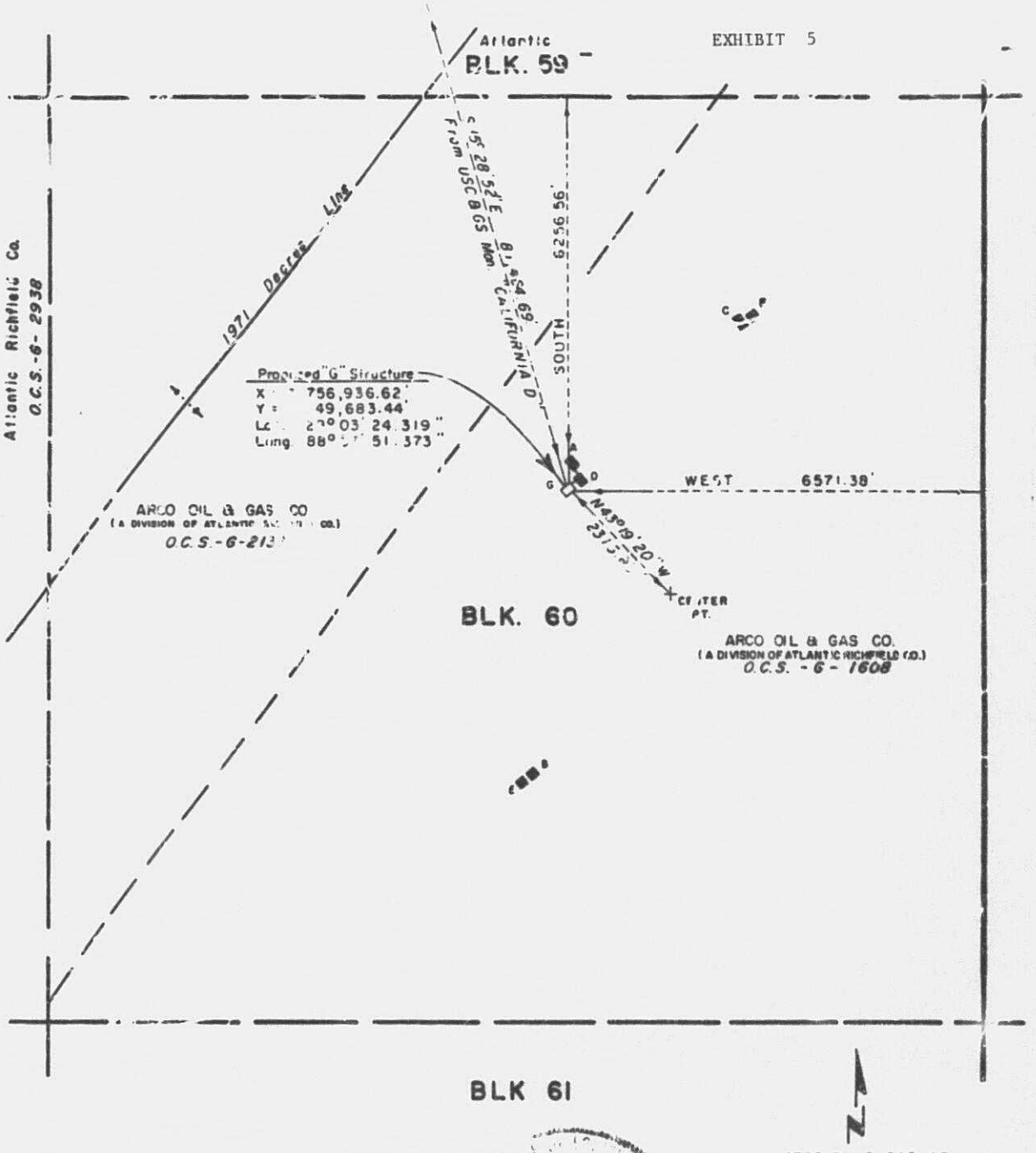
SOUTH PASS AREA

GULF OF MEXICO

APPLICATION BY ARCO OIL & GAS COMPANY
A DIVISION OF ATLANTIC RICHFIELD CO.

MARCH 1985 LAFAYETTE, LA.

EXHIBIT 5




I hereby certify that the above proposed structure location is correct.

R. J. Champagne

Registered Land Surveyor No. 309
State of Louisiana
John E. Chance & Associates, Inc.

ARCO OIL & GAS CO.
(A DIVISION OF ATLANTIC RICHFIELD CO.)
O.C.S. - G - 1608 "G" STR.

**PERMIT PLAT**

SOUTH PASS AREA

SCALE: 1" = 2000' 2/08/85

# EXHIBIT 6

ATLANTIC RICHFIELD COMPANY

SIMULTANEOUS OPERATIONS ON THE
OUTER CONTINENTAL SHELF - GULF OF MEXICO
South Pass Block 60
Platform "G"
OCS-1608

"Simultaneous Operations" is the producing of wells simultaneously with certain other activities such as drilling, workover, wireline, and major construction activities. These guidelines are intended to establish general rules that will be followed during simultaneous operations. These are designed to insure safety of personnel and facilities and to prevent harm to the environment. They do not preclude establishing more restrictive limitations that may be warranted by particular circumstances or conditions. All applicable Federal, State and other regulations shall be followed while complying with these guidelines. All personnel have the continuing responsibility to recommend changes to meet changing operating conditions. Everyone should exercise good judgment and promptly respond to any emergency situation to assure maximum safety of personnel, protection of property, and prevention of or the minimization of harm to the environment.

Two basic rules that must be observed when simultaneous operations are in progress or anticipated on an offshore platform are the following:

1. One company employee shall be designated as platform supervisor of the activity. This person will be the responsible company employee assigned to the facility at the time. At isolated structures or locations, the responsible company employee may designate another person-in-charge of the activity. The platform supervisor will have complete control to determine which operation or phase of the work has precedence at any given time.

2. Proper communications must be established between all personnel involved. The platform supervisor shall communicate at the commencement of work, and at other times during the operation as conditions require, with responsible personnel from the various operations to discuss the expected activities, and at that time resolve any conflicts due to the anticipated simultaneous operations. He/she must make all parties involved aware of any special problems that might be encountered, and the appropriate actions to take if such problems should occur.

   A thorough check of the structure shall take place prior to commencing any work, and as appropriate during the work. Any person arriving on a platform shall report immediately to the platform supervisor and state his business or purpose. He/she must be made aware of any non-routine or unusual operations in progress or anticipated, and alerted to conduct his business accordingly.

Specific precautions to be taken during the conduct of various simultaneous operations are as follows:

A. Rig Activity (Drilling, Workovers, Sand Washing, etc.)

1. Under normal conditions, oil and gas will be produced in conjunction with drilling or workover operations on an offshore platform. These simultaneous operations will be conducted with proper preplanning and provisions for safe operations.

2. When appropriate during simultaneous operations, consideration will be given at the outset to shutting in all or at least nearby producing wells (completions, and setting well plug(s) or closing surface controlled subsurface safety valves).

3. Swabbing and drillstem testing will not be initiated at night, except with the prior approval of the District Production and Drilling Superintendent.

4. Smoking is permitted on platforms only on specifically designated areas. Platform supervisor may designate times when no smoking is allowed anywhere on the platform.

5. When moving heavy equipment, shut in wells that could be damaged if the equipment falls, and consideration given to setting plugs or closing surface controlled subsurface safety valves and bleeding down wells and lines in the area.

6. During rigging-up or rigging-down operations, shut in all wells which could be endangered.

7. Store BOP's in a safe position when not in use to prevent accidental falling and possible injury or damage.

B. Wireline Work

1. When wireline work is to be performed on a well, the lubricator should be tested before going in the hole with the wireline tools. The lubricator should be of sufficient length to enclose the entire length of the running tool string.

2. Blind ram blowout preventers shall be installed below the lubricator and checked for condition prior to use.

3. Insure proper support is provided for the wireline lubricator.

4. For wells with over 1,000 PSI tubing pressure, purge the lubricator of air before pressuring up.

5. Whenever more than one wireline operation is in progress on a structure, a Production Foreman or other designated competent person, will be on the platform and will coordinate all activities initially and periodically check on the operation.

C. Lifting and Major Construction Activities

1. When performing major lifts or moving rigs (including all lifts requiring use of a derrick barge) over or near wellheads, set

plugs or close surface controlled subsurface safety valves in all wells and bleed down wells. If lifts are over open areas only, wells, vessels and pipelines need not be shut-in; however, the District Production Supervisor or his/her representative shall be present when major lifts are involved.

2. All lines containing hydrocarbons shall be adequately rotated or bled down when performing major lifts. All pipeline safety valves shall be in operation. Lines flowing across a platform may be left in service provided the scraper-traps or any portion of the line is not endangered by the lift. No scraper-trap will be opened during these operations.

3. Install guides where possible to prevent heavy lifts from swinging into and damaging wells and/or producing equipment.

4. Every effort shall be maintained during anchoring operations to avoid endangering pipelines and submarine cables. If doubt exists regarding pipeline location, the lines in question should be buoyed or bled down during anchoring operations.

5. Helicopter landings and take-offs are prohibited during crane operations whenever movement of the crane could interfere with the helicopter flight path. Booms should be cradled or laid down when not in use to insure safety of personnel and equipment.

D. Welding, Burning and Hot Tapping Safe Practices and Procedures Plan

1. Applicability

The following requirements apply to all:

a. Offshore mobile-drilling units during the drilling mode.

b. Mobile workover units during any drilling, completion, recompletion, remedial, repair, stimulation, or other workover activities.

c. OCS platforms, structures, artificial islands or other installation during any drilling, completion, workover, or production operations including any installations which contain a well open to a hydrocarbon bearing zone.

The following plans will also be followed when conducting any major construction operations:

2. Welder Qualification Standards

a. Hydrocarbon Piping and Vessels - All burning and welding on hydrocarbon equipment will be performed by welders qualified in accordance with the latest edition of the ASME Boiler and Pressure Vessel Code, Section IX or ANSI B31.3 or B31.4 as appropriate. Prior to the commencement of operations, the ARCO supervisor shall verify that the welder or welders are certified.

b. Welding Other than Hydrocarbon Piping and Vessels - Any burning or welding on anything other than hydrocarbon equipment shall be performed by personnel acceptable to the ARCO supervisor. They shall be fully aware of all safety regulations and the contents of this plan.

3. Safe Welding Areas

Prior to welding or burning operations, an approved safe welding area shall be established. The National Fire Protection Association Bulletin No. 51 B, "Cutting and Welding Processes", 1976 shall be used as a guide to establish these safe-welding areas. A drawing showing the location of these areas shall be prominently displayed on the facility. Welding which cannot be performed in the approved safe-welding area shall adhere to the following practices as required by OCS Order No. 5, Section 5.4.3.

a. Prior to the commencement of any welding or burning operations on a structure or mobile drilling rig, the designated person-in-charge at the installation shall inspect the qualification of the welder or welders to assure that they are properly qualified in accordance with the approved company qualification standards or requirements for welders. The person-in-charge and welders shall inspect the area in which the work is to be performed for potential fire and explosion hazards. After it has been determined that it is safe to proceed with the welding or burning operations, the person-in-charge shall issue a written authorization for the work (Appendix "A").

b. All welding equipment shall be inspected prior to beginning any welding or burning. Welding machines located on production or process platforms shall be equipped with spark arrestors and drip pans. Welding leads shall be completely insulated and in good condition: oxygen and acetylene bottles secured in a safe place; and hoses leak-free and equipped with proper fittings, gauges, and regulators.

c. During all welding and burning operations, one or more persons as necessary shall be designated as a Fire Watch. Persons assigned as Fire Watch shall not be members of the welding crew and shall have no other duties while actual welding or burning operations are in progress. If welding is to be done in an area which is not equipped with a gas detector the Fire Watch shall also maintain a continuous surveillance with a portable gas detector during welding.

d. Prior to any welding or burning, the Fire Watch shall have in his possession fire-fighting equipment in a condition ready to use.

e. No welding shall be done on containers, tanks, or other vessels which have contained a flamable substance unless the contents of the vessels have been rendered inert and determined to be safe for welding or burning by the designated person-in-charge.

f. In the event drilling, workover, or wireline operations are in progress on the platform, welding operations in other than approved safe-welding areas may be conducted only if the well(s) on which work is being done contain non-combustible fluids, and entry of formation hydrocarbons into the wellbore is precluded by a positive overbalance toward the formation.

g. All other producible wells shall be shut-in at the surface safety valves while welding or burning in the wellhead or production area.

4. Hot-Tapping

Hot-tapping pipelines or atmospheric vessels present additional exposure to personnel and plant operations. This should be considered and hot-taps requested only when it proves impractical to drain, depressure or tie into existing equipment, with normal procedures. Detailed procedures and requirements may be obtained by referencing the API standard PSD 2201, November, 1963. The following procedure will be followed for issuance of a hot-tap permit with certain restrictions.

a. Prior to requesting a permit for hot-tap work, Engineering will be requested to run a thickness test by instrument and issue a note stating the wall thickness and their recommendations.

b. Approval to proceed with the hot-tap will then be followed by the issuance of the Safe Work Permit.

## RESTRICTIONS

1. When welding on a storage tank or other atmospheric vessel for hot-tapping, the liquid level must be 3 feet or more above the weld.

2. When welding on a liquid line, there must be flow through the line or the line must be full and vented to avoid pressure build-up.

3. When welding on gas lines, they must be flowing, preferably at reduced pressure.

4. If the welding is on a vapor line, there must be a flow through the line. The oxygen content of the vapor line must be below the explosive limits of the contained gas.

5. In the event CONTRACTORS perform the hot-tap, they must have a Contractor Tie-In Permit.

* * * * * *

Standard for

Fire Prevention in Use of

# Cutting and Welding Processes

NFPA No. 51B — 1971

## 1971 Edition of No. 51B

This edition contains amendments recommended by the Committee on Cutting and Welding Practices and adopted at the NFPA Annual Meeting on May 19, 1971. It supersedes the 1962 edition. Amendments, other than editorial, are indicated by a vertical line in the margin of the pages on which they appear. Appendix B is entirely new.

## Origin and Development of No. 51B

This standard was Tentatively Adopted at the 1960 Annual Meeting and the first edition was adopted in 1962.

## Committee on Cutting and Welding Practices

F. C. Sancks, *Chairman*,
Air Reduction Co., Inc., 150 E. 42nd St., New York, N. Y. 10017

L. G. Matthews, *Secretary*,
Union Carbide Corporation, Linde Division, Safety Affairs Dept., Old Saw Mill River Road, Tarrytown, N. Y. 10591 (rep. Compressed Gas Assn., Inc.)

Warren M. Apgar, American Insurance Assn.

Vincent Bamford, American Mutual Insurance Alliance

Gunnar E. Berglund, Ford Motor Co.

Edward A. Fenton, American Welding Society

William E. Maloney, Mechanical Contractors Assn. of America, Inc.

A. C. Miller, Factory Mutual Research Corp.

H. Emerson Thomas, National LP-Gas Assn.

G. N. Wade, Chemical Dept., Factory Insurance Assn.

Frank E. Wilcher, Jr., National Welding Supply Assn.

Charles W. Woolsey, National Electrical Manufacturers Assn.

Alternates.

W. H. Johnson, National LP-Gas Assn. (Alternate to H. Emerson Thomas)

Robert E. Lenhard, Compressed Gas Assn., Inc. (Alternate to L. G. Matthews)

W. F. Sievert, Factory Insurance Assn. (Alternate to G. N. Wade)

**Scope:** To develop recommendations for the safe use, maintenance and operation of gas and electric cutting and welding equipment to prevent loss of life and property from fire.



**Standard for Fire Prevention In Use of**

# Cutting and Welding Processes

**NFPA No. 51B — 1971**

## Foreword

Cutting and welding processes using electric arcs or oxy-fuel gas flames are a necessary part of our industrial world. Too often, however, the persons who use, hire, or supervise the use of these processes do not fully appreciate that their improper use can result in loss of life and property by fire and explosion.

Approximately 6 per cent of fires in industrial properties have been caused by cutting and welding, primarily with portable equipment in areas not specifically designed or approved for such work. Cutting and welding operations produce literally thousands of ignition sources in the form of sparks and hot slag. The electric arc or the oxy-fuel gas flame and the hot work pieces are also inherent ignition sources.

A majority of industrial fires in which cutting and welding is a factor have been caused by sparks. These globules of molten metal have scattered as far as 35 feet, setting fire to all kinds of combustible materials. They have also fallen through cracks, pipe holes or other small openings in floors and partitions starting fires which have reached serious proportions before being noticed.

Electric arcs or oxy-fuel gas flames, in themselves, have rarely caused fire except where they have overheated combustibles in the vicinity of the work or where they have been used on containers that had not been purged of flammable materials. In the latter case, an explosion generally resulted.

The heat of the metal being welded or cut has caused fires where the hot pieces were permitted to rest or fall upon combustible materials. Fires and explosions have also been caused where this heat was transmitted, as in the case of a container, through the metal to a flammable atmosphere or to combustibles within the container.

Anything which is combustible or flammable is susceptible to ignition by the cutting and welding. The most common materials

likely to become involved in fire are combustible building construction such as floors, partitions, and roofs; combustible contents such as wood, paper, textiles, chemicals, and flammable liquids and gases; and combustible ground cover such as grass and brush.

Preventing cutting and welding fires can best be achieved by separating the combustibles from ignition sources or by shielding the combustibles.

**1. Purpose.** This standard has been prepared for the guidance of cutters and welders, their supervisors (including outside contractors), and those in management on whose property cutting and welding is to be performed.

**2. Scope.** This standard covers recommendations for the safe use of gas and arc cutting and welding equipment to prevent loss of life and property from fire.

NOTE: Details on installation and operation of oxygen cutting and welding equipment are covered in Standard for the Installation and Operation of Oxygen-Fuel Gas Systems for Welding and Cutting, NFPA No. 51. Details on installation and operation of arc cutting and welding equipment are covered in American National Standard Safety in Welding and Cutting, ANSI Z49.1 (1967).*

**3. Responsibility for Cutting and Welding.** Although the cutter or welder has the best opportunity to avoid fire or injury by proper control of the hot work equipment he is using, there are many circumstances where fires, explosions, or severe injuries would be inevitable if the oxy-fuel gas torch or the electrode were to be used. Such circumstances can arise where the cutter or welder may not be aware of (1) the proximity or the flammable nature of nearby combustible solids, liquids, or dusts; (2) the presence or development of possibly explosive mixtures of flammable gases and air; or (3) the presence or nature of an oxygen-enriched atmosphere in the location where hot work is to be performed. The precautions taken by a cutter or welder will often be governed by the desire of others for speed or economy in his work or by the failure of management to emphasize the possible extent or seriousness of a fire in the work area. Therefore, all three, the cutter or welder, his supervisor, and management share full responsibility for the safe use of cutting or welding equipment. Specific responsibilities of each are cited in 31, 32, and 33.

*No. 51 is available from National Fire Protection Association, 60 Batterymarch St., Boston, Mass. 02110. ASA-Z49.1 available from American Welding Society, 345 E. 47th St., New York, N. Y. 10017.



**31. Management** shall recognize its responsibility for the safe usage of cutting and welding equipment on its property and:

311. Based on fire potentials of plant facilities, establish approved areas for cutting and welding, and establish procedures for approving cutting and welding in other areas.

312. Designate an individual responsible for authorizing cutting and welding operations in areas not specifically designed or approved for such processes.

NOTE: He may be a welding supervisor, foreman, contractor, person responsible for fire protection, or other qualified individual aware of the fire hazards involved and familiar with NFPA No. 51B.

313. Insist that only approved apparatus, such as torches, manifolds, regulators or pressure reducing valves, and acetylene generators, be used.

314. Insist that cutters or welders and their supervisors are suitably trained in the safe operation of their equipment and the safe use of the process.

315. Select contractors to perform hot work involving cutting or welding who have suitably trained personnel and who have an awareness of the magnitude of the risks involved.

316. Advise all contractors about flammable materials or hazardous conditions of which they may not be aware.

**32.** The Supervisor of cutting or welding operations in areas not designed or approved for such processes may be a foreman in a large plant or a plant manager or owner in a small one. In contract operations he may be the contractor or one of his foremen or supervisors.

321. He shall be responsible for the safe handling of the cutting or welding equipment and the safe use of the cutting or welding process.

322. He shall determine the combustible materials and hazardous areas present or likely to be present in the work location.

323. He shall protect combustibles from ignition by the following:

3231. Have the work moved to a location free from dangerous combustibles.

3232. If the work cannot be moved, have the combustibles moved to a safe distance from the work or have the combustibles properly shielded against ignition.

323. See that cutting and welding are so scheduled that plant operations that might expose combustibles to ignition are not started during cutting or welding.

324. He shall secure authorization for the cutting or welding operations from the designated management representative (see 312).

325. He shall determine that the cutter or welder secures his approval that conditions are safe before going ahead.

326. He shall determine that fire protection and extinguishing equipment are properly located at the site.

327. Where fire watchers are required (see 43), he shall see that they are available at the site.

**33. The Cutter or Welder** shall handle his equipment safely and use it so as not to endanger lives and property.

331. He shall have approval by his supervisor before he starts to cut or weld.

332. He shall not cut or weld where conditions are not safe.

333. He shall continue to cut or weld only so long as conditions are unchanged from those under which approval was granted.

**4. Fire Prevention Precautions.** Cutting or welding shall be permitted only in areas that are or have been made firesafe (see 42). Within the confines of an operating plant or building, cutting and welding should preferably be done in a specific area designed or approved for such work, such as a maintenance shop or a detached outside location. Such areas shall be of noncombustible or fire-resistive construction, essentially free of combustible and flammable contents, and suitably segregated from adjacent areas. When work cannot be moved practically, as in most construction work, the area shall be made firesafe by removing combustibles or protecting combustibles from ignition sources.

**41. Cutting or welding shall not be permitted in the following situations:**

411. In areas not authorized by management.

412. In sprinklered buildings while such protection is impaired.

413. In the presence of explosive atmospheres (mixtures of flammable gases, vapors, liquids, or dusts with air), or explosive atmospheres that may develop inside uncleaned or improperly prepared tanks or equipment which have previously contained such materials, or that may develop in areas with an accumulation of combustible dusts. (See Standard Procedures for Cleaning or Safeguarding Small Tanks and Containers, NFPA No. 327; and Safety Practices for Welding and Cutting Containers That Have Held Combustibles, AWS A6.0 (1965).*)

414. In areas near the storage of large quantities of exposed, readily ignitible materials such as bulk sulfur, baled paper or cotton.



42. Before cutting or welding is permitted, the area shall be inspected by the individual responsible for authorizing cutting and welding operations to ensure that it is a firesafe area. He shall designate precautions to be followed in granting authorization to proceed, preferably in the form of a written permit. (A suggested form of written permit is shown in the Appendix. It may be modified to suit local conditions.) He shall sign the permit or otherwise authorize the work, and shall assure himself of the following:

421. That the cutting and welding equipment to be used is in satisfactory operating condition and in good repair.

422. Where combustible materials such as paper clippings, wood shavings or textile fibers are on the floor, the floor shall be swept clean for a radius of 35 feet. Combustible floors shall be kept wet, covered with damp sand, or protected by fire-resistant shields. Where floors have been wet down, personnel operating arc welding or cutting equipment shall be protected from possible shock.

423. Where practicable, all combustibles shall be relocated at least 35 feet from the work site. Where relocation is impracticable, combustibles shall be protected with flame-proofed covers or otherwise shielded with metal or asbestos guards or curtains. Edges of covers at the floor should be tight to prevent sparks from going under them. This precaution is also important at overlaps where several covers are used to protect a large pile.

424. Wall or floor openings or cracks within 35 feet of the site shall be tightly covered to prevent the passage of sparks to adjacent areas.

425. Ducts and conveyor systems that might carry sparks to distant combustibles shall be suitably protected or shut down.

*Available from American Welding Society, 345 East 47th Street, New York, New York 10017.

426. Where cutting or welding is done near walls, partitions, ceiling or roof of combustible construction, fire-resistant shields or guards shall be provided to prevent ignition. If welding is to be done on a metal wall, partition, ceiling or roof, precautions shall be taken to prevent ignition of combustibles on the other side, due to conduction or radiation, preferably by relocating combustibles. Where combustibles are not relocated, a fire watch on the opposite side from the work shall be provided. Welding shall not be attempted on a metal partition, wall, ceiling or roof having a combustible covering nor on walls or partitions of combustible sandwich-type panel construction.

427. Cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings or roofs shall not be undertaken if the work is close enough to cause ignition by conduction.

428. Portable fire extinguishers, appropriate for the type of possible fire, shall be concentrated at the work area. Where hose lines are available, they shall be connected and ready for service.

429. He shall see that nearby personnel are suitably protected against heat, sparks, slag, etc.

43. **Fire Watchers** shall be required by the individual responsible for authorizing cutting and welding whenever cutting or welding is performed in locations where other than a minor fire might develop, or any of the following conditions exist:

(a) Appreciable combustible material in building construction or contents closer than 35 feet to the point of operation.

(b) Appreciable combustibles are more than 35 feet away but are easily ignited by sparks.

(c) Wall or floor openings within a 35-foot radius expose combustible material in adjacent areas including concealed spaces in walls or floors.

(d) Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.

431. Fire watchers shall have fire extinguishing equipment readily available and be trained in its use.

432. Fire watchers shall be familiar with facilities for sounding an alarm in the event of a fire.



433. Fire watchers shall watch for fires in all exposed areas, and try to extinguish them first only when obviously within the capacity of the equipment available, or otherwise sound the alarm.

434. A fire watch shall be maintained for at least a half hour after completion of cutting or welding operations to detect and extinguish possible smoldering fires.

44. Where a fire watcher is not required, a Final Check-Up shall be made one-half hour after the completion of cutting or welding operations to detect and extinguish possible smoldering fires.

45. "Hot tapping" or other cutting or welding on a flammable gas or liquid transmission or distribution utility pipeline shall be performed by a crew qualified to make hot taps. For a gas pipeline, see 841.28 in "Gas Transmission and Distribution Piping Systems", ANSI B31.8 (1968)*.

*Available from American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, New York 10017.

# APPENDIX A

**A Suggested Form of Written Cutting and Welding Permit**
**(May be modified to suit local conditions)**

(Front)

**PERMIT**
**FOR CUTTING AND WELDING**
**WITH PORTABLE GAS OR ARC EQUIPMENT**

Date .....

Building .....

Dept. ..... Floor .....

Work to be done .....

.....

Special Precautions .....

.....

Is fire watch required? .....

The location where this work is to be done has been examined, necessary precautions taken, and permission is granted for this work. (See other side)

Permit expires .....

Signed .....
(Individual responsible for authorizing welding and cutting)

Time started ..... Completed .....

**FINAL CHECK-UP**

Work area and all adjacent areas to which sparks and heat might have spread (including floors above and below and on opposite sides of walls) were inspected 30 minutes after the work was completed and were found firesafe.

Signed .....
(Supervisor)



(Rear)

**ATTENTION**

Before approving any cutting and welding permit, the fire safety supervisor or his appointee shall inspect the work area and confirm that precautions have been taken to prevent fire in accordance with NFPA No. 51B.

**PRECAUTIONS**

- ☐ Sprinklers in service
- ☐ Cutting and welding equipment in good repair

**WITHIN 35 FT. OF WORK**

- ☐ Floors swept clean of combustibles
- ☐ Combustible floors wet down, covered with damp sand, metal or other shields
- ☐ No combustible material or flammable liquids
- ☐ Combustibles and flammable liquids protected with covers, guards or metal shields
- ☐ All wall and floor openings covered
- ☐ Covers suspended beneath work to collect sparks

**WORK ON WALLS OR CEILINGS**

- ☐ Construction noncombustible and without combustible covering
- ☐ Combustibles moved away from opposite side of wall

**WORK ON ENCLOSED EQUIPMENT**
(Tanks, containers, ducts, dust collectors, etc.)

- ☐ Equipment cleaned of all combustibles
- ☐ Containers purged of flammable vapors

**FIRE WATCH**

- ☐ To be provided during and 30 minutes after operation
- ☐ Supplied with extinguisher and small hose
- ☐ Trained in use of equipment and in sounding fire alarm

**FINAL CHECK-UP**

- ☐ To be made 30 minutes after completion of any operation unless fire watch is provided.

Signed .....
(Supervisor)

## APPENDIX B

Appendix B is a collection of fires and explosions caused by improper use of cutting and welding equipment drawn from NFPA fire records. The sole purpose is to illustrate how such incidents occur and to emphasize the provisions of this standard.

### B.1 Kaukauna, Wis., June 26, 1970, Warehouse

While an arc welder was being used on the second floor, sparks dropped through a metal grating to cardboard boxes below, and the boxes ignited. There was no one again on the first floor, and when the fire was discovered 15 minutes later, employees could not put it out. They finally called the fire department, but it was too late to save the 2-story building of ordinary construction. Loss was $1,000,000.

### B.2 Winnipeg, Manitoba, Jan. 16, 1970, Food-Processing Plant

While an employee was using an oxyacetylene cutting torch to modify a bracket in the boiler room, hot slag ignited canvas and plywood that were being used as a temporary covering over a hole in the wall between the fire-resistive boiler room and the storage room. Fire then spread to waxed cartons and plastic bags in the storage room. Fire fighting was impeded by the windowless walls and thick black smoke. Loss was $650,000.

### B.3 Hulsey, Ore., Oct. 10, 1969, Rolled Paper Storage

A bracket was being welded on a column adjacent to an aisle, with rolled paper storage not more than five feet away. A welding permit was reportedly issued for the work, but the standard permit form clearly stated that combustibles within 35 ft. of the work should be removed or shielded. The permit also required the signature of the supervisor certifying that a check of the area had been made. In this case there was no protection for the combustibles and no signature.

The fire quickly spread into the interior of the storage pile, but sprinklers operated, roof vents were opened, and hose streams were brought into play as the smoke cleared a little. About 300 rolls were burned beyond salvage and other rolls wet. Loss was $250,000.

### B.4 Atlanta, Ga., Dec. 10, 1969, Poultry Processing

An employee using an electric arc welder was working in an area above a refrigerated room, which was insulated with polyurethane foam sandwiched between sheets of aluminum. Sparks fell on the exposed ends of the insulation, causing a severe fire. The heat was sufficient to bring about collapse of exposed metal bar joist roof framing, and the total loss was $250,000.

### B.5 Ontario, Ore., July 29, 1969, Food Processing

An oxyacetylene cutting torch was being used in a metal-lined freezing tunnel, with some pipes passing through the walls of the tunnel and making a loose fit with these walls. Sparks evidently passed through a crack to ignite polystyrene foam insulation. This event happened at a rest period and was not discovered until the rest period was over. Further time was lost during a fruitless effort to extinguish the fire with extinguishers and small hose. The fire department, when finally called, was confronted with a tough task in the heavy smoke and with the fire spreading to the concealed and undivided attic space. Loss $2,300,000.



### B.6 San Pedro, Calif., Dec. 28, 1967, Wharf

Workmen were using a gasoline-powered chain saw and a cutting torch to repair pilings on a 3,700-foot-long wharf. While some of the men were refueling the chain saw from a two-gallon can, another man was using a cutting torch far too close. Gasoline vapors ignited, and during efforts to extinguish the fire, the can was kicked into the water. Burning gas in the water ignited the pilings and flames spread 370 feet along the underside of the wharf before firemen could control the fire.

### B.7 Portland, Ore., Dec. 7, 1967, Lumber Mill

Workmen had shut down one of several sprinkler systems in the plant to remove branch lines to facilitate removal of a conveyor. While workmen were cutting bolts from the conveyor with welding equipment, some of the sparks went through cracks in the floor to land in sawdust accumulations below. There smoldering occurred for three hours without being noticed by the maintenance employees, who were the only people in the plant. In the meantime the area in the region of the cutting operations, but not the floor below, had been washed down and visited regularly at half-hour intervals.

When the fire was finally noticed, some time was spent in trying to extinguish it before the fire department was called. By the time the fire department arrived, it was too late to save the lumber storage and stacker buildings. Destruction caused loss of $1,250,000.

### B.8 Austin, Texas, Aug. 10, 1965, University Library

Workmen were using an acetylene torch to remove old heating ducts in a utility shaft between the twentieth and twenty-first stories of the tower of a 27-story university library building. Flying sparks fell through a vent and ignited papers stacked against the vent in a twenty-story storage room. Apparently the fire burned for 20 to 30 minutes before discovery.

There was no fire protection in the upper stories besides portable fire extinguishers, and firemen had to connect to the standpipes in the third and fourth stories and pull hose lines up the enclosed stairways to the twentieth and twenty-first stories. They finally controlled the fire in 2½ hours, but damage extended to four stories when fire spread by way of nonfirestopped utility shafts and elevator shafts.

The work here was being done by two air conditioning installation workmen, on contract, and they were obviously more interested in speed than in safety. They had not investigated the possibility of combustible material being in contact with the old heating duct on which they were working.

### B.9 Atlanta, Ga., Nov. 1, 1963, Wire and Nail Mill

A small fire started on the built-up wood roof by repairmen using an acetylene torch for welding. The repairmen believed that they had extinguished the fire, but 3½ hours later the fire broke out again and spread on an accumulation of metal dust on overhead beams throughout the unsprinklered, undivided single-story structure. The loss was $2,300,000.

### B.10 Provo, Utah, Feb. 4, 1962, Hardware Warehouse

An employee was welding a broken metal roof beam in the attic of a 1-story brick, wood-joisted, wholesale hardware building. A spark fell through a crack in the attic floor and ignited cardboard boxes in the shelving below. No precautions had been taken to guard against fire, and the welder did not realize that there was a fire until he felt the heat coming up from below. Loss was $131,000.

**B.11 Thomson, N.Y., Feb. 2, 1962, Paper Mill**

Production lines were shut down in a tissue paper mill so that maintenance men could use a cutting torch to remove a drive roll for repairs. The area where the cutting was to be done was cleaned up and wet down as a precaution against flying sparks. Also an employee with a portable extinguisher acted as fire guard during the cutting operation.

A stray spark ignited paper dust on the floor at the adjacent machine. When the fire watch attempted to extinguish the small blaze, he found that his portable extinguisher was empty. The blaze spread to paper dust and lint atop an unused overhead heating duct which was from 2 to 6 ft. in diameter. It took fire fighters about three hours to extinguish the blaze in the unsprinklered duct. The damage to tissue paper by fire fighting operations amounted to $25,000.

**B.12 Jacksonville, Ill., June 13, 1970, Pavement Manufacturing**

After partially unloading a tanker of MC 800 road oil at a temperature of about 280° F., two employees went to the top of the asphalt tank to straighten a pipe through which they measured the oil level. In this repair work they were using an acetylene torch. The torch so heated the top of the tank that flammable vapors within the tank exploded and tore up a large part of the top. Both men were thrown long distances, and both were killed.

**B.13 Toledo, Ohio, June 25, 1969, Tar Manufacturing**

Welders were repairing a leak in an odor scrubbing system when an explosion occurred in a tank connected with the system and containing naphthalene vapors above the hot tar level. It is believed that heat from the torch ignited flammable vapors within the pipe, and that the flame was propagated to the tank. Spread of hot tar when the tank ruptured handicapped firemen in gaining quick access to the area. Three workmen were killed and property damage was $110,000.

**B.14 New Orleans, La., April 22, 1969, Office Building**

An outside contractor, installing new elevator equipment in a 7-story office building with plank floors, set a number of fires as a result of cutting and welding operations, but the contractor's employees extinguished all but one. This one occurred towards the end of the day's work, and the four employees, without discovering it, went home. Later in the evening the night porter noticed the old elevator penthouse, partly of wooden construction, ablaze as he was summoning the elevator to perform his normal duties. Two hours later the fire department, using many large hose lines, brought the fire under control. The loss was $530,000, mainly to the top story from fire and to lower stories from water.

There was no formal fire watch, nor following the last use of the welder, was there any inspection of the area during a set period after the welding.

**B.15 Hatboro, Pa., Sept. 12, 1964, Chemical Plant**

Workmen were welding some additional fill-line supports on a 6,000-gallon vertical tank containing 3,000 gallons of alcohol. Heat transmitted through the metal of the tank ignited alcohol vapors inside, and the tank was blown into the air. Alcohol was dumped into two diked areas containing eight tanks of high-flash-point liquid, but heavy use of hose streams kept other tanks from rupturing. Loss was $100,000.



**B.16 New Orleans, La., Aug. 1, 1964, Candy Storage**

The outside of the walls of this sprinklered metal-frame warehouse were lined with combustible laminated paper-asphalt vapor barrier and a 1½-inch layer of foamed polystyrene insulation. A workman was welding metal plates to the base of the structural member when the combustible vapor barrier ignited. While the welder ran to turn in an alarm and to get a portable extinguisher, seven sprinklers operated to control the fire.

**B.17 Billings, Mont., Dec. 5, 1969, Auditorium**

In the remodeling of the auditorium at the Fairgrounds, workmen were welding straps on channel iron which had been placed on each side of 12-in. by 12-in. wooden uprights to give more strength to these columns. Heat from the welding apparently caused some smoldering in the columns. Some five hours later the caretaker noticed that the roof was ablaze. It was too late to save the building, which was of ordinary construction and unsprinklered. Loss was $200,000.

**B. [illegible], Dec. 12, 1966, Passenger Ship Under Construction**

A shipyard worker was welding a steel bracket beneath the steel deck of a stateroom when the hot deck plate ignited paper on the floor of the stateroom. Flames then spread to wooden paneling and other combustibles and soon reached synthetic rubber insulation on electrical cables and also resin-impregnated glass fiber ducts carrying 3,000 cfm of warm air. Although a workman discovered the fire within a few minutes and the fans for the air ducts were quickly shut off, the heat and dense smoke from the burning resin and synthetic rubber prevented control. The fire spread from the promenade deck to three other decks. Damage to the vessel was $4,000,000.

**B.19 San Francisco, Calif., Oct. 3, 1967, Marine Terminal**

The reinforced concrete dock had a tarpaper vapor barrier beneath the concrete, and a wooden fenderline around the outside of the apron. Workmen had a 30-day "blanket" welding and cutting permit, but had not notified the Port Authority Fire Marshal that they planned to do cutting in the known dangerous area. They had also failed to take a portable extinguisher to the job with them. The two workmen, in a boat, were cutting a reinforcing rod beneath the apron when flame or sparks from the torch ignited the tarpaper, and the fire spread overhead so fast that the two men had to jump into the water to save themselves. The loss was estimated at $200,000.

**B.20 Searcy, Ark., August 9, 1965, Missile Silo**

A welder in a missile silo under repair inadvertently included a temporarily installed steel-braided hose containing hydraulic oil under 600 psi pressure in the range of the electric arc, and caused rupture of the steel braid and of the teflon inner tube. The escaping oil ignited at the arc, and a very severe fire resulted in the confined underground space, fatally trapping 53 workmen. The hose was only 14 inches away from the work being done and working conditions were crowded and cramped.

After the accident, conditions were duplicated as nearly as possible at another site, with, of course, proper protection of personnel; and the time from the beginning of the arc at the hose to rupture was 0.69 second, and from rupture to ignition 0.02 second.

**B.21 River Rouge, Mich., July 31, 1964, Metal Working**

A workman was cutting an object with a torch, using as a workbench the top of a drum containing kerosine, when the torch cut into the drum and caused an explosion in the partially full interior. The workman was fatally burned over 75 percent of his body.

**B.22 Port Maitland, Ont., Sept. 6, 1967, Fertilizer Manufacturing**

Workmen had been welding on a rubber-lined steel separator vessel. Reportedly, the rubber lining inside the vessel had been stripped from the metal tank wall where welding was to be done; however, workmen a short time later noticed smoke and discovered that the lining was burning. The fire spread from the vessel through several feet of rubber-lined duct connected to the vessel, and employees were unable to extinguish the fire on the vessel until after about 45 minutes. The process equipment affected remained out of service for two weeks.

EXHIBIT B

**AtlanticRichfieldCompany**
**Fire and Safe Work Permit**

Permit number

Date | Permission is hereby granted Mr.

To use

- ☐ Welding and cutting equipment
- ☐ Electrical tools
- ☐ Tarpot or fire
- ☐ Entering confined spaces which may contain hazardous vapors or lack of sufficient oxygen
- ☐ Other _____

On date above from _____ am/pm to _____ am/pm

Note: Separate fire and work permit is required for each tour of duty

Location where work will be done

Detail of work to be done

Special precautions

## Hot work

It shall be the responsibility of the supervisor ordering welding or cutting operations and operator to establish and maintain the following procedures plus those contained in the Safety Manual.

1. Secure fire and safe work permit and advise appropriate personnel of intention to weld immediately prior to welding activity.
2. Has a gas sampling test been made with a combustible gas indicator? ☐YES ☐NO
3. _____% of lower explosive limits of gas in air shown by indicator.
4. See that area in which welding is to be performed is cleared of any flammable materials such as rags, paper, wood, oil or grease, etc.
5. Where welding or cutting operations may cause sparks on the other side of a floor or partition this area will receive the same treatment as the area in which welding is being performed.
6. An assistant fire watch will stand by at all times with adequate fire protection equipment.
7. If welding is performed where there is a possibility of setting off automatic fire protection equipment, this shall be shut off immediately prior to welding operations and turned back on immediately following welding operations.
8. Work area and all adjacent areas to which sparks and heat might have spread (including floors above and below and on opposite sides of walls) were inspected at least 30 minutes after the work was completed and found fire safe.

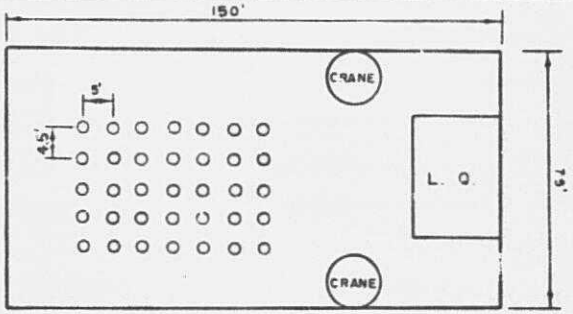
   Signed _____
9. During the performance of work where combustible, asphyxiant, or toxic gasses may be encountered, periodic gas tests shall be taken to insure continuous safe operation.

## Confined spaces

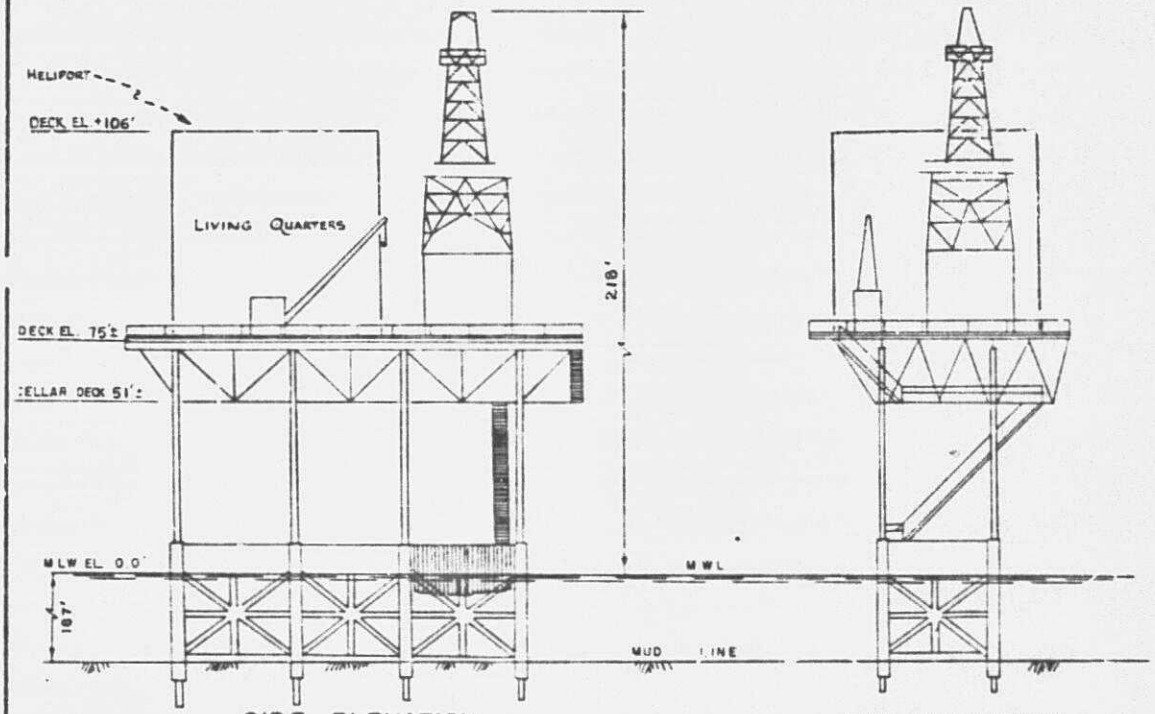
Personnel shall not enter a confined space likely to contain hazardous vapors or gasses or which may lack sufficient oxygen without obtaining a Fire and Safe Work Permit and following all the safe practices contained in the Safety Manual.

AR3B-654-1

EXHIBIT 7




PLAN




SIDE ELEVATION

END ELEVATION

TYPICAL SELF CONTAINED DRILLING PLATFORM

PROPOSED "G" STRUCTURE

0 20 40 80 FT

SCALE

BLOCK 60

PROPOSED MINERAL DEVELOPMENT

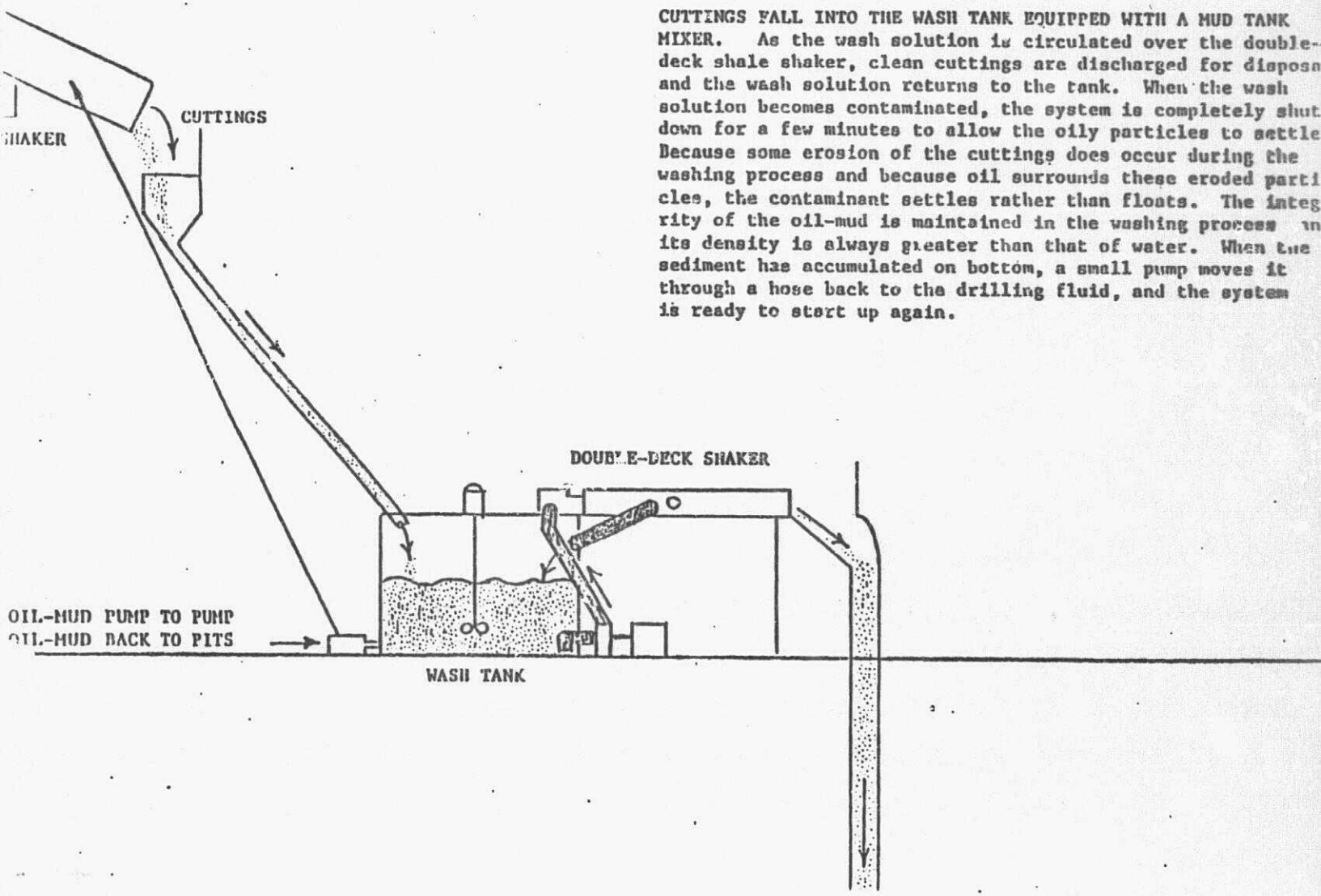
SOUTH PASS AREA

GULF OF MEXICO

APPLICATION BY ARCO OIL & GAS CO. A DIVISION OF ATLANTIC RICHFIELD CO.

MARCH 1, 1985 LAFAYETTE, LA

Exhibit 8




CUTTINGS FALL INTO THE WASH TANK EQUIPPED WITH A MUD TANK MIXER. As the wash solution is circulated over the double-deck shale shaker, clean cuttings are discharged for disposa and the wash solution returns to the tank. When the wash solution becomes contaminated, the system is completely shut down for a few minutes to allow the oily particles to settle Because some erosion of the cuttings does occur during the washing process and because oil surrounds these eroded parti cles, the contaminant settles rather than floats. The integ rity of the oil-mud is maintained in the washing process in its density is always greater than that of water. When the sediment has accumulated on bottom, a small pump moves it through a hose back to the drilling fluid, and the system is ready to start up again.

# COMPARABLE MUD PRODUCTS BY TRADE NAMES

| Description or Principal Component | IMCO SERVICES | Baroid | Magcobar | Milchem | Primary Application |
|---|---|---|---|---|---|
| **WEIGHTING AGENTS AND VISCOSIFIERS** | | | | | |
| Barite | IMCO BAR | Baroid | Magcobar | Mil-Bar | For increasing mud weight up to 20 ppg. |
| Calcium Carbonate | IMCO WATE | | Lo-Wate | W.O. 30<br>W.O. 50 | For increasing weight of oil muds up to 10.8 ppg. |
| Bentonite | IMCO GEL | Aquagel | Magcogel | 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. |
| Attapulgite | IMCO BRINEGEL | Zeogel | Salt Gel | Salt Water Gel | Viscosifier in saltwater muds. |
| Beneficiated Bentonite | IMCO HYB | Quick-Gel | Kwik-Thik | Super-Col | Quick viscosity in fresh-water, upper-hole muds with minimum chemical treatment. |
| Asbestos Fibers | IMCO SHURLIFT | Flosal | Visquick | Flosal | Viscosifier for fresh-water or saltwater muds. |
| Bacterially Produced Polymer | IMCO XC | XC Polymer | Duovis | XC Polymer | Viscosifier and fluid-loss control additive for low-solids muds. |
| Sepiolite | IMCO DUROGEL | | | | Viscosifier in all water-base muds, especially high-temperature drilling fluids. |
| **DISPERSANTS** | | | | | |
| Sodium Tetraphosphate | IMCO PHOS | Barofos | Magco-Phos | Oil Fos | Thinner for low pH fresh-water muds where temperatures do not exceed 180°. |
| 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. |
| Modified Tannin | DESCO | Desco | Desco | Desco | Thinner for fresh-water and saltwater muds alkalized for pH control. |
| Processed Lignite | IMCO LIG | Carbonox | Tann A Thin | Ligco | Dispersant, emulsifier and supplementary additive for fluid-loss control. |
| Caustic-ized Lignite | IMCO THIN | CC-16 | Caustig | Lignox | 1-6 ratio caustic-lignite dispersant, emulsifier and supplementary fluid-loss additive. |
| Modified Lignosulfonate | IMCO VC-10 | Q-Broxin | Spersene | 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. |
| Chrome-Free Lignosulfonate | IMCO RD-2000 | | | X-KB Thin | Dispersant and fluid-loss control additive for water-base muds. |
| **FLUID-LOSS REDUCERS** | | | | | |
| Organic Polymer | IMCO PERMALOID | DEXTRID | | | Controls fluid loss in water-base systems. |
| Pregelatinized Starch | IMCO LOID | Impermex | My-Lo-Jel | Milstarch | Controls fluid loss in saturated salt water, and lime muds. |
| Sodium Carboxymethyl Cellulose | IMCO CMC (Regular) | Cellex (Regular) | Magco 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) | Magco CMC (Hi-Vis) | Milchem CMC (Hi-Vis) | For fluid-loss control and viscosity building in low-solids muds. |
| Polyanionic Cellulosic Polymer | DRISPAC | Drispac | Drispac | Drispac | Fluid-loss control additive and viscosifier in salt muds. |
| Polyanionic Cellulosic Polymer | DRISPAC SUPERLO | Drispac Superlo | Drispac Superlo | Drispac Superlo | Primary fluid-loss additive, secondary viscosifier in water-base muds. |
| *Sodium Polyacrylate | IMCO SP-101 | | | | Fluid-loss control in calcium-free low solids and nondispersed muds. |

*Cypan and WL-100 are sold by American Cyanamid and Rotary Engineering, respectively.

# COMPARABLE MUD PRODUCTS BY TRADE NAMES (Continued)

| Description or Principal Component | IMCO SERVICES | Baroid | Magcobar | Milchem | Primary Application |
|---|---|---|---|---|---|
| **LUBRICANTS, DETERGENTS, EMULSIFIERS, AND SURFACTANTS** | | | | | |
| 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 downhole 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 | Pave-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 | Nonweighted 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. |
| Blend of Anionic Surfactants | IMCO SWS | Trimulso | Salinex | Atlosol & Atlosol S | Emulsifier for saltwater and freshwater muds. |
| An Organic Entity Neutralized with Amines | IMCO LUBRIKLEEN | Torq Trim | DOS-3 | Mil-Plate 2 | Supplies the lubricating properties of oils without environmental pollution. |
| Blend of Fatty Acids, Sulfonates, and Asphaltic Materials | IMCO SPOT | SF 100 | | | Invert emulsion that may be weighted to desired density for placement to free differentially stuck pipe. |
| **DEFOAMERS, FLOCCULANTS, AND BACTERICIDES** | | | | | |
| Aluminum Stearate | Aluminum Stearate | Aluminum Stearate | Aluminum Stearate | Aluminum Stearate | Defoamer for lignosulfonate muds |
| Liquid Surface-Active Agent | IMCO DEFOAM L | | | | Defoamer for all water-base 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. |
| Blended Solutions | IMCO CIDE | | | | Bactericide used to prevent fermentation. |
| **LOST CIRCULATION MATERIALS** | | | | | |
| Fibrous Material | IMCO FYBER | Fibertex | Mud Fiber | Mil-Fiber | Filler as well as matting material. |
| Nut 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 | Micatex | Magco-Mica | Milmica | Used for prevention of lost circulation. |
| Coarse | IMCO MYCA | Micatex | Magco-Mica | Milmica | Forms a good mat at face of wellbore. |
| 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. | KWIKSEAL | Kwik-Seal | Kwik-Seal | Kwik-Seal | Used where large crevices or fractures are encountered. |

## COMPARABLE MUD PRODUCTS BY TRADE NAMES (Continued)

| Description or Principal Component | IMCO SERVICES | Baroid | Magcobar | Milchem | Primary Application |
|---|---|---|---|---|---|
| **SPECIALTY PRODUCTS** | | | | | |
| Bentonite Extender | IMCO GELEX | Benex | Benex | Benex | Increases yield of bentonite to form very low-solids drilling fluid. |
| Inhibiting Agent | IMCO IE PAC | | | | Imparts high-temperature fluid-loss control, temperature stability and increased inhibition. |
| Synergistic Polymer Blend | IMCO POLY Rx | | Resinex | | Rheological stabilization and filtration control. |
| Biodegradable Surfactant | IMCO FOAMANT | | | | Foaming agent in air or mist drilling. |
| High-Temperature Polymer | IMCO DRILTHERM | | | | High-temperature fluid-loss control. |
| Multipurpose Polymer | IMCO POLYSAFE | | | | Polymer for fluid-loss control. |
| **COMMERCIAL CHEMICALS** | | | | | |
| Sodium Chromate | Sodium Chromate | Sodium Chromate | Sodium Chromate | Sodium Chromate | Used in water-base muds to prevent high-temperature gelation. |
| 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 | Anhydrox | 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 gyp 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-MUD ADDITIVES** | | | | | |
| Primary Emulsifier | IMCO KENOL-S (L) 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. |
| **CORROSION INHIBITORS** | | | | | |
| Zinc Compound | IMCO SULF-X II | | | | For use as a hydrogen sulfide scavenger in water-base and oil-base muds. |
| Liquid Corrosion Inhibitor | IMCO CRACK CHEK | | | | Prevent stress cracking of drill strings in an $H_2S$ environment. |
| A Catalyzed Ammoninium Bisulfite | IMCO $XO_2$ | Cost 777 | A-202 | | For use as an oxygen scavenger. |
| Filming Amine | IMCO X-CORR | | | | Corrosion inhibitor. |

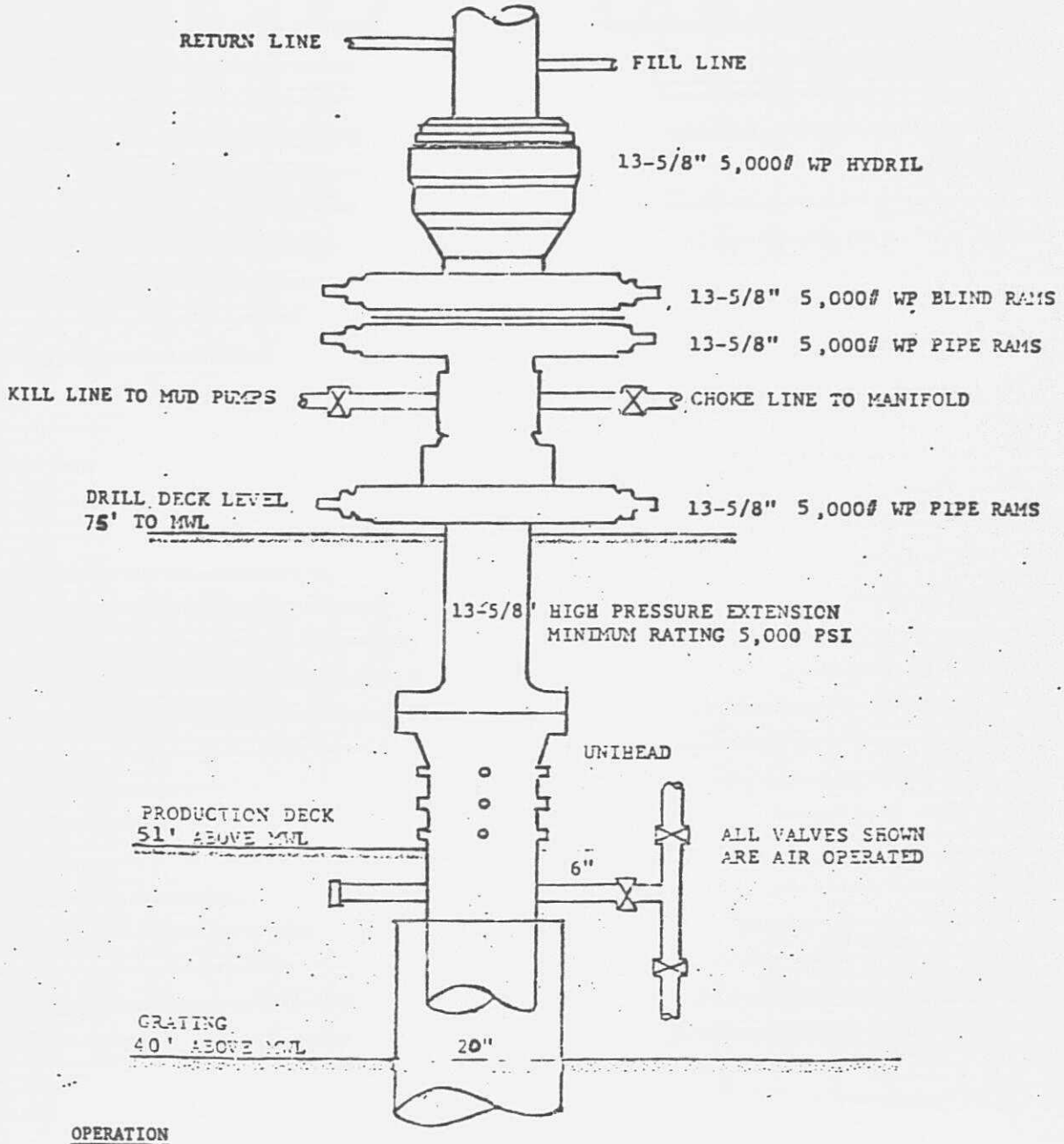
## COMPARABLE MUD PRODUCTS BY TRADE NAMES (Continued)

| Description or Principal Component | IMCO SERVICES | Baroid | Magcobar | Milchem | Primary Application |
|---|---|---|---|---|---|
| **CORROSION INHIBITORS (Continued)** | | | | | |
| Filming Amine | IMCO PERMAFILM | | | | Corrosion inhibitor. |
| Organic Polymer | IMCO SCALECHEK | | | | Scale inhibitor. |
| Calcium Oxide | IMCO KENOX | | | | Calcium source for saponification. |
| Fatty Acid Emulsifier | IMCO KEN SUPREME Conc. A | | Oilfaze | | 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. |
| Specially Modified Saponified Fatty Acid Chemicals | KEN PAK | SF-100 | | | Gelling agent for formulating high-gelation casing packs. |
| Wetting Agent and Dispersant | IMCO KEN CAL-L | | | | Wetting agent and dispersant for oil muds for the reduction and/or stabilization of viscosity. |

**NOTES**

DIVERTER SYSTEM (CASE 2)

Exhibit 9

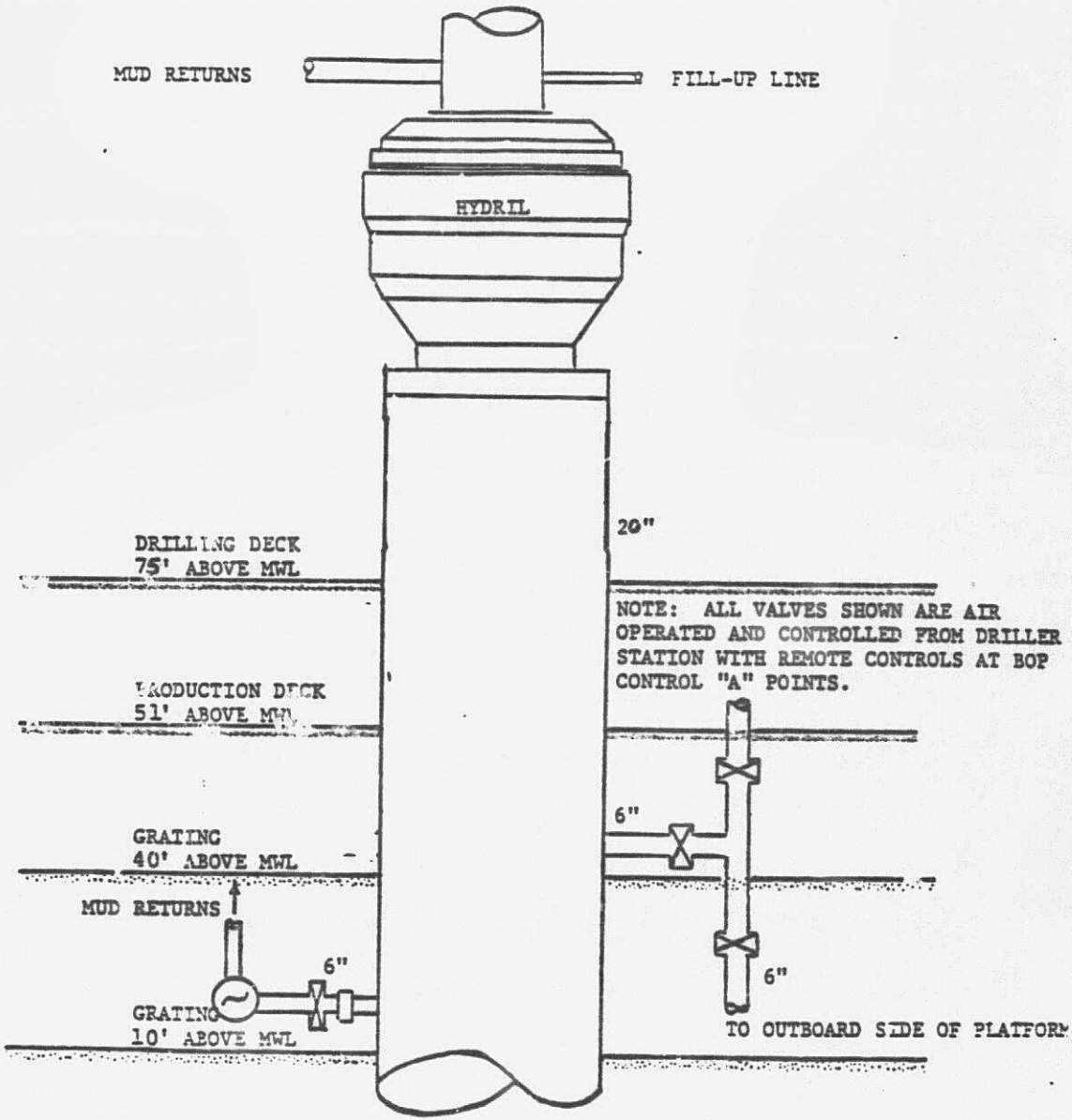



OPERATION

AT THE FIRST SIGN OF A KICK, WHICH WILL BE AN INCREASE IN MUD PIT VOLUME AND/OR AN INCREASE IN FLOW RATE, THE DIVERTER LINE DOWNWIND OF THE RIG WILL BE OPENED. THIS BOP WILL BE CLOSED TO DIVERT THE WELL FLUIDS AWAY FROM THE PLATFORM. THE DIVERTER LINE SHOULD ALWAYS BE OPENED BEFORE CLOSING THE BOP TO PREVENT FLOW AROUND THE BASE OF THE DRIVE PIPE.

STRUCTURAL DIVERTER (CASE 1)

Exhibit 10




OPERATION

AT THE FIRST SIGN OF A KICK, WHICH WILL BE AN INCREASE IN MUD PIT VOLUME AND/OR AN INCREASE IN FLOW RATE, THE DIVERTER LINE DOWNWIND OF THE RIG WILL BE OPENED. THIS BOP WILL BE CLOSED TO DIVERT THE WELL FLUIDS AWAY FROM THE PLATFORM. THE DIVERTER LINE SHOULD ALWAYS BE OPENED BEFORE CLOSING THE BOP TO PREVENT FLOW AROUND THE BASE OF THE DRIVE PIPE.

EXHIBIT 11

EPA AIR EMISSIONS DATA

A. Summary of Operations

ARCO Oil and Gas Company's leases in the South Pass Block 61 Field encompasses (in part or in whole) Blocks 6, 17, 59, 61, 66 and 67. We currently operate six (6) platforms in Block 60 and one (1) platform in Block 67. The proposed platform "G" will be located in Block 60 adjacent to existing "A" and "D" platforms, approximately 13 miles from shore.

Construction of platform "G" will require relocating the platform deck and production equipment from the Block 67 "A" platform onto a new jacket. A new platform deck and limited production equipment will be installed on the Block 67 "A" platform. Development drilling on the new platform "G" will be conducted using the H&P 90 natural gas fueled drilling rig. Development drilling and well maintenance work on Block 67 "A" platform will be conducted by the H&P 101 natural gas fueled drilling rig.

Both rigs are self-contained platforms rigs having similar equipment which consists of:

1. Four V-16 Caterpillar G-399 Engines

   Natural gas fueled, 870 BHP each. Average of two are used 75% in drilling mode at 75% load, 25% non-drilling mode at 25% load. Assume 80% engine efficiency.

2. Crane - Unit Mariner 650-H

   GM 8V-92N diesel engine, 355 BHP. Used 30% of the time and operates at 50% load.

3. Cementing Unit

   a. Two GM 8V-71N diesel engine driven pumps, 333 rated BHP, average of 5% actual use at continuous rating.

   b. One GM 3-71N diesel cement mixer, 90 rated BHP, 67 continuous BHP, average of 5% actual use at continuous rating.

4. Wireline Unit

   Cummins 378-C-155 diesel engine, 99 BHP GIH - 5% of the time, 85 BHP POOH - 50% of the time, average 4 days/well (each 2 months). Total of 24 days/year.

5. Emergency Rig Generator

   Caterpillar D-379 V-8 diesel, 715 continuous BHP at 1300 RPM, used for emergency back-up. Not figured into total emissions.

CJT/3/2

Proposed platform "G" would have the same platform engines presently on Block 67 "A" platform which would consist of:

1. Two Solar Saturn 1000 HP turbines to drive the generators (one continuous, one backup).

2. One 12V-71 Detroit Diesel - fire pump rated at 504 BHP, 335 continuous BHP. Used only in an emergency and is not figured in total emissions.

3. One Detroit Diesel 6-71 pump down pump rated at 200 BHP, with 142 continuous BHP and an average of 30% actual use.

The new platform deck replacing the Block 67 "A" platform deck would have the following platform engines:

1. 150 continuous BHP natural gas generator.

2. 335 continuous BHP diesel fire pump and 100 BHP emergency diesel generator used for emergency purposes only. Not figured into total emissions.

3. Detroit Diesel 6-71N crane rated at 200 BHP and 142 continuous BHP. Average actual use of 30%.

4. One pump down pump, rated at 200 BHP, 142 continuous BHP. (To be added at a later date).

B. Calculation of Emission Exemptions - Part 250.57.101

Exemption Formulas

1. 33.3 D for $NO_x$, $SO_2$, TSP, THC each

2. $3400\ D^{2/3}$ for CO

Where, D = distance from shore defined as landward of the mean high water mark.

Maximum Allowables

1. $33.3 \times 13 = 435.5$ tons/year each of $NO_x$, $SO_2$, TSP, THC

2. $3400 \times 13^{2/3} = 18{,}797.8$ tons/year for CO

C. EPA AP-42 Emission Factors

| | NATURAL GAS FUELED INTERNAL COMBUSTION ENGINE (#/HP-HR) | DIESEL FUELED INTERNAL COMBUSTION ENGINE (#/HP-HR) | TURBINE ENGINE (#/HP-HR) |
|---|---|---|---|
| $NO_x$ | 0.024 | 0.030837 | 0.0029 |
| CO | 0.0031 | 0.006674 | 0.0011 |
| $SO_2$ | 0.000004 | 0.0020507 | 0.000004 |
| TSP | -- | 0.0022026 | -- |
| THC* | 0.0097 | 0.002467 | 0.00020 |

* NOTE: Total Hydrocarbons (THC) as methane and non-methane

D. Calculation of Expected Air Emissions for South Pass Block 61 Field

Calculations have been performed assuming one year continuous operation of drilling rigs and platform engines on both proposed Block 60 "G" platform and modified Block 67 "A" platform. The expected incremental air emissions for this Supplemental Development in the South Pass Block 61 Field are equal to:

Total Incremental Expected Air Emissions (Tons/Year) for:

$NO_x$, CO, $SO_2$, TSP, THC =

1. (Block 60 Platform "G" Air Emissions) plus

2. (Block 67 Platform "A" Air Emissions) less

3. (Block 67 Platform "A" Air Emissions Previously Permitted)

* * * * * * *

TABLE 1
Block 60 Platform "G" Air Emissions[4]

| ENGINE | AVERAGE POWER (HP/HR) | EMISSION TOTALS (TONS/YEAR) $NO_x$ | CO | $SO_2$[1] | TSP | THC |
|---|---|---|---|---|---|---|
| Prime Movers[2] | 1366.5 | 143.65 | 18.55 | -- | -- | 58.066 |
| Rig Emergency Ge[3] | (715) | (96.61) | (20.91) | (6.41) | (6.91) | (7.71) |
| Cement Unit | 11.5 | 1.55 | .31 | .11 | .11 | .11 |
| Cement M... | 3 | .32 | .10 | .03 | .03 | .04 |
| ...ane | 28 | 3.88 | .80 | .25 | .27 | .30 |
| Crane[3] | (28) | (3.78) | (.80) | (.25) | (.27) | (.30) |
| Platform Generator[5] | 1000 | 12.70 | 4.82 | -- | -- | .88 |
| Fire Pump[3] | (335) | (45.25) | (9.79) | (3.01) | (3.23) | (3.62) |
| Pump Down Pump | 43 | 5.81 | 1.26 | .39 | .41 | .46 |
| Emergency Generator[3] | (335) | (45.25) | (9.89) | (3.01) | (3.23) | (3.62) |
| | TOTALS | 167.91 | 25.84 | .78 | .82 | 59.85 |

TABLE 2
Block 67 Platform "A" Air Emissions[4]

| ENGINE | AVERAGE POWER (HP/HR) | EMISSION TOTALS (TONS/YEAR) $NO_x$ | CO | $SO_2$[1] | TSP | TH... |
|---|---|---|---|---|---|---|
| Prime Movers[2] | 1366.5 | 143.65 | 18.55 | -- | -- | 58.06 |
| Rig Emergency Generator[3] | (715) | (96.61) | (20.91) | (6.41) | (6.91) | (7.71) |
| Cement Unit | 11.5 | 1.55 | .31 | .11 | .11 | .11 |
| Cement Mixer | 3 | .32 | .10 | .03 | .03 | .04 |
| Crane | 43 | 5.92 | 1.22 | .38 | .41 | .46 |
| Platform Generator[2] | 150 | 15.77 | 2.04 | -- | -- | 6.38 |
| Fire Pump[3] | (335) | (45.25) | (9.79) | (3.01) | (3.23) | (3.62) |
| Pump Down Pump | 43 | 5.81 | 1.26 | .39 | .41 | .45 |
| Emergency Generator[3] | (100) | (1.20) | (0.46) | -- | -- | (0.08) |
| | TOTALS | 173.02 | 23.48 | .91 | .96 | 65.50 |

1 Analysis of natural gas indicates no sulfur content.

2 Natural gas fueled engines - use natural gas emission factor in calculation.

3 These engines essentially never used, so not included in totals.

4 The general quotation used to calculate the tabulated air emission values is provided on the final page of this section as well as an example of the use of the equation.

5 Use turbine engine emission factor.

TABLE 3

Air Emissions Previously Permitted for Block 67 "A" Platform

| Air Pollutants | Air Emissions Previously Permitted for 1/ Block 67 "A" Platform and Natural Gas Fueled Drilling Rig |
|---|---|
| $NO_x$ | 167.8 |
| CO | 25.8 |
| $SO_2$ | 0.8 |
| THC | 0.8 |
| TSP | 59.9 |

1/ Air emissions obtained from the Air Emissions Data Report for South Pass Block 67 "A" Platform Supplemental Plan of Development for Lease OCS-G-1611 and 1612, Blocks 66 and 67, South Pass Areas, approved on June 13, 1981.

TABLE 4

Total Expected and Allowable Air Emissions are Provided Below

| Air Pollutants | (1) + (2) - (3) = Expected Incremental Air Emissions (Ton/Year): [60 "G" Platform] + [67 "A" Platform] - [67 "A" Platform Previously Permitted] | Allowables (Ton/Year) |
|---|---|---|
| $NO_x$ | 173.1 | 435.5 |
| CO | 23.5 | 18,797.8 |
| $SO_2$ | 0.9 | 435.5 |
| THC | 1.0 | 435.5 |
| TSP | 65.5 | 435.5 |

NOTE THAT ALL EXPECTED AIR EMISSIONS ARE BELOW ALLOWABLE AIR EMISSIONS

* * * * * * * * *

The general equation used for calculation of the tabulated expected air emissions in Tables 1 and 2 for a particular piece of equipment is given by:

(1) Expected Air Emissions (Tons/Year)

= [Continuous BHP of Equipment] x [% Actual Use]

x [Appropriate Air Emission Factor, lbs/HP-HR]

x [8760 Hours/Year] x [1/2000 lbs/ton]

The above equation reduces to:

(2) Expected Air Emissions (Tons/Year)

= [Average Power of Equipment] x [Appropriate Air Emission Factor]

x [4.38]

An example of the use of equation (2) is given below:

The expected yearly air emissions of $NO_x$ in tons/year for the platform generator on proposed "G" platform is:

Expected $NO_x$ Air Emissions = [1000 (HP/HR)] x [0.0029 ($lbsNO_x$/HP-HR)]

x 4.38

From Generator on "G" Platform = 12.70 tons/year of $NO_x$ air emissions

* * * * * *

A.

# ENVIRONMENTAL REPORT

FOR

SUPPLEMENTAL DOCD

SOUTH PASS BLOCK 61 FIELD

ARCO OIL AND GAS COMPANY

A DIVISION OF

ATLANTIC RICHFIELD COMPANY

Contact:

Cliff J. Toberman

P. O. Box 51408, OCS

Lafayette, Louisiana 70505

(318) 264-4000



October 1984

# C O N T E N T S

B. DESCRIPTION OF PROPOSED ACTION

1. Transportation will include boats and helicopters presently operated in the South Pass Block 61 Field. Personnel transport is done almost exclusively by helicopter. One large helicopter will visit the rig daily. The South Pass Block 61 Field operates three crewboats (100') that make approximately ten runs per week each, and three workboats (165') that make an average of seven runs per week each, during drilling. A standby/utility boat is maintained in the field.

2. The base operations for all offshore activity out of this district is in Venice, Louisiana. This base consists of a docking facility, warehouse, yard, heliport, parking lot and office, which are used to supply the needed logistic, communication and supervisory support. Crewboats, supply boats and helicopters which support the platforms and rigs are coordinated from this base. Private radios, micro-wave channels and regular telephones are installed. This shore base facility has dispatchers on duty 24 hours a day and a base coordinator who is immediately available. Attachment "A" is a general location map of the base site and Attachment "B" is a layout of the base facilities

3. No new support facilities are expected as a result of this activity.

4. Platform G is to be constructed by separating the existing platform deck from South Pass 67A platform, and setting it on a new jacket. A new platform deck will then be installed on 67A jacket. For further details, refer to the attached Supplemental DOCD.

5. Attachment "C" shows the location of the proposed activity in relation to the affected coastal states of Louisiana and Mississippi.

6. Produced crude oil and gas will be transported to shore through existing pipelines.

C. DESCRIPTION OF THE AFFECTED ENVIRONMENT AND IMPACTS

1. Physical and Environmental

a. Offshore oil and gas operations may impact commercial fisheries in the following ways: removal of sea floor from use; underwater obstruction; oil pollution; pipelines. Specifics on how these impacts may occur are addressed in the FEIS Sale 58 at pp. III 39, 40, 41. In this and other FEIS's, impacts are mainly discussed in

terms of development and production activities. A main concern has been the effects of drilling muds and cuttings. Numerous studies have been conducted (Gulf of Mexico, mid-Atlantic, Tanner Bank, Cook Inlet, Beaufort Sea, etc.) to examine the water column, benthic environment, sediment chemistry, and bioaccumulation in various organisms.

Several recent reports which address fate and effects of drilling muds are: Dames and Moore, 1981; Petrazzuolo, 1981; Ayers, 1981; and Jackson et al., 1981. These reports were submitted to the U.S. EPA as background data for the issuance of NPDES permits and in Environmental Reports (Exploration) submitted, as part of a Minerals Management Service requirement for offshore exploratory drilling.

In the event of an oil spill, commercial fishing activities would be inhibited in order to avoid contamination of fishing equipment, vessels and catch. However, the frequency and magnitude of such spills is minimal. Supporting this, Mertens (1973) refers to Environmental Impact Statement Hearing, August 1972. "Despite the presence of the oil industry in this area, the fishing catch has risen markedly in that period and presently is greater than any other fishing in the United States." (FEIS Lease Sale 36, Vol. II pp.168-169). (FEIS Lease Sales A-66 and 66, page 68).

Assumptions about the characteristics, rates and effects of a typical Gulf of Mexico oil spill are addressed in the Regional FEIS at pp. 276-290.

b. Shipping (transit lanes, anchorage areas, fairways, etc.)

The fairway system in the Gulf (see visual No. 11, Regional FEIS, January 1983) cuts across many lease blocks. The lease blocks and parts of blocks that lie within the fairways are subject to certain constraints. Although oil and gas resources can be exploited through directional drilling, no structure may be placed in a fairway. Pipelines can only cross perpendicular to a fairway and they must be entrenched where this occurs. (See Regional FEIS, January 1983, pp. 16, 402, 403, 420).

Ships, of course, do not always use these fairways and this increases the possibility of a collision with drilling rigs, permanent platforms, or vessels attending these platforms. The most serious environmental hazard involving offshore structures and shipping could occur in the case of an oil tanker colliding with a platform.

To minimize the chance of this type of accident, navigational aids such as fog horns and beacons are installed on offshore MODUs (Mobile Offshore Drilling Units) as per U.S. Coast Guard regulations.

Stationary offshore structures such as rigs and platforms may function as navigational aids for small boat operators and thus have a beneficial impact. Also in Louisiana, lives have been saved by the presence of offshore platforms when pleasure boat crews and passengers were forced to abandon their craft during storms or following boat accidents.

Fairways are present in South Pass Block 61 field.

c. Small Craft: Pleasure Boating, Sport Fishing and Recreation

Offshore mineral development in the past 25 years has led to the erection of over 100 major platforms and 4,000 individual structures in the Gulf of Mexico, most of which are in the central Gulf off the coast of Louisiana. Some areas have become widely recognized over the years as having a special interest to fishermen, scuba divers and marine researchers because they serve as breeding grounds and artificial reefs. Now most of the offshore fishing in the central and western Gulf, except big game fishing, is focused around petroleum structures and designated artificial reefs.

Extensive testimony and evidence have been received that overall oil and gas operations have a favorable impact on sport fishing activities. The favorable impact is the result of sport fish population enhancement due to the artificial reef effect of offshore platforms. In the open sea, offshore platforms provide both food and cover in areas that are largely devoid of these essentials. (FEIS Lease Sale 36, Vol. II, page 189).

Background and statistics on the offshore "rig fishing" phenomenon is discussed on page 439 of the January 1983 Final Regional Environmental Impact Statement.

A "REEFS (Recreation, Environmental Enhancement and Fishing in the Seas) Task Force has been created by the Department of Interior (MMS News Release, August 5, 1983). The task force was created to "pave the way for aggressive movement towards a National Rigs-to-Reef program which will enhance fishery resource and improve recreational and sport fishing opportunities within America's

offshore marine environment." Under "Cumulative Impacts" the Regional FEIS states, "It is likely that continued and expanded oil and gas leasing in the CPA (Central Planning Area) will have a very high favorable impact on offshore marine recreational fishing in the next 10-50 years".

d. Cultural Resources - Known Archaeological or Historic Areas

The South Pass Block 61 Field is not in a known archaeological or historic area. A shallow hazards analysis has been done previously for the field and is discussed in the Supplemental DOCD.

e. Ecologically Sensitive Features

Although communities of anemones, limpets, mollusks, barnacles and other forms of marine/estuarine life which attach themselves to the substrate are prolific in California and New England, few of these animals have a wide distribution in Louisiana because of the predominantly soft-substrate beaches of the State. Those invertebrate sessile organisms which do colonize the jetties of the Mississippi River are largely protected from contact with oil resulting from a spill due to the gulfward movements of the river. (FEIS Lease Sale 36 Vol. II, pp. 146, 147 [C-4]).

The lease area is not situated in or near areas of biological significance. (See Visual No. 10 of Regional FEIS). No designated preservation areas exist near this block. Among the refuges and preserves to be found in coastal shorefront parishes of Louisiana are Sabine National Wildlife Refuge and Lacassine National Wildlife Refuge in Cameron Parish, Rockefeller Wildlife Refuge and Game Preserve in Cameron/Vermilion Parishes, the Paul J. Rainey and the Louisiana State Wildlife Refuge and Game Preserves in Vermilion Parish, the Russell Sage (Marsh Island) Wildlife Refuge and Game Preserve in Iberia Parish, Pt. Au Chien Wildlife Management Area in Terrebonne /Lafourche Parishes, Wisner Wildlife Management Area in Lafourche Parish, Bohemia Wildlife Management Area, Delta National Wildlife Refuge and Pass a Loutre Game and Fish Preserve all in Plaquemines Parish, and the Biloxi Wildlife Management Area and Breton Bird Refuge, both in St. Bernard Parish.

The South Pass Block 61 Field is located approximately 13 miles south of the Pass A Loutre Game and Fish Preserve.

No national marine or estuarine sanctuaries exist near the proposed development area.

f. South Block 61 Field contains many pipelines and cables as depicted in attachment D. No new pipelines to shore are expected as a result of this proposal.

g. No other known mineral deposits of commercial importance occur within the lease area.

h. All ocean dumping is regulated by the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, on October 15, 1973 (38 FR 28610 et seq.). A revised version of the regulations became effective on February 10, 1977 (43 FR 2450-2462). These regulations require a U.S. EPA permit for all ocean dumping of industrial wastes and municipal sludge materials. The Federal regulation 40 CFR 228 lists the designated ocean areas where wastes may be disposed. Further, EPA publishes an annual report entitled Ocean Dumping in the United States.

U.S. EPA has one designated deepwater disposal area in the Gulf of Mexico. Two smaller sites used for the dumping of liquid industrial wastes in the Gulf have been inactive for several years and their designation has lapsed. The large site in the Western Gulf of Mexico is an incineration site for the burning of liquid chemical wastes, e.g., PCB, DDT, trichloral ethylene, etc. The permit has expired, but it is up for redesignation.

l and gas development will not have any impact upon A's sites due to its distance from shore and the mobility of the disposal ship within the permitted area.

i. Several federally listed endangered and threatened species inhabit the coastal and offshore areas of the Gulf region. Six endangered marine mammals (five whales and the Florida manatee), the key deer, two threatened and three endangered marine turtles, the threatened alligator and endangered crocodile, and seven endangered species of birds were selected as representative of endangered and threatened species that could be affected by offshore or onshore activities resulting from OCS oil and gas development in the Gulf.

Five federally endangered whale species occur within the Central and Eastern Gulf. These include the fin, humpback, right, sei, and sperm whales. Generally, these larger cetaceans occur in continental slope and deep oceanic waters. Recently, sperm whales have been sighted near the Louisiana Delta.

No federally listed endangered plant species are known to occur in the Central and Eastern Gulf areas.

Concluding statements found in appendix "B" of the Regional FEIS from both the Fish and Wildlife Service and National Marine Fisheries Service attest that "leasing and exploration activities are not likely to jeopardize the continued existence of the Endangered or Threatened species of the Gulf Region or result in the destruction or adverse modification of their Critical Habitats if the probability of oil spills from exploration are considered to be near zero and as long as existing support bases are sufficient to handle anticipated exploration activities." (See Regional FEIS, pp. 182-185, 324-326, 413-414, 884-891 and Visual No. 11).

2. Socio-Economics

a. Employment

The economic activity that has occurred in the areas bordering the Gulf of Mexico has been a significant part of the total economic activity of the nation. Business activity in these states has shown resistance to depressing forces present in the national economy. The increase in domestic oil prices has led to a substantial increase in energy production-related activities in general over the already well established pattern. The FEIS for Lease Sale Number 58/58A (12) provides extensive quantitative data regarding this subject.

Table III-9 (regional FEIS, p. 191) reflects the historic indicators for the labor force and unemployment in the Gulf region. In 1970, the regional unemployment rate was just below that of the United States; in 1980, the regional rate was well below the comparable U.S. figure.

b. Location and Size of the Related Population and Industrial Centers and Existing Community Services

ARCO's base is located in Venice, Louisiana from where personnel and supply movements are coordinated. However, the whole coastal area from New Orleans to Corpus Christi with its well established character of energy-related industries and supplies will provide the necessary services required for the operations associated with this plan. The FEIS for Lease Sales Number 58/58A (12) provides extensive information on the population employment and industrial centers in the area.

Table III-16 (Regional FEIS, p. 196) shows population changes in the Gulf region for 1960, 1970 and 1980 when growth over this period was substantial. Except for Alabama's 1960-1970 change, all states experienced growth rates well above national level.

c. Public Opinion of the Proposed Action

The general feeling of the citizens of the area adjacent to the Gulf of Mexico is favorable towards the development of energy-related industries in view of the continued job availability, even in economically depressed times in other areas of the USA.

D. UNAVOIDABLE ADVERSE IMPACTS

(See FEIS Lease Sale 58, Volume 1, pp. V - 1, 2, 3)
(See FEIS Lease Sale 36, Vol. II, pp. VI - 281-291)
(See FEIS Lease Sale 41, Vol. II, pp. V - 565-576)
(See Regional FEIS, VOl. I, pp. 427-430)

"All unavoidable adverse impacts that will be sustained by the natural environment as a result of routine operations will be relatively localized in their effects. Many will be followed by unhindered natural recovery within relatively short time periods. A massive oil spill could result in short-term severe and widespread damage of major consequence. However, the probability that such a massive spill will occur is very low".

E. REFERENCES


a. Environmental Impact Statement, OCS Sales A66 and 66, 1980

b. Environmental Impact Statement, OCS Lease Sale 58, 1978

c. Environmental Impact Statement, OCS Lease Sale 36, 1974

d. Environmental Impact Statement, OCS Lease Sale 41, 1976

e. Final Regional Environmental Impact Statement, January 1983

## F. GUARANTEES

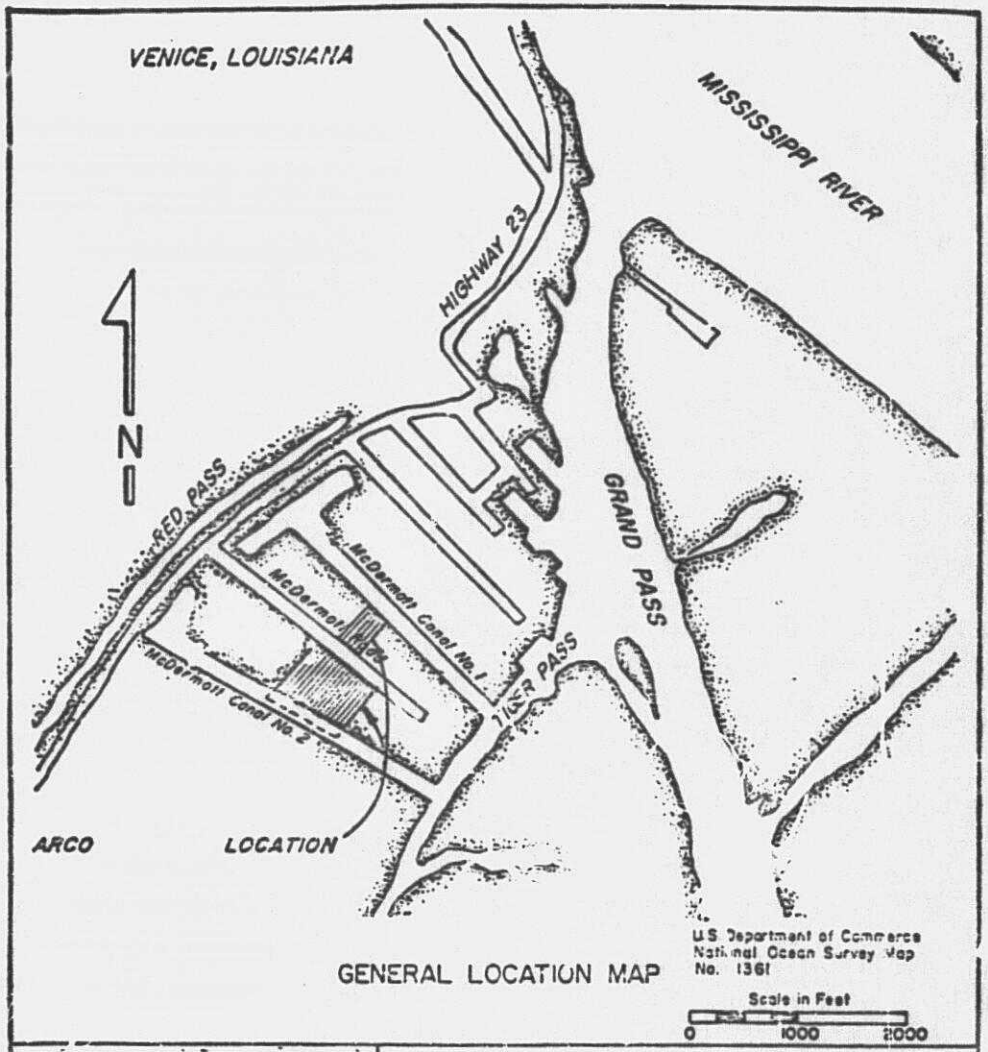
The proposed activity will be carried out and completed with the guarantee of the following items:

a. The best available and safest technologies will be utilized throughout the project. This includes meeting all applicable requirements for equipment types, general project layout, safety systems, and equipment and monitoring systems.

b. All operations will be covered by a MMS approved oil spill contingency plan.

c. All applicable Federal, State, and local requirements regarding air emissions and water quality and discharge for the proposed activities, as well as any other permit conditions, will be complied with.

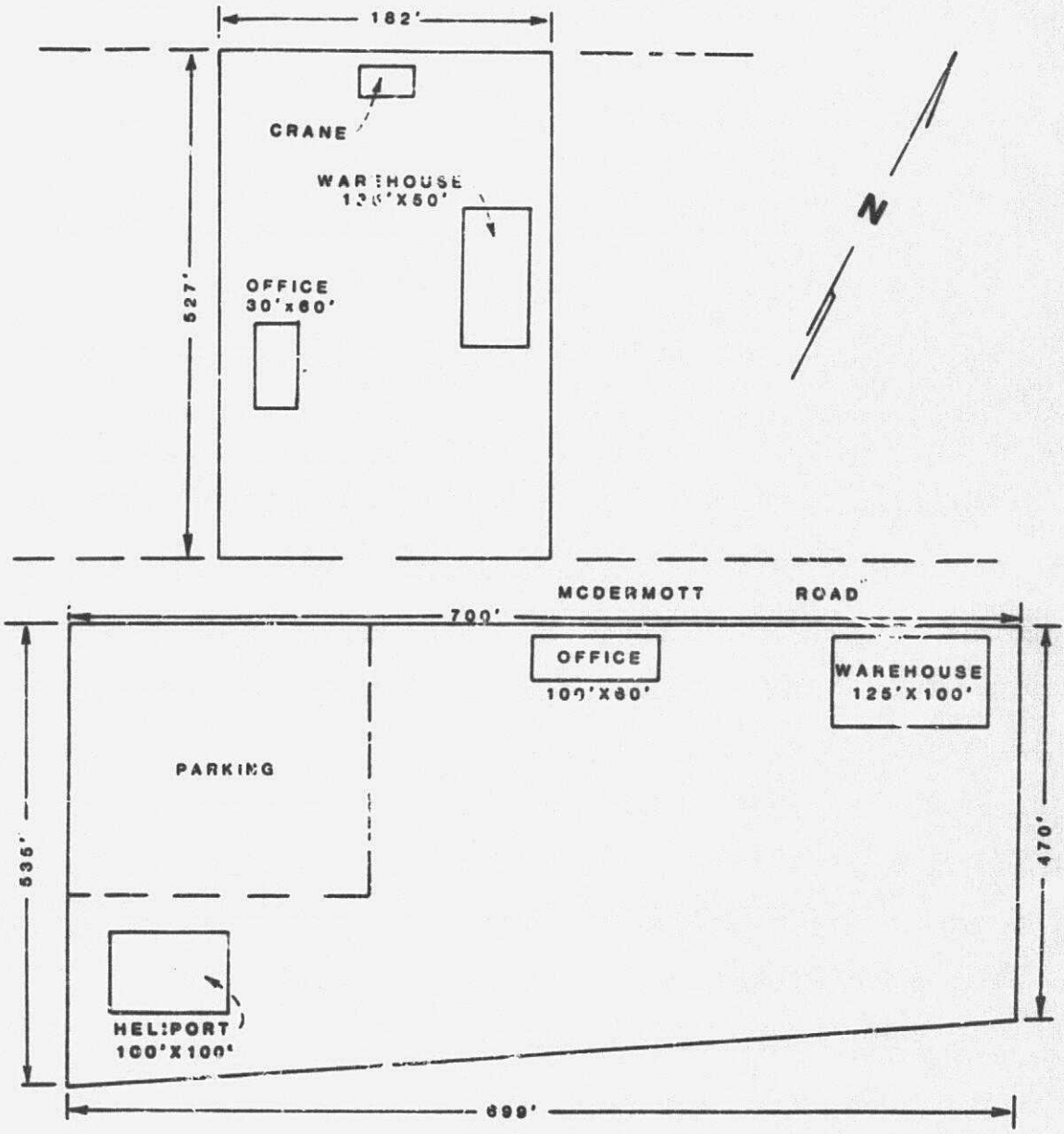
ATTACHMENT A. GENERAL LOCATION MAP FOR
VENICE SHORE BASE




GENERAL LOCATION MAP

| | |
|---|---|
| ARCO OIL AND GAS COMPANY | ARCO OIL AND GAS COMPANY |
| | In: McDERMOTT CANAL NO. 2<br>At: PLAQUEMINES PARISH<br>State: LOUISIANA |

ATTACHMENT B. VENICE BASE FACILITY LAYOUT

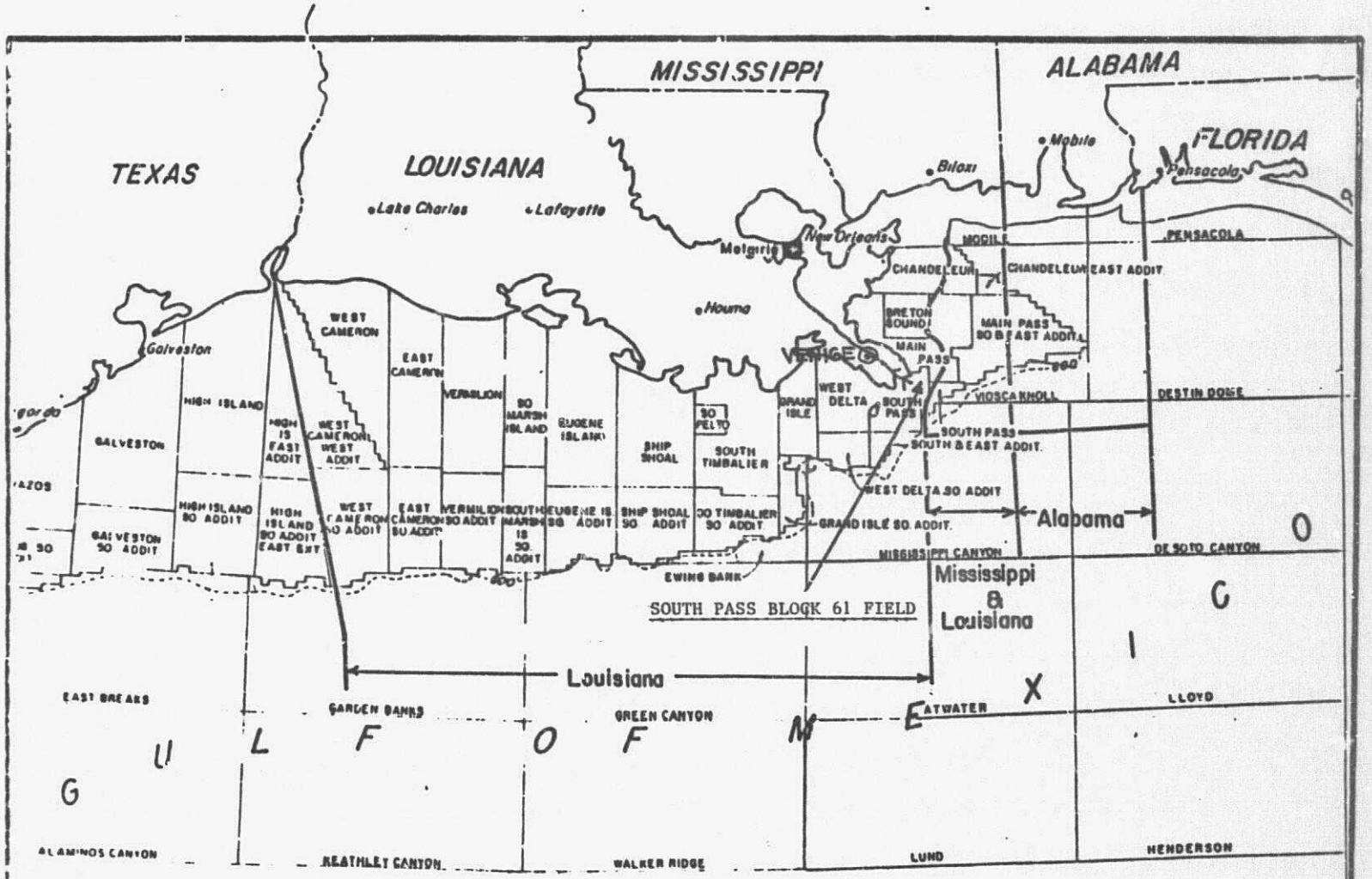



ARCO OIL & GAS CO.

VENICE BASE

NOT TO SCALE

NOV.,1980




ATTACHMENT C. LOCATION OF ACTIVITY IN RELATION TO AFFECTED COASTAL ZONE