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PLATFORM HARVEST (OCS P-0315)
AMENDMENT - DEVELOPMENT AND PRODUCTION PLAN

November 26, 1984

Noted - Mason

Mr. Thomas W. Dunaway
Regional Supervisor
Office of Field Operations
United States Department of the Interior
Minerals Management Service
Pacific OCS Region
1340 West Sixth Street
Los Angeles, California 90017

Dear Mr. Dunaway:

Enclosed please find six copies of an Amendment to Texaco's Development and Production Plan for its Platform Harvest project. The purpose of this amendment is to indicate a change in the location for Platform Harvest. Full details are included in the Amendment.

If you have any questions on this matter, please feel free to contact Mr. C. S. Alpert of my staff at (213) 739-7799. Your attention to this matter will be appreciated.

Very truly yours,

J. J. Ziober

CSA/bt

AMENDMENT

DEVELOPMENT AND PRODUCTION PLAN

PLATFORM HARVEST PROJECT

LEASE P-0315

POINT ARGUELLO FIELD, OFFSHORE CALIFORNIA

Texaco recently contracted a high precision bottom topology survey to provide detailed bathymetric data in the vicinity of the Platform Harvest site. These investigations confirm the approximate 7% seabed slope along a 34 degree azimuth and water depth of 672 feet in the vicinity of the platform site. Small scale variations from the approximate 7% seafloor slope were identified in the high precision survey records, however. To maintain a seafloor slope variation to within $\pm$0.10% within the boundaries of the jacket base and a mean water depth at the jacket base centerline of 672 feet below mean lower low water (both requirements of the original platform jacket design from which the jacket is currently being fabricated), it is necessary to relocate Platform Harvest. The new platform location chosen by a review of the high precision survey data is located 405 feet west and 55 feet south of the previously proposed Platform Harvest location (Figure 1). The new Platform Harvest coordinates proposed are 664619X, 866180Y (California Coordinate System Lambert Projection Zone 6); 713,012.1 Easting, 3,816,417.1 Northing (UTM); 34°28'8.8"N, 120°40'51.0"W (latitude and longitude) (Figure 2). This minor relocation eliminates potential structural modifications (and associated repeated CVA reviews) required to address seafloor irregularities associated with the original platform site. To assist the MMS in its review of this amendment to our Development and Production Plan, the following discussion briefly describes the high precision bottom topology survey and addresses each principal topic covered in the DPP and Environmental Reports.

HIGH PRECISION BOTTOM TOPOLOGY SURVEY

A standard geophysical survey was conducted by McClelland Engineers in December 1982. This survey was reported to the MMS, and the data reported (including a bathymetric survey) were used as input to the platform engineering design. To ensure the platform jacket is fabricated to the precise features of the seafloor, Texaco contracted with Oceaneering International to perform a high precision bottom topology survey in the vicinity of the proposed platform site.

The survey was accomplished using a Remotely Operated Vehicle (ROV) outfitted with an Ulvertech Bathymetry System. This system allows the simultaneous determination of ROV altitude above the seafloor (via echosoundings) and ROV depth (derived from hydrostatic head) to accurately determine bathymetry. The ROV was positioned relative to an acoustic transponder network deployed on the seafloor. This transponder network was left in place following the completion of this survey to allow the accurate positioning of the platform jacket during installation.

The locations of the four (4) Sonardyne transponders are illustrated on Figure 3. These transponders were deployed in a quadrangular network encompassing the desired survey area, and the network was geodetically calibrated using a UHF trisponder system with four line-of-sight shore stations. A 500 foot by 800 foot survey grid network was established on specified X-Y coordinates within the transponder network. The ROV paths within the survey area were spaced 10 feet apart, with one set approximately parallel to the isobaths and one set perpendicular to the isobaths.

Soundings were collected from the ROV while flying 10 to 15 feet above the seabed. Horizontal positioning was determined using an intelligent transponder on the ROV which interrogated and relayed the ranges from the seafloor transponders. Simultaneous echo and pressure readings were taken for each position fix, approximately every 15 feet along each survey line. Data were telemetered through the ROV umbilical to an HP 9845 computer system aboard the survey vessel.

Water depth was computed for each sounding position, and temperature, density, and salinity were measured throughout the survey to allow post survey processing corrections for sound propogation and pressure variations. Tide and swell corrections were also considered during final data reduction. Secondary checks on system accuracy were performed by direct comparison of the Ulvertech System readings to a calibrated taut wire and Digiquartz pressure sensor system fixed on an existing Texaco platform at a known water depth.

The high precision survey provides more accurate information than conventional surveys because:

1. Errors due to sound refraction, beam spread, sound velocity, etc. are minimized due to the reduction of the distance between the echosounder and the seabed.

2. Surface swell and sea state is dampened out by the pressure sensor on the Ulvertech unit at depths below one (1) wavelength.

3. Horizontal position of the depth measurement is controlled by utilizing acoustic location of the ROV with the transponder installation. ROV location is defined by triangulation and least squares data reduction.

The accurate positioning of the platform jacket during installation is further enhanced by the maintenance of the transponder installation used during the high precision survey for platform positioning. Seafloor bathymetry at the platform site is shown on Figure 4. Figure 5 shows profiles of the seafloor along the platform base at the new Platform Harvest location.

DEVELOPMENT AND PRODUCTION PLAN MODIFICATIONS

The proposed platform relocation is entirely associated with the refined seafloor topology data. It will not result in any change to the following sections of the Development and Production Plan:

Reservoir Evaluation
Offshore Production
Oil and Gas Treating Facilities
Product Storage and Transportation
Termination and Abandonment
Critical Operations and Curtailment Plan
Hydrogen Sulfide Contingency Plan

In addition, no changes are proposed to the product storage and transportation commitments previously agreed to by Texaco in consultation with the California Coastal Commission.

The following paragraphs describe specific changes to the DPP associated with the proposed platform relocation.

Overview of Development and Production

All details discussed in the original DPP section remain unchanged with the exception of the platform location labeled on Figure I-2. The platform location is to be moved from Lambert (Zone 6) 665,024X, 866,235Y to Lambert (Zone 6) 664,619X, 866,180Y.

Geology

The only changes to the geology section of the DPP occur in the local seafloor topography discussion (Section 2.3.2). That discussion should be expanded to include the results of the high precision bottom topology survey. The following information should be incorporated into that discussion:

A high precision bottom topology survey was conducted by Oceaneering International to refine bathymetry information in the vicinity of the proposed Platform Harvest site. This survey confirmed a 7% bottom slope along a 34 degree Azimuth at a water depth of 672 feet within the surveyed area. A review of the detailed bathymetry data identified a potential platform location centered on the Lambert (Zone 6) coordinates of 664,619X and 866,180Y which allows the installation of Platform Harvest without modification. This minor platform relocation will not affect Texaco's ability to reach identified bottom-hole objectives, and eliminates potential structural modifications (and associated repeated CVA reviews) required to address seafloor irregularities associated with the original platform site. A detailed report addressing the high precision bottom topology survey will be submitted to the MMS under separate cover.

Platform Engineering

The proposed platform relocation will allow the completion of platform fabrication (already in progress) in accordance with the original Platform Harvest design. Design changes would be required if the original location was retained.

The discussion concerning platform installation procedures (Section 4.6.1) should be expanded to include information concerning final jacket positioning as follows:

Texaco has made special efforts to ensure the precise positioning of the platform jacket. A seafloor transponder network established to accurately locate the Remotely Operated Vehicle used in Texaco's high precision bottom topology survey has been left in place for use during platform jacket positioning. This will allow the precise positioning of the platform jackets in accordance with the location recommended as a result of the high precision survey.

Pipeline Engineering

The proposed platform relocation will not affect general pipeline design characteristics. All applicable design standards and codes will be complied with, and general design criteria and installation procedures will not change. Because the platform will be relocated approximately 400 feet, the pipeline route will change slightly. The general pipeline route shown on Figure V-1 in the DPP should be modified to reflect this change (a modified copy is attached as Figure 6).

Drilling

No change to the general drilling program, sequence, production safety systems, completion procedures, pollution prevention and control measures, equipment, or operations are anticipated as a result of the proposed platform relocation. Minor changes in individual well programs will be required to reach the same bottom-hole objective from a slightly different platform site, but these changes are considered insignificant.

Oil Spill Contingency Plan

The proposed platform relocation will not result in any change of Texaco's oil spill contingency plan. Because Texaco's commitment to an onsite oil spill response vessel (to be shared with Chevron) will allow rapid spill response regardless of the precise location of the platform structure. The approximately 400 foot relocation is well within the uncertainty of available oil spill modeling techniques, and spill risk would not be measurably affected by this minor relocation.

ENVIRONMENTAL REPORT TOPICS

The analysis presented in the EIS addressing Platform Harvest considers hypothetical worst-case effects, and generally would not be modified if the minor platform relocation (to a position slightly farther offshore) was considered. This is also true with respect to the Environmental Report submitted by Texaco with minor exceptions. Each environmental topic addressed in the environmental report is discussed briefly below.

Geology

The proposed platform relocation will not increase the structure's exposure to geologic hazards or constraints. The new platform location is farther from a fault identified during a site specific geophysical survey, but overall project exposure to strong ground motion associated with seismic activity is expected to remain unchanged.

Atmospheric Sciences

The proposed platform relocation will not result in any change in predicted air pollutant emissions. The new platform location is slightly farther offshore, hence the DOI exemption ("E") limits applicable to Platform Harvest will increase. Because the original Platform Harvest location resulted in E limits well above projected emissions (and so was in compliance with applicable air quality regulations), the proposed platform relocation will be in compliance with applicable air quality regulations. For this reason, and because the onshore air quality benefit of this minor platform relocation is considered trivial, no additional analysis of air quality is considered necessary.

Oceanography

Site-specific oceanographic and marine water quality data used in the evaluation of project impacts is equally applicable to the original and relocated Platform Harvest sites. The assessments of marine water quality impacts are also equally applicable to both sites. Drilling muds dispersion with respect to nearby hard-bottom habitats may change slightly, however. This topic is discussed in detail under Flora and Fauna (below).

Other Uses

The proposed platform relocation could require a slightly longer pipeline installation period associated with the small increase in length of the proposed pipeline route. This increase is not expected to require more than one day additional time to install the pipeline, and is considered well within the scheduling uncertainty of the construction schedule projections. For this reason, projected impacts on commercial fishing operations and other ocean users are not expected to change as a result of the platform relocation.

Flora and Fauna

Project-related impacts on flora and fauna are not expected to appreciably change as a result of the proposed platform relocation. Direct disturbances of the seafloor by the platform structure will still occur entirely on soft-bottom habitats, and the pipeline route (mostly unchanged) will still avoid hard-bottom areas. Because the total distance of the platform relocation represents a minor portion of total anchor scope (less than 10%) and precise anchor positions have never been defined, predicted impacts associated with anchor disturbances are not expected to change. Drilling muds discharges will occur closer to the hard-bottom habitats west of Platform Harvest, and some increased sedimentation could occur in these areas. Based on a review of drill cuttings and muds dispersion modeling investigations conducted by Dames & Moore, the following conclusions may be reached:

1. Drill cuttings deposition in the mapped hard-bottom areas west of Platform Harvest will increase from 0.001 inches per day to approximately 0.005 inches per day (based on Table 4.e-1 in the ERP). Drill cuttings are not expected to be deposited on the hard bottom areas east of Platform Harvest. Cuttings deposition changes are shown on Figure 7.

2. Worst case drilling mud solids deposition on the mapped hard bottom areas west of Platform Harvest would decrease from nearly 0.0001 pounds per square foot to between 0 and 0.00001 pounds per square foot. (Because drilling muds dispersion and settlement involves convective descent, dynamic collapse, and passive diffusion

phases, peak bottom deposition of drilling muds occurs well-removed from the discharge point. Relocating the platform closer to the hard bottom area will actually decrease the drilling muds deposition on that hard-bottom area. Drilling muds deposition in relation to the nearby hard-bottom habitat is shown on Figure 8.

Observations of natural sedimentation rates in the hard-bottom area west of Platform Harvest recorded by Nekton (1983) during an onsite biological survey indicated that this area is presently subjected to high sedimentation rates, and minor increases associated with drill cuttings deposition are not expected to be significant. Because the deposition rate of mud solids would actually decrease, impacts associated with muds components of potential concern (such as barite, heavy metals, and mud additives) could actually be reduced by the proposed platform relocation.

Socioeconomics

The proposed platform relocation will not affect any socioeconomic impacts associated with the proposed project.

Accidents

The proposed platform relocation will not appreciably affect the risk of accidents associated with the proposed project. Depending on the exposure variables used to calculate risk, pipeline accident risk could increase slightly due to the increased pipeline length. This increase is expected to be well within the uncertainty of the previously calculated risk, and so does not represent any change in potential project impact.

Cumulative Effects

The proposed platform relocation will not modify anticipated cumulative impacts associated with Platform Harvest and other Point Arguello Field platforms.

SUMMARY

In summary, the proposed relocation of Platform Harvest represents an unsubstantial change of the Development and Production Plan previously filed with the MMS. We believe even with this change the project remains consistent with the California Coastal Zone Management Act and the rules and regulations of the Minerals Management Service.

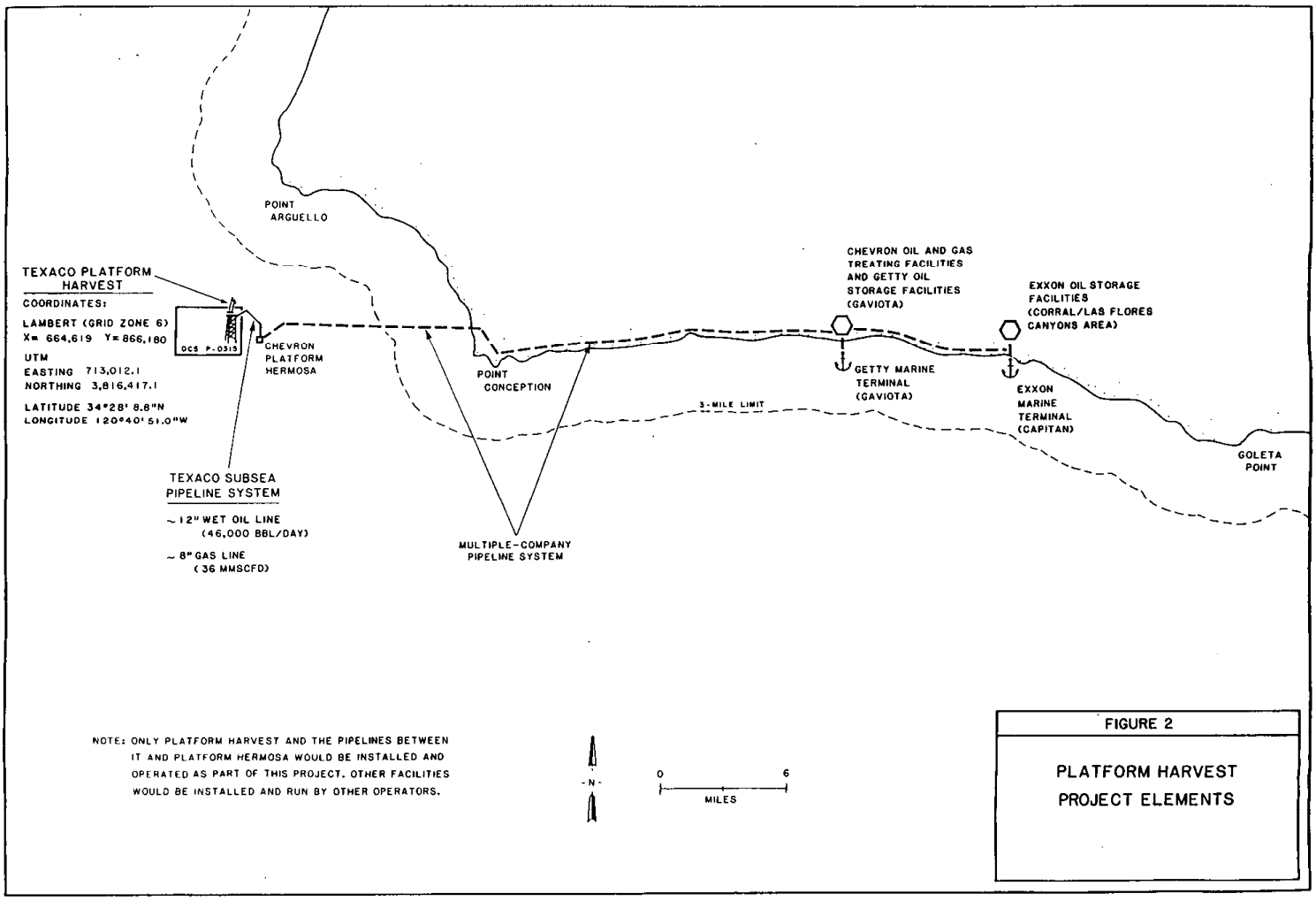


FIGURE 2

PLATFORM HARVEST
PROJECT ELEMENTS

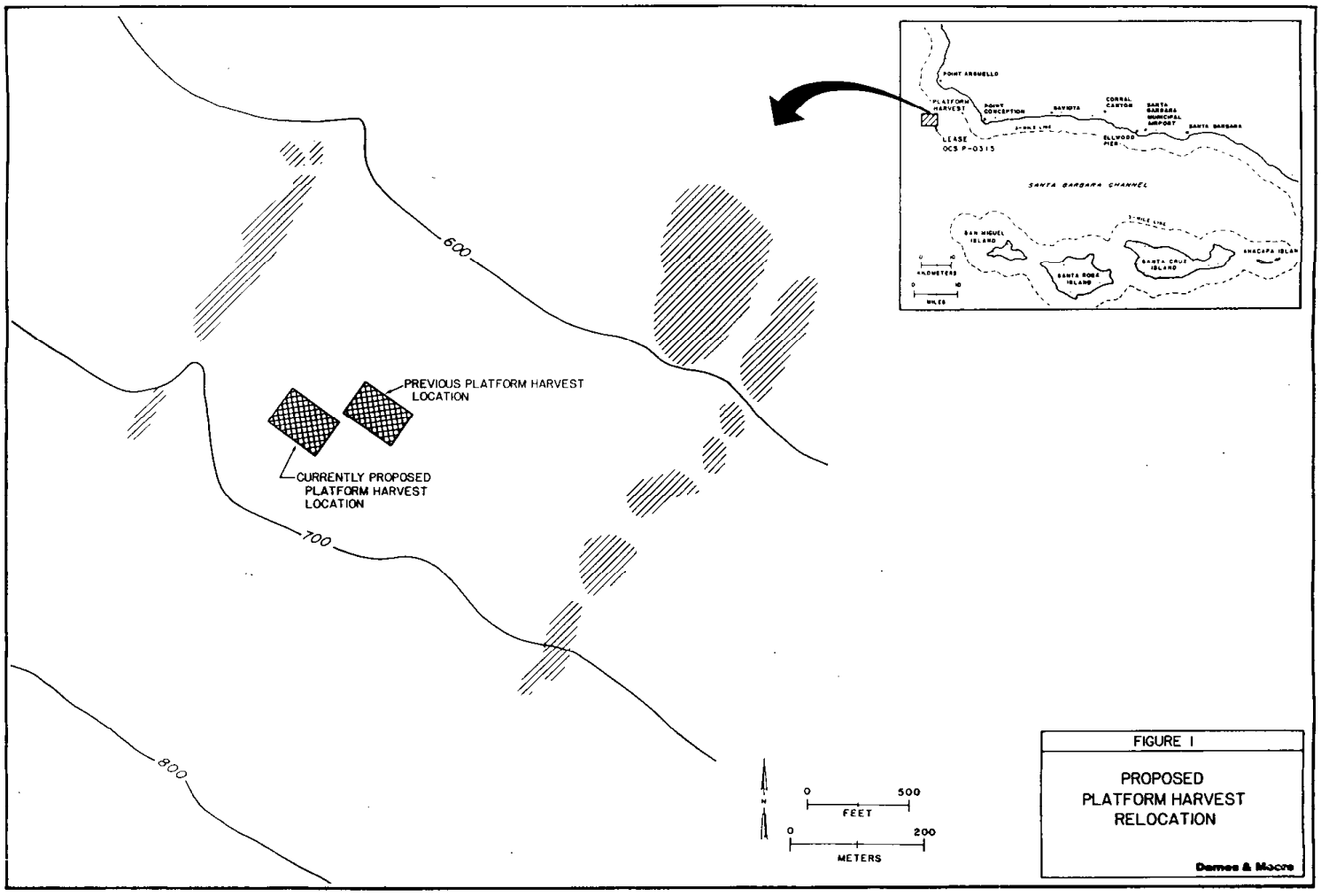


FIGURE 1

PROPOSED PLATFORM HARVEST RELOCATION

Dames & Moore

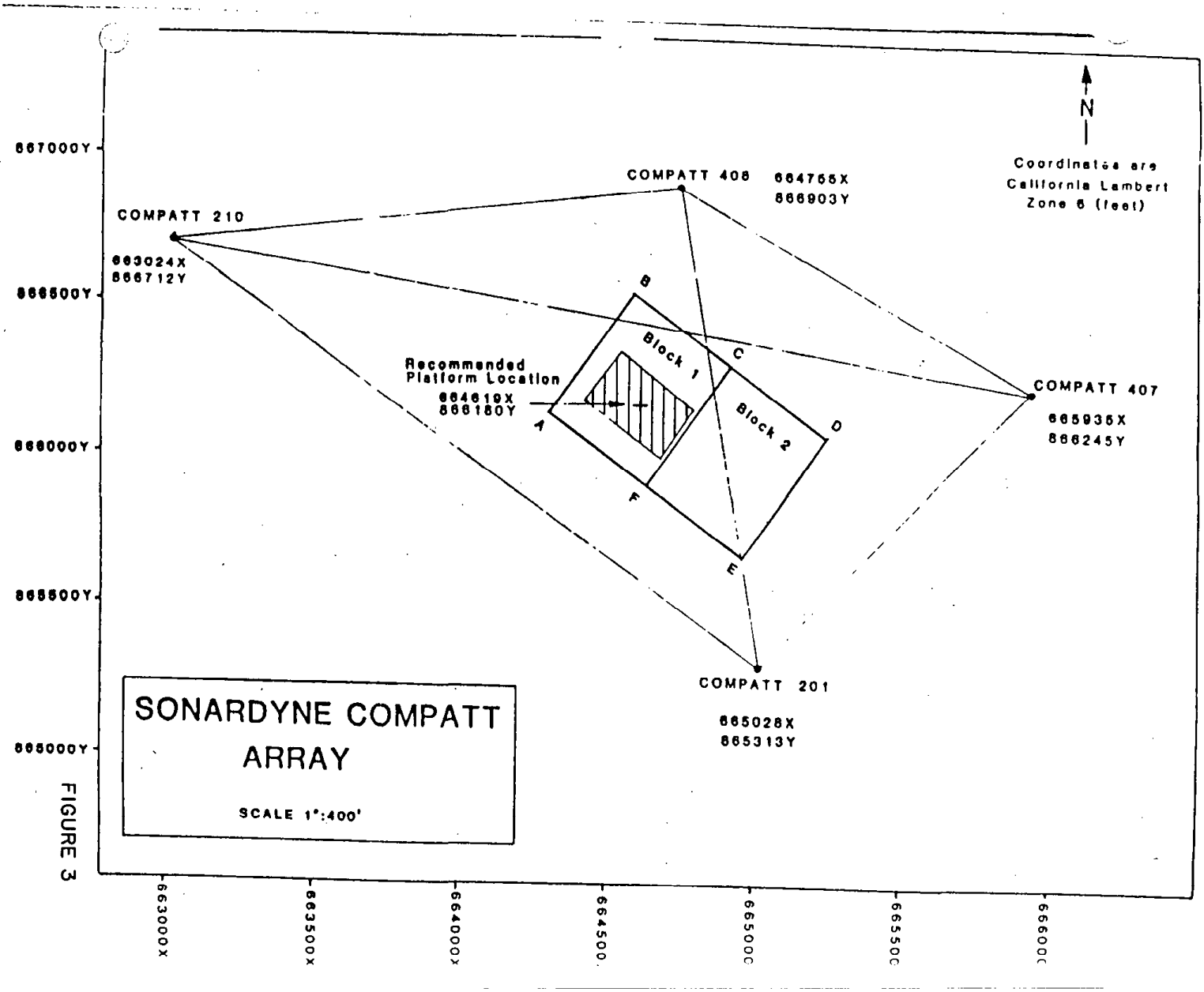

N
Coordinates are
California Lambert
Zone 6 (feet)
COMPATT 408
664755X
866903Y
COMPATT 210
663024X
866712Y
COMPATT 407
665936X
866245Y
COMPATT 201
665028X
865313Y
Recommended
Platform Location
664619X
866180Y
Block 1
Block 2
A
B
C
D
E
F
SONARDYNE COMPATT
ARRAY
SCALE 1":400'
667000Y
866500Y
866000Y
865500Y
865000Y
663000X
663500X
664000X
664500X
665000X
665500X
666000X

FIGURE 3

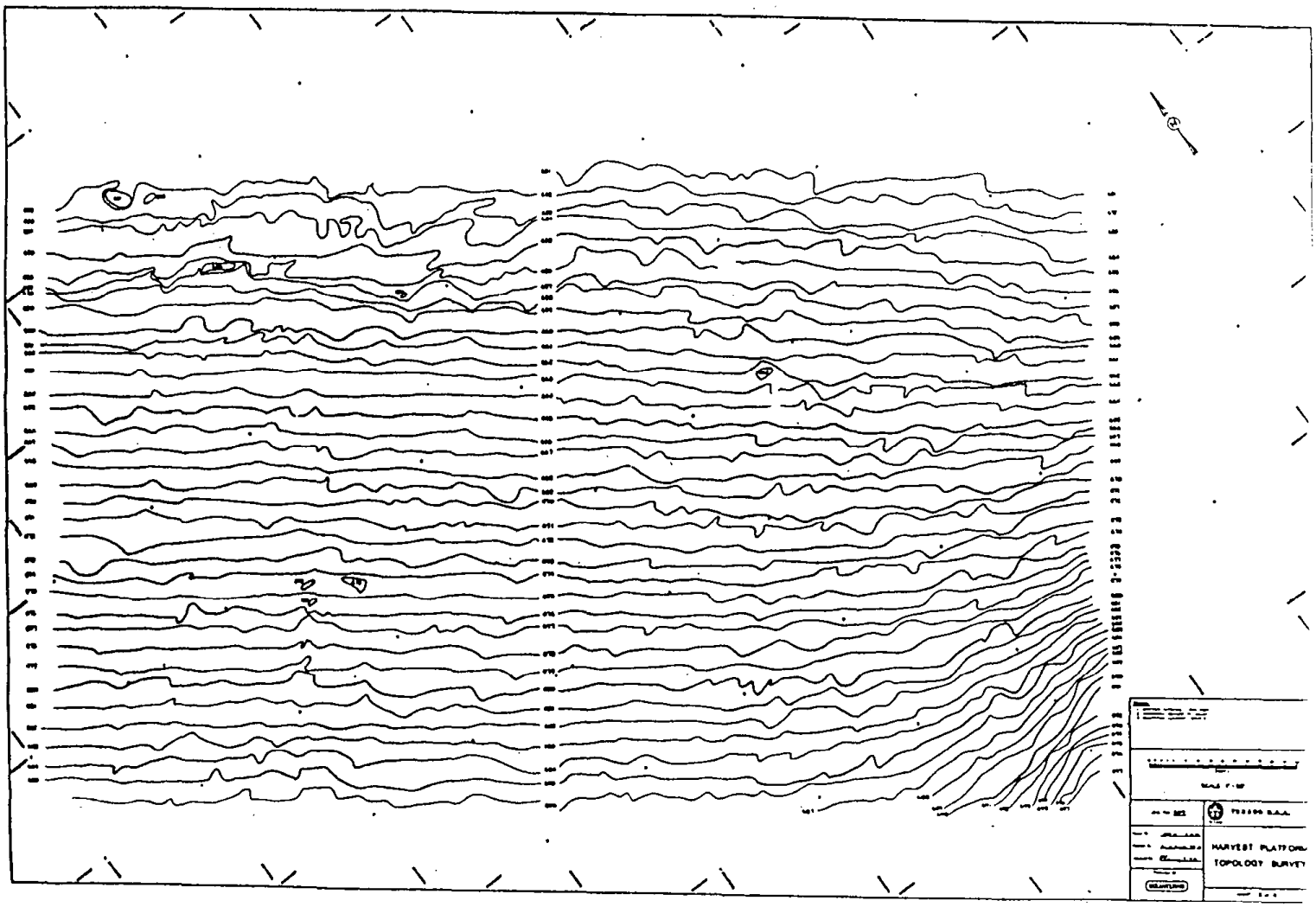
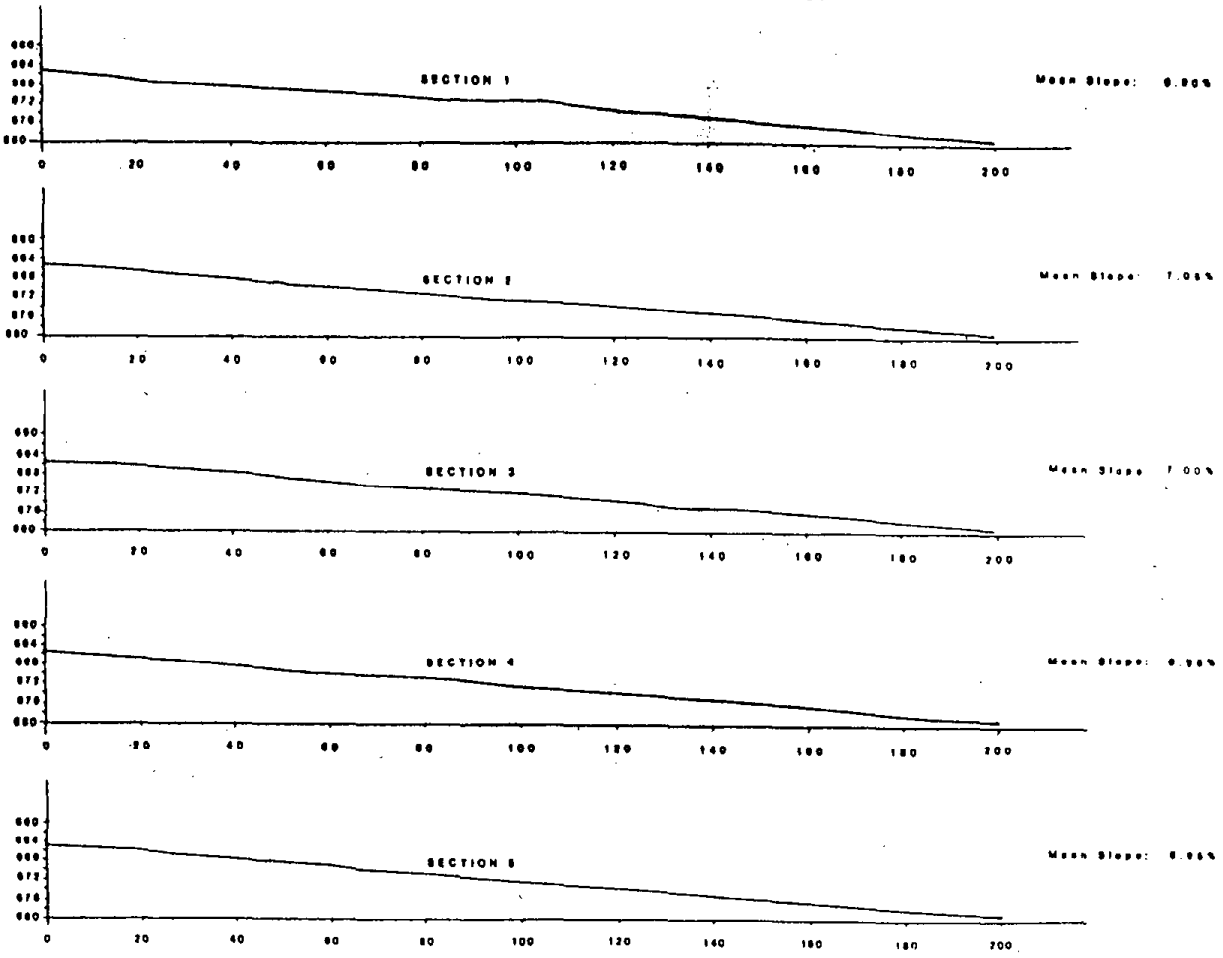


FIGURE 4

SEABED PROFILES AT RECOMMENDED PLATFORM LOCATION

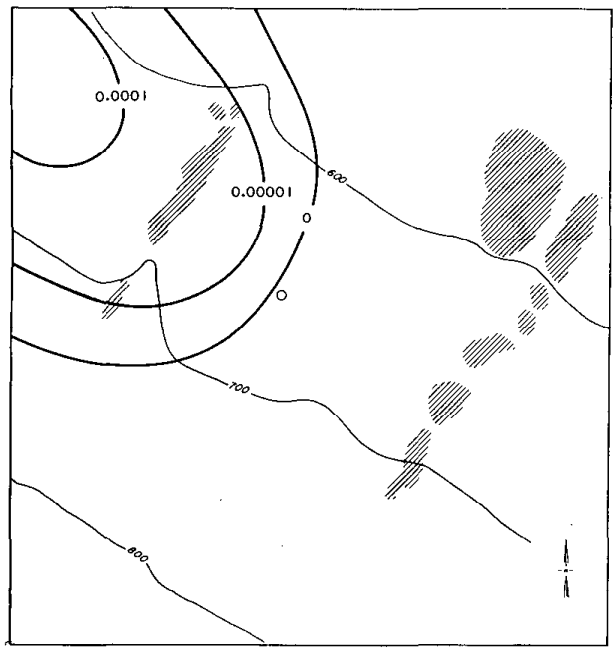


DEPTH

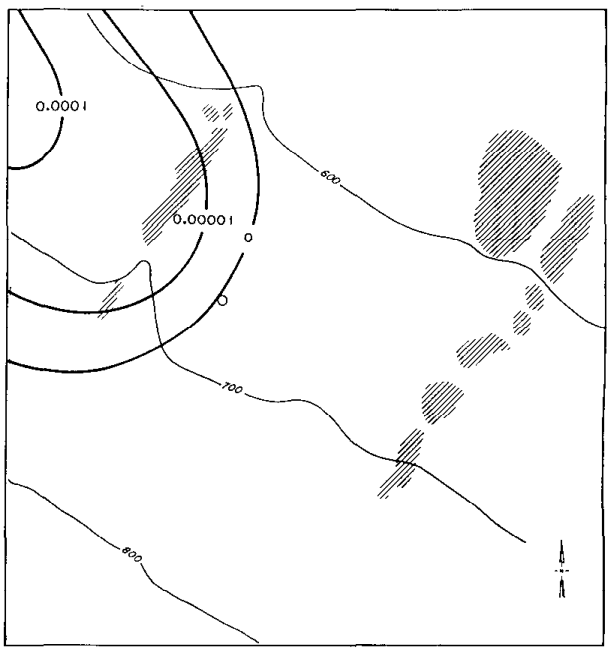
(feet)

DISTANCE ALONG PLATFORM BASE

FIGURE 5



ORIGINAL PLATFORM HARVEST LOCATION



CURRENTLY PROPOSED PLATFORM HARVEST LOCATION

EXPLANATION:
- PLATFORM HARVEST
- HARD BOTTOM AREAS
- DEPTH IN FEET

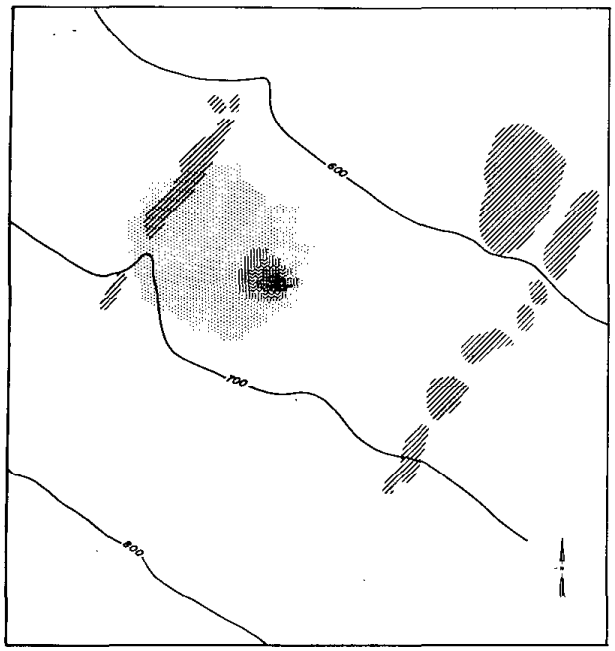
NOTE: HARD BOTTOM AREAS ARE AS MAPPED IN MERTON (1983). RESULTS PREDICTED BY THE OOC MUDS DISPERSION MODEL

0 500 FEET
0 200 METERS

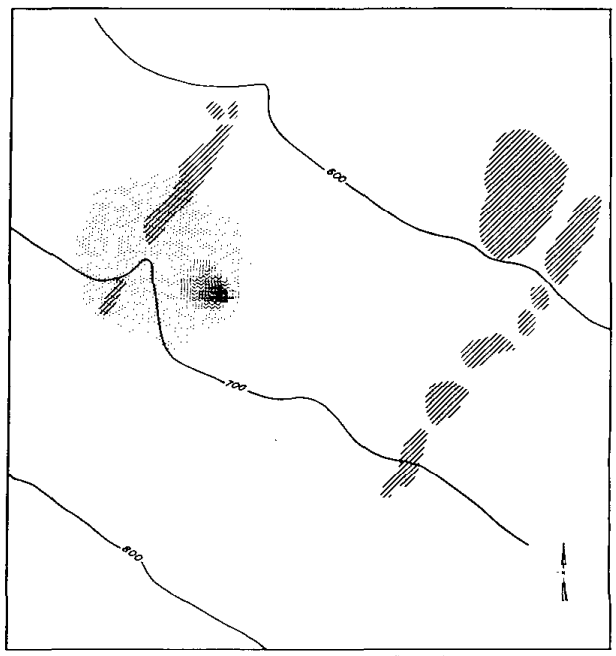
FIGURE 8

DRILLING MUDS SOLIDS DEPOSITION COMPARISON OF ORIGINAL AND CURRENTLY PROPOSED PLATFORM HARVEST LOCATIONS

Dames & Moore



ORIGINAL PLATFORM HARVEST LOCATION



CURRENTLY PROPOSED PLATFORM HARVEST LOCATION

Level	Settlement Rate* (inches/day/2 rigs) Minimum	Maximum	Percent of Total Discharge
	0.00019	0.025	5.41
	0.026	0.07[illegible]	10.81
	0.077	0.139	13.51
	0.140	0.225	18.92
	0.226	0.342	24.32
	0.343	0.926	27.03

* RESULTS PREDICTED BY THE DAMES & MOORE DRIFT MODEL

EXPLANATION

PLATFORM HARVEST

HARD BOTTOM AREAS

DEPTH IN FEET

NOTE: HARD BOTTOM AREAS ARE AS MAPPED BY NEKTON (1983).

0 500 FEET

0 200 METERS

FIGURE 7

DRILL CUTTINGS DEPOSITION COMPARISON OF ORIGINAL AND CURRENTLY PROPOSED PLATFORM HARVEST LOCATIONS

Dames & Moore

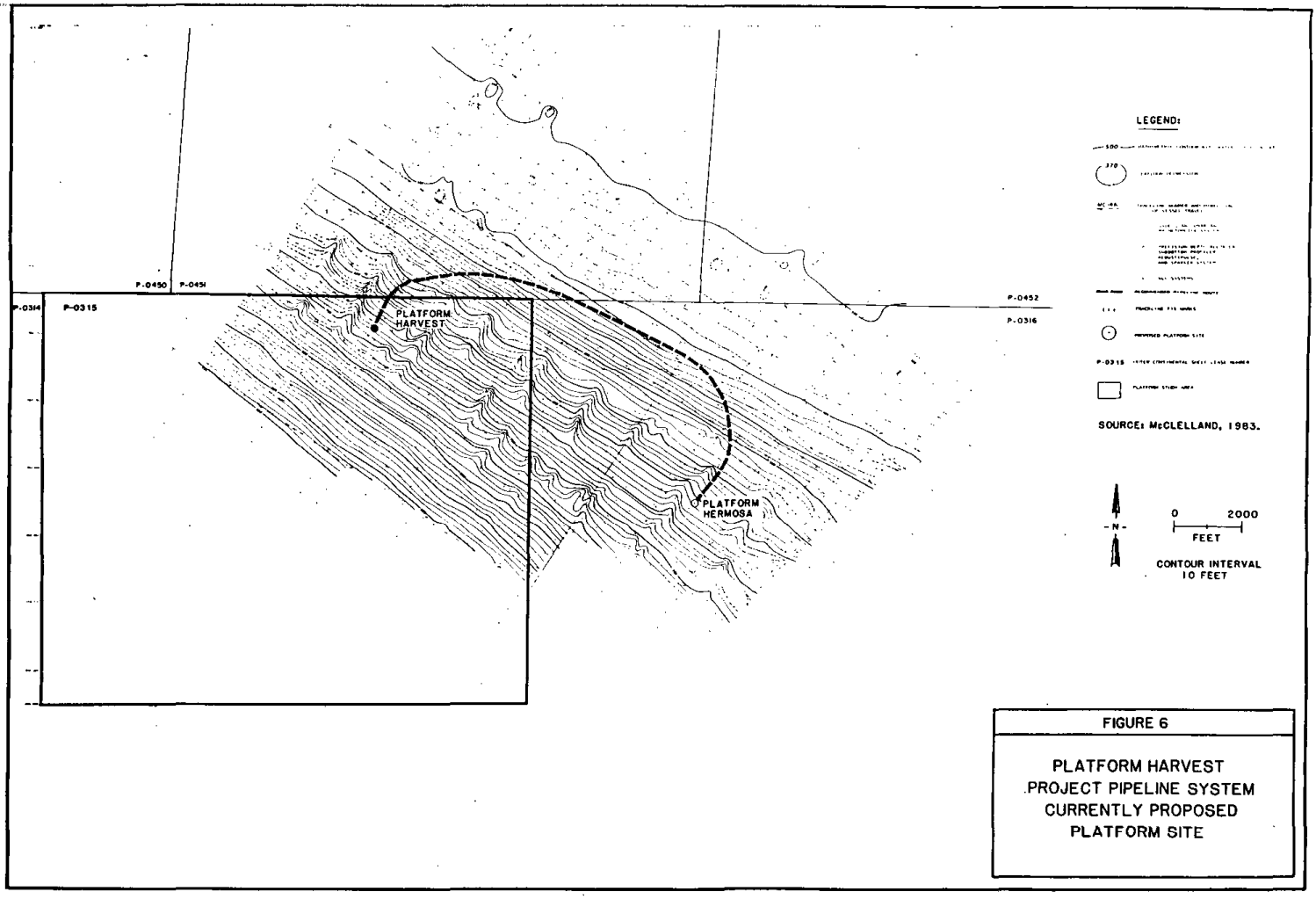


FIGURE 6

PLATFORM HARVEST
PROJECT PIPELINE SYSTEM
CURRENTLY PROPOSED
PLATFORM SITE

APPENDIX A

Appendix A contains information considered proprietary by Texaco and has been submitted under separate cover. It may not be disclosed beyond the MMS without prior written authorization from Texaco.

APPENDIX B

CRITICAL OPERATIONS AND CURTAILMENT PLAN

APPENDIX B

PLATFORM HARVEST
OCS P-0315
CRITICAL OPERATIONS AND
CURTAILMENT PLAN

General

This plan is filed under the legal jurisdiction of the Department of the Interior - Minerals Management Service - Pacific Outer Continental Shelf Orders Governing Oil and Gas Lease Operations, OCS Order No. 2 - Effective January 1, 1980.

Texaco U.S.A. Western Division Contacts

J.J. Ziober, Manager of Operations	(213) 739-7437
D.L. Hynek, District Manager	(805) 642-6790

Critical Operations List

Texaco considers the following to be critical operations. Table I summarizes the prescribed restrictions to critical operations conducted on Platform Harvest.

1) Directional Control of Wellbores From Fixed Conductor Locations.

Sufficient directional surveys will be taken on all wells to accurately define the well courses so that all upcoming wells can be preplanned to avoid well interference problems. While drilling out from beneath platform conductors, drilling weights and rotary speed will be controlled until sufficient distance from other wellbores is obtained.

If communication with a producing wellbore occurs at a shallow depth beneath a conductor and a blowout is imminent, then the drilling well will be diverted and all attempts will be made to kill the producing well by pumping kill weight fluids down the tubing.

2) Running and Cementing Casing.

The hole will be conditioned to minimize casing running problems. The casing will be filled with mud as run and the hole monitored for wellbore flow or lost circulation. Casing rams will be installed to allow for well shut-in if required. Mud weights will be carefully checked and maintained to over-balance any formation pressures.

All attempts will be made to obtain a good cement job. All cement slurries will be laboratory checked to insure that sufficient thickening time is available for the casing cementing job plus contingency for unforeseen problems. Mud and cement returns will be monitored. Preventative measures will be taken if gas flow through the cement is anticipated during hardening.

The integrity of the cement at the shoes of surface and intermediate casing strings will be checked with a pressure integrity leak-off test. Anomalously low leak-off pressures indicating insufficient cement integrity will be corrected by means of a remedial cement squeeze at the casing shoe.

A cement bond log will be run on the production and intermediate casing strings to ensure proper cement isolation of critical areas.

3) Drilling Ahead Into Untested Fault Blocks.

A mud logging unit will be used to monitor drilling rates, shale densities, chlorides, flowline temperature, gas units, and formation cuttings for indications of abnormal pressure.

Sufficient drilling recorders along with pit volume indicators, flowline monitors, and a trip tank will be used to allow early detection of wellbore kicks. Proper blowout preventers will be tested and used to control any well problems.

4) Production Testing.

All production testing operations shall be conducted within the cased hole by using production packers, downhole recorders, and production tubing. All liquid hydrocarbons will be contained within tanks. Natural gas will be burned through the flare system. No production testing will be commenced during or in the event of imminent unsafe inclement weather.

5) Wireline Logging Operations.

When logging operations are to be conducted in open hole sections below the prior casing string, blind rams and an annular preventer will be available to control the well if a kick occurs. If necessary, the wireline will be cut and dropped below the BOP stack to allow the BOP stack to seal the wellbore. The kick will be controlled by lubricating and bleeding the kick to the surface. Stripping operations would be conducted to reestablish circulation in the wellbore.

6) Acidizing.

Oil wells may be stimulated with acid in the production interval. Prior to the acid job all surface lines will be pressure tested as a standard procedure. Any spend acid will be produced into a barge or tank and shipped to shore for proper disposal.

7) Well Completion Operations.

In all subsurface completions that involve conventional perforated cased hole completions, the casing string will be tested to the anticipated flowing tubing pressure prior to completion. Tubing, packers, and any other flowcontrol devices such as subsurface safety valves will be fully tested prior to being run and also tested after the tubing and packer are set. Tubing rams will be installed in the drilling rig BOP stack and tested before beginning any well work. Back-pressure valves will be installed in the tubing head prior to

removing the BOP stack and installing the Christmas tree. Full wellbore control will be maintained at all times. At no time will the wellbore be open without kill weight fluid throughout the wellbore.

8) Cutting and Removing Casing.

If after open hole logging and/or production testing operations it is determined that a well is not capable of sustaining production, then proper cement plugs will be set across uncased hydrocarbon zones and the deepest casing shoe. The casing will be cut and recovered above the top of the cement within the casing or open hole annulus. After properly plugging the stub, the conductor and surface casing strings will then be reused and another well drilled to a different bottom hole location. The fluid left inside the casing will be properly conditioned and of sufficient weight to maintain well control.

9) H_2S Safety Precautions.

Sufficient H_2S monitors and alarms will be installed on the rig in critical locations. Safety air packs will be properly maintained and stored in accessible areas. A safety consultant will train all personnel in H_2S safety and provide the necessary preventative measure to assure equipment readiness. Refer to the H_2S Contingency Plan for Platform Harvest, OCS P-0315, for further details.

10) Transfer of Fuel and Materials.

No transfer operations will be conducted if weather conditions endanger the safety of the operation. When liquid hydrocarbons are being transferred, a close watch of all lines shall be maintained to detect leaks and prevent discharge of liquid into the ocean.

RIG PERSONNEL AND ENVIRONMENTAL SAFETY

Texaco considers personnel safety and environmental protection to be of the highest priority. Every effort will be made to prevent pollution and maintain safe working conditions.

Sufficient oil spill equipment will be stored at a nearby port and on the drilling location to combat the spread of hydrocarbon discharge from the platform. A trained team of Texaco personnel has been designated to respond to any possible emergency condition. See Texaco's Oil Spill Cleanup Manual for Offshore California for further information.

TABLE 1
RESTRICTIONS ON CRITICAL OPERATIONS CONDUCTED ON PLATFORM

	WIND GREATER THAN 40 MPH (SUSTAINED) or 60 MPH (3 SEC.GUST)	SIGNIFICANT WAVES GREATER THAN 38 FT. @ 11.5 SEC PERIOD	DENSE FOG	DISASTER OR SEVERE STORM	BOP FAILS TO TEST	LUBRICATOR FAILS TO TEST	LACK OF WELL CONTROL MATERIAL	LACK OF MANPOWER	LACK OF TRANSPORTATION OR CLEAN-UP CAPABILITY
DRILLING									
Spud-in	*	*	*	*			*	*	*
Tripping	*	*		*	*		*	*	*
Drill Stem Test	*	*	*	*	*		*	*	*
Run Casing	*	*		*	*		*	*	*
Cut & Rec. Casing	*	*		*	*		*	*	*
Perforating	*	*	*	*	*	*	*	*	*
Swabbing	*	*	*	*	*	*		*	*
CONSTRUCTION & MAINTENANCE									
Open Pressure Vessels	*	*		*				*	*
Welding	*	*		*				*	
Off. Loading	*	*	*	*				*	*
Loading	*	*	*	*				*	*

* Do not start.

APPENDIX C

HYDROGEN SULFIDE CONTINGENCY PLAN

APPENDIX C

HYDROGEN SULFIDE CONTINGENCY PLAN

INTRODUCTION

This Hydrogen Sulfide (H_2S) Contingency Plan will be in effect for all drilling operations conducted by Texaco U.S.A. (Texaco) on Platform Harvest. All people on the drilling platform (including Company personnel, contract personnel, and visitors) will become familiar with this Plan. This Plan complies with the rules and regulations of the Minerals Management Service (MMS) under Pacific Region OCS Order 2 and GSS-OCS-1 (April, 1977).

Because of the physiological effects of H_2S and its corrosive properties, problems may arise in the production of natural gases and petroleum if this material is not quickly detected and measures taken for its control. For safety, it is necessary that all personnel visiting or working on a drilling platform be educated in the dangers of H_2S, learn to recognize its presence, and know how to protect themselves and equipment from its effects.

The Contingency Plan outlines equipment and procedures necessary for early detection and suspension of drilling operations before hydrogen sulfide reaches levels dangerous to personnel or equipment. Further, the document provides plans for evacuation of personnel and instructions on the location and use of protective equipment for those required to secure the well. If hydrogen sulfide is encountered in unsafe levels, and it is decided that drilling continue with hydrogen sulfide present, a more detailed plan will be prepared before operations are restarted.

Texaco will provide adequate safeguards against harm from the effects of hydrogen sulfide to persons both on location and in the immediate vicinity. To be effective, this plan requires the cooperation and effort of each individual participating in the drilling of an H_2S well. Each individual should review

this entire plan, and should know his responsibilities in regard to normal drilling operations and emergency procedures. He should understand and be able to use, at a moments notice, all safety equipment on the drilling platform. He should familiarize himself with the location of all safety equipment and ensure that his equipment is properly stored, readily accessible, and routinely maintained.

Sulfur dioxide (SO_2) is another potentially lethal gas that may be generated by drilling activities. It is a combustion product of H_2S and as such, both the quantity of SO_2 and its point of release can be controlled. Sulfur dioxide is rarely a safety threat since it is always associated with hot rising air masses that quickly dissipate. Also, it is so irritating that it provides its own warning system in toxic concentrations. Therefore, this plan will deal primarily with H_2S; however, for completeness, the physiological aspects of SO_2 will be discussed.

I. GENERAL INFORMATION AND PHYSIOLOGICAL RESPONSES

A. General Properties of Hydrogen Sulfide

H_2S IS A POISONOUS GAS. The degree of danger depends on concentration and exposure time. Exposure to high concentrations of H_2S can be lethal. H_2S is colorless and about 2 times heavier than air. It tends to accumulate in low-lying and poorly ventilated areas, such as hollows, inside firewalls, around tanks, and above the roofs of floating roof tanks. This characteristic makes its concentration dependent on atmospheric conditions. Dangerous accumulations are more likely to occur in periods of calm air, but changes in atmospheric conditions or gas composition can quickly increase the concentration in local areas.

Hydrogen sulfide is a colorless gas with a specific gravity 1.7 times that of air. It is flamable in air at concentrations between 4.3% and 45.5%, and under special conditions, is explosive. A mixture of two volumes of H_2S and three volumes of oxygen will detonate when ignited. It is highly soluble in water and in hydrocarbons, and has a strong corrosive effect on metals either as a free gas or in solution.

At low concentrations, H_2S has an offensive odor similar to rotten eggs. At higher concentrations it may have a "sickening" sweet odor. In the concentration range of 100 to 150 ppm, H_2S deadens the sense of smell by paralysis of the olfactory nerve. Consequently, THE SENSE OF SMELL CANNOT BE DEPENDED UPON TO DETECT ITS PRESENCE. IN FACT, SOME PEOPLE CANNOT DETECT THE ODOR OF H_2S AT ANY LEVEL OF CONCENTRATION.

B. Physiological Effects of Hydrogen Sulfide

Table 1 shows the toxic effects of different concentrations of H_2S for short-term exposure. Longer exposures to low concentrations may have more serious effects.

C. Physiological Effects of SO_2

Sulfur dioxide is less hazardous than H_2S because its odor is extremely pungent at non-fatal concentrations. Therefore, it provides its own warning system. However, like H_2S, SO_2 gas can cause serious injury as well as death. Its irritant properties are due to the rapidity with which it forms sulfurous acid on contact with moist membranes; thus, it is intensely irritating to the eyes, throat and upper respiratory system. Concentrations as low as 0.3 ppm-1 ppm can be detected by average individuals (sometimes by taste rather than sense of smell) and levels of 6-12 ppm will cause immediate irritation of the nose and throat.

Acute symptoms of sulfur dioxide exposure are eye mucosal and upper respiratory irritation. Studies which have attempted to determine chronic effects of SO_2 exposure are limited and their results are inconclusive. Yet it is generally suggested that there are permanent debilities related to long-term or continuous exposure to SO_2 such as: chronic nasopharangitis, pulmonary impairment and increased resistance to oxygen intake.

TABLE 1

TOXIC EFFECTS OF H_2S

ppm	0 to 2 minutes	15 to 30 minutes	30 minutes to 1 hour
1-20	Detectable by "rotten egg" smell.	Detectable by smell.	Detectable by smell. Maximum allowable concentration for 8-hour exposure without protective mask.
50-100	Coughing. Slight irritation of eyes. Loss of sense of smell.	Disturbed respiration. Pain in eyes. Sleepiness.	Throat and eye irritation.
150-250	Loss of sense of smell.	Throat and eye irritation.	Throat and eye irritation.
250-350	Irritation of eyes. Loss of sense of smell.	Irritation of eyes and respiratory tract.	Painful secretion of tears, weariness; may cause death in longer exposures.
350-450	Irritation of eyes. Loss of sense of smell.	Difficult respiration. Irritation of eyes.	Increased irritation of eyes and nasal tracts. Dull headache. Serious disturbances.
500-900	Coughing; unconsciousness. Serious respiratory disturbances.	Respiratory disturbances. Eye irritation. Unconsciousness.	Serious eye irritation. Slow pulse, rapid shallow breathing. Respiratory paralysis, convulsions, asphyxia and death.

Toxicity of SO_2 gas:

1 ppm	Pungent smell may cause respiratory changes.
5 ppm	Safe for eight-hour exposure. Normally, a person can detect the gas in this concentration range.
12 ppm	Throat-irritating cough, constriction of the chest, tearing of the eyes.
150 ppm	So irritating that it can be endured for only a few minutes.
500 ppm	Causes a sense of suffocation, even with first breath.
1,000 ppm	Will cause death with short-term exposure.

II. SAFETY

The following section deals with the procedures, equipment, and training necessary to ensure safe management of situations involving the presence of H_2S gas. It is the responsibility of all supervisory and working personnel to report to the Texaco Supervisor or Texaco offices if any of the procedures, training programs or equipment outlined in this section are not available.

A. General Safety Procedures

The following safety procedures will be in effect to control and minimize the exposure of personnel and equipment to H_2S:

- Self-contained breathing apparatus (30-minute) will be maintained and available for all working crews and supervisors. Extra units will be available to aid in the evacuation of non-essential personnel from the platform, and spare air bottles (with refill capability) will be available for each unit.

- In the event of an H_2S alarm, personnel will be paired, outfitted with self-contained breathing apparatus, and will work in teams.

- Attempts to rescue incapacitated personnel will only be made by teams of two or more people equipped with self-contained breathing systems.

- Hydrogen sulfide sensors and alarms will be located in all living and sleeping quarters, at the intake for the air ventilation system, and in low-lying areas where concentrations of H_2S are likely to collect (See Safety Equipment). In these areas, H_2S sensors will have both visible and audible alarms, set to activate when a concentration of 10 ppm is reached.

- If H_2S concentrations reach and maintain 50 ppm or higher, all non-essential personnel will evacuate the platform (See Evacuation Plan).

- Appropriate agencies will be contacted if an H_2S alert is called.

- Medical facilities will be notified if an extreme alert is called.

- During drilling operations, the mud logger will continuously monitor the mud pit for the presence of H_2S.

- At the mud logger's monitoring station the H_2S alarm system will be set for 20 ppm.

- H_2S produced during drilling will be vented in a safe manner or flared.

- Three portable hydrogen sulfide detectors will be maintained on the platform. They will be placed in the control room, near the mud pumps, and near the well bay. The detectors will be moved to other areas if necessary.

- Two portable blowers will be utilized during times of dead calm to disperse H_2S in poorly ventilated areas.

- To ensure proper operation of all alarm systems, Texaco supervising personnel will be responsible for having daily inspections conducted.

- Smoking areas will be established and prominently identified.

- Smoking will not be permitted anywhere on the platform during an H_2S alert.

B. Special Equipment

Special equipment and detection and warning systems will be operational at all time on board the platform. Table 2 lists the locations of each type of safety equipment. A brief description of safety systems is presented below:

1. Four areas will be designated and marked as Safe Briefing Areas for personnel during an H_2S alert. These areas will be designated by the Texaco supervisor. One will be located near each cardinal point of the drilling and production platform. If H_2S is detected in excess of 20 ppm, all personnel not assigned emergency duties are to assemble at the designated Safe Briefing Area for instructions. The briefing area to be used in the event of an H_2S event will be located upwind from the highest detected H_2S concentration. The predominant wind direction is from the northwest in the vicinity of Platform Harvest. Therefore, the normal safe briefing area will be at the northwest corner of the platform. Wind direction may be highly variable at low wind speeds, however. All personnel should observe wind indicators and follow the instructions of supervisory personnel to proceed to the briefing area via the safest routes.

2. Windsocks and streamers will be installed on the derrick and off of each corner of the Drilling Deck. They will be positioned so that they are easily seen by all personnel on the Drilling Deck and Rig Floor.

3. Operational danger signs will be displayed from all sides of the platform in a manner visible to watercraft and aircraft in the event that H_2S is detected in concentrations equal to or exceeding 10 ppm. The signs will be at least 4' x 8' and painted a highly visible yellow with the following warning painted in 12" high black, block lettering.

DANGER

HYDROGEN SULFIDE

(H_2S)

In addition, 2' x 3' red flags will be displayed from high points off

TABLE 2

H_2S SAFETY EQUIPMENT AND ITS LOCATION

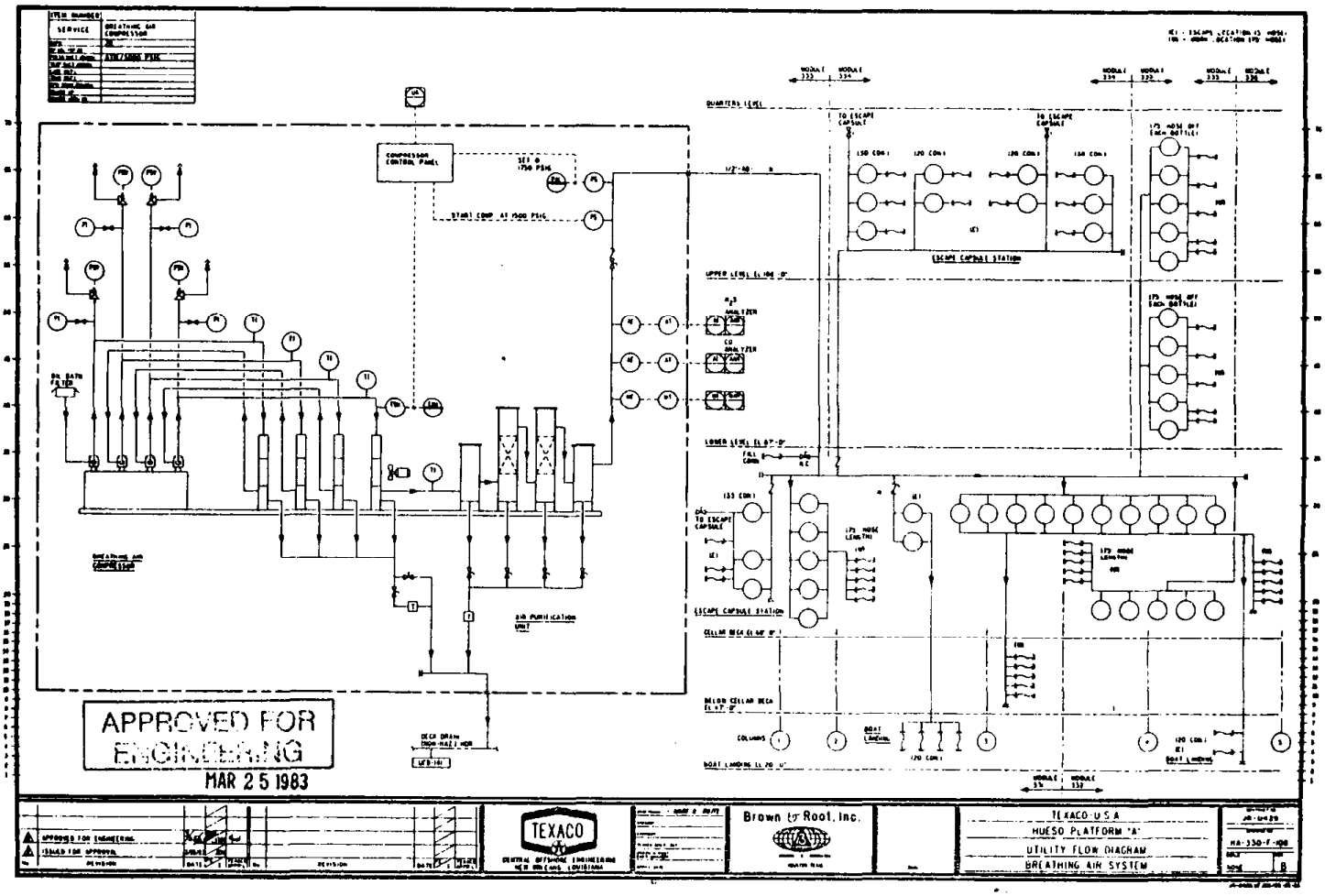
EQUIPMENT TYPE	LOCATION(S)
Wind Direction Indicators	Derrick Off each corner of drilling deck
H_2S Monitoring Equipment with Visual and Audio Alarms	Bell nipple Shale shaker Mud pits Driller's stand Living quarters Control room
H_2S Portable Monitoring Equipment	Quarters Mud pumps Production offices
H_2S Detector Ampules	Worn by each worker Supply stocked at Quarters
Protective Breathing Apparatus for each worker (cascade air bottle systems)	Rig floor Working areas about the rig floor Mud logging facility Cementing unit Electric logging unit Shale shaker areas Pump rooms Crew quarters Mud pit area Mud storage area Briefing areas Heliport
Breathing Air Manifold Systems (with hoses and masks)	Rig floor Briefing areas Heliport Escape capsules (Module 334 upper main deck) Module 335 upper main deck Module 335 lower main deck Escape capsules (Module 331 cellar deck) Module 332 cellar deck Boat landings Module 331 below cellar deck Module 331 cellar deck

TABLE 2 (continued)

EQUIPMENT TYPE	LOCATION(S)
Reserve Air Bottles	Heliport Escape capsules (Module 334 upper main deck) Module 335 upper main deck Module 335 lower main deck Escape capsules (Module 331 cellar deck) Module 332 cellar deck Boat landings Module 331 below cellar deck Module 331 cellar deck
Fill Regulator and Air Bottle Recharge Station	Recharge Station (cellar deck) for 30 min. and 5 min. self-contained air breathing apparatus.
Retrieval Ropes and Safety Harnesses	Rig floor Working areas about the rig floor Mud logging facility Shale shaker areas Pump rooms Crew quarters Mud pit area Mud storage area Briefing areas Heliport
Bullhorns	Production & Drilling Superintendant offices
Flashing Warning Lights	Yellow warning lights to be visible from all working areas and living quarters.
Resuscitators	Sick bay
Ventilation Devices (explosion proof)	Rig floor Mud pit area
H_2S Warning Signs (4' x 8')	Permanently posted on all sides of the drilling deck. If 10 ppm or more of H_2S is detected in the air, signs will be uncovered.

TABLE 2 (concluded)

EQUIPMENT TYPE	LOCATION(S)
Red Flags (2' x 3')	Stored in the Drilling Superintendant's office. To be posted from high points off each corner of the drilling deck if 20 ppm or more H_2S is detected in the air.
H_2S Flare System	Mud/gas separator
Standby Vacuum Pump	Mud system degasser
Portable Blowers (explosion proof)	Rig floor Mud pits
Chalk Boards and Note Pads	Rig floor Mud pits Briefing areas
Caustic Soda, Zinc Carbonate, Iron Sponge	Mud pit area, rigged for immediate use.
Remote Controls for Choke Manifold and BOP Stack Components	Main deck
WORK BOATS	
Demand-type Breathing Apparatus	Crew and passenger areas
HELICOPTERS	
Breathing Apparatus	Cockpit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TEXACO U.S.A.
HUESO PLATFORM "A"
UTILITY FLOW DIAGRAM
BREATHING AIR SYSTEM

of each corner of the Drilling Deck along with the MY-6 Flag System if H_2S concentrations reach 20 ppm or greater at the surface. All signs and flags shall be illuminated at night and under conditions of poor visibility. Signs indicating the designated Safe Briefing Areas and Moderate Danger or Extreme Danger signals will be posted on the platform, workboats, and crewboats.

4. Continuous monitoring-type H_2S detectors, complete with visual and audio alarms, will be located in appropriate areas and will be monitored by both Control Room personnel and the Driller from the time the intermediate casing shoe is set until total well depth is achieved. The monitors shall be capable of sensing a minimum concentration of 5 ppm and the alarm will be set to go off when the detectors sense an H_2S concentration exceeding 10 ppm.

5. Proper personnel protective positive-pressure breathing apparatus shall be available for all personnel on the platform and on board the marine vessels serving the platform. Helicopters attendant to rig operations will also be equipped with a protective breathing apparatus for the pilot. In addition, other personnel safety equipment shall be available for use as needed, such as:

   - Portable H_2S detectors.
   - Retrieval ropes with safety harnesses to retrieve incapacitated personnel from contaminated areas.
   - Chalk boards and note pads for communication purposes located on the rig floor, in the shale shaker area, and in the cement pump area.
   - Bull horns and flashing lights.
   - Resuscitators.
   - Explosion proof electric fans.

6. A system of breathing-air manifolds, hoses, and masks shall be provided in critical locations, including the rig floor and the Safe Briefing Areas. Cascade air bottle systems shall be provided to refill individual protective breathing apparatus bottles. The cascade air bottle systems will be recharged by a high pressure compressor suitable for

providing breathing-quality air, provided that the compressor suction is located in an uncontaminated atmosphere.

Workboats attendant to rig operations shall be equipped with pressure demand type masks connected to a breathing-air manifold. Extra protective breathing apparatus shall be provided for evacuees.

7. The mud/gas separator equipment will be rigged so that the gas can be flared in the event that H_2S is encountered. A standby vacuum pump for the degasser will be on location.

8. All well control equipment, including the blowout preventers and choke manifold, will be trimmed for H_2S service. The hydraulic choke and BOP stack components will be remotely operable. Inside blowout preventers will be provided for each size drill pipe, and safety valves and kelly valves will be trimmed for H_2S service.

9. A sufficient supply of caustic soda and zinc carbonate will be stored on Platform Harvest for use in the event the mud becomes contaminated with H_2S. Caustic soda and zinc carbonate will be available on the platform at all times during drilling and testing.

C. SAFETY TRAINING

1. All personnel, whether regularly assigned, contracted, or employed on an unscheduled basis will be informed about the following items upon arrival at Platform Harvest:

- Physiological effects of H_2S and SO_2.
- Location and operation of all H_2S emergency safety equipment, including self-contained air breathing apparatus and escape capsules.
- The significance and function of all H_2S detection and alarm systems.
- The significance and use of ventilation equipment.
- Prevailing wind directions.

- Location of safe briefing areas.
- Evacuation procedures.
- Smoking areas and smoking regulations.

2. Information relating to safety measures will be prominently posted on the platform and on all vessels in the immediate vicinity serving the platform. These posters shall contain information on the following:

- Location and operation of all personnel related H_2S emergency safety equipment, including self-contained air breathing apparatus and air manifold system.
- The significance and function of H_2S detection and alarm systems.
- The location of H_2S emergency briefing areas.
- Evacuation procedures.

3. To promote efficient safety procedures, an on-site H_2S safety program will be established. Prior to the initiation of drilling operations and at periodic intervals thereafter, all personnel will receive weekly training and drills on how to react to an H_2S emergency. The training sessions will cover the following subjects:

- The physiological effects of H_2S.
- The significance and function of all H_2S detector and alarm systems.
- Location and operation of all personnel-related H_2S emergency safety equipment including self-contained air breathing apparatus and air manifold system.
- The location, significance and function of wind direction indicators.
- Prevailing wind directions.
- The significance and use of ventilation equipment.
- Locations of H_2S emergency briefing areas.
- Evacuation routes and procedures.
- How to brief visitors on evacuation procedures.

4. All personnel in the working crew will be given a complete basic first aid course. During subsequent weekly training and drills, emphasis will be placed upon rescue and first aid for H_2S victims. The following procedures for rescue will be emphasized.

- Summon help.
- Put on air capsules and work in teams.
- Retrieve stricken personnel from contaminated area and move upwind of H_2S source or to fresh air.
- Immediately initiate artificial resuscitation.
- Summon a physician and a resuscitator. (Do not stop artificial resuscitation while waiting for professional help to arrive.)
- Keep victim warm and in a prone position until professional help arrives.

D. Special Health Problems

Knowledge of the toxicology of H_2S permits the identification of individuals who are hyper-susceptible to H_2S and its by-products. These are individuals whose capacity to tolerate H_2S is reduced by special health problems such as:

- A perforated eardrum, which may allow air passage through the Eustachian Tube into the respiratory tract.
- Emphysema.
- Chronic Pulmonary Obstructive disease of Bronchial Asthma.
- Coronary Artery Disease or Angina Pectoris.
- Myocardial Infraction or progressive or severe Hypertension.
- Diabetes.
- Grand Mal Epilepsy.
- Eye infections.
- Anemia.
- Alcoholism (or alcohol consumption within 24 hours of exposure).
- Psychiatric problems.

All hyper-susceptible individuals will be prohibited from working in an H_2S environment or given special attention should an emergency situation occur.

III. OPERATING CONDITIONS AND THEIR RESPECTIVE PROCEDURES

Operating conditions when drilling in H_2S environments have been separated into three categories: (1) Normal Operations, (2) Moderate Danger, and (3) Extreme Danger. A description of each of these conditions and required actions follows.

A. NORMAL OPERATIONS IN AN H_2S AREA - H_2S BELOW 10 PPM

1. Warning Sign: None
2. Alarm: None
3. Characterized by:

   Drilling operations are under control during routine drilling operations in zones that may contain hydrogen sulfide. This condition will be in effect continuously from the setting of the intermediate casing shoe to achieving total well depth.

4. Required Actions:

   a. Prior to Setting Intermediate Casing:

      (1) A list of emergency stations and phone numbers of personnel to be contacted will be sent to the platform prior to spudding and should be posted at the following places:

         (a) Texaco Supervisor's office.
         (b) Contractor Tool Pusher's office.
         (c) Radio Operator's room.
         (d) On each marine vessel attending the platform.

      (2) All safety equipment and H_2S related hardware will be set up as outlined under "Special Equipment." All safety equipment must be inspected routinely, paying particular attention to resuscitators and breathing-air facilities. Routine maintenance will include checking for leaks.

      (3) Contractor personnel, necessary service company personnel, and Texaco personnel will be thoroughly trained in the use of breathing equipment, emergency procedures, responsibilities and first aid for H_2S victims.

      The Texaco Supervisor will keep a list of all personnel who have been through H_2S training programs on the platform. All personnel should be given a copy of this "H_2S Contingency Plan."

The Texaco Supervisor will keep a list of all persons who have copies of the plan, with signatures verifying that they have read and thoroughly understand the plan. All personnel should read this document and sign the verification immediately upon their arrival at the platform.

(4) A copy of the "H_2S Contingency Plan" will be given to the Masters of the attending marine vessels and to the helicopter coordinator. They will, by appropriate signature, indicate that their crews have read and do understand the Plan.

b. Below Intermediate Casing:

(1) All personnel on the platform will be instructed in the use of breathing equipment until supervisory personnel are satisfied that they are capable of using the equipment. This training must include all construction personnel, production operations personnel, and visitors who are allowed on the platform during drilling operations. All personnel in the working crew shall have completed a basic first aid course.

After initial familiarization with the breathing equipment, each rig and roustabout crew must perform a weekly drill with the breathing equipment. The drill should include getting the breathing equipment, putting it on, and then a short work period. As required by the MMS, a record should be kept of the crews drilled and the dates.

(2) Along with the normal weekly fire drill and safety meeting, an H_2S training session must be held for all off-duty personnel and a record of attendance must be kept as required by the MMS.

(3) Rig crews and service company personnel should be made aware of the locations of spare air bottles, the resuscitation equipment, portable fire extinguishers and H_2S detectors. Knowledge of the location of the H_2S detector monitors is vital to understanding the emergency conditions. In addition, key personnel must be trained in the use of the resuscitator and the portable H_2S detectors.

(4) H_2S detector ampules shall be available for use by all working personnel. After H_2S has been initially detected by any device, periodic inspections of all areas of poor ventilation shall be made with a portable H_2S detector instrument.

(5) All personnel on location should become "wind-conscious" and be aware at all times of the prevailing wind direction. Remember, H_2S is heavier than air and will collect in low places during times of still air.

(6) All personnel should stay alert for any detection of H_2S. Should the presence of H_2S be indicated by any detection device, make it known to those personnel in the area and to the proper supervisors.

(7) During the logging of suspected H_2S bearing zones, all equipment used in logging operations must be treated with H_2S corrosion inhibitors or be made of H_2S resistant materials.

(8) The H_2S continuous monitoring variety of detectors will be in operation at all times. These units must be tested and, if necessary, recalibrated every 24 hours under normal drilling

conditions. In the event that H_2S is detected, or when drilling in a zone containing H_2S, the units will be tested at least once every 12 hours. The time and results of each test will be logged and reported each day to the Texaco Supervisor. The log will include the initial response time and ppm reading and the final response time and ppm reading.

(9) In the event that an H_2S detector does not test successfully, drilling will cease until the detector is (1) repaired or replaced, or (2) approval to proceed is received from the Texaco Supervisor.

(10) A pH of 10 or above shall be maintained in any water-based mud system unless a lower pH is specifically authorized by the MMS.

B. MODERATE DANGER - H_2S DETECTED BETWEEN 10-20 ppm

1. Warning Sign:
"DANGER - H_2S" signs on all sides of the platform.

2. Alarm:
Emergency Alert pulsating horn and flashing lights. White light flashing in Control Room alarm panel and flashing amber light on rig alarm panel.

3. Characterized by:
Drilling operations are under control during routine drilling in zones containing hydrogen sulfide. Poisonous gasses are present in concentrations between the threshold level of 10 ppm and 20 ppm and may or may not be detectable by odor. This condition will be in effect continuously from the time H_2S is first detected until total depth is reached (unless Extreme Danger procedures are implemented). This condition remains in effect up to H_2S concentrations of 20 ppm.

4. General Procedures:

If at any time H_2S is detected in concentrations of 10 to 20 ppm, the following steps will be taken:

a. The person detecting H_2S must immediately notify the Driller. He must then notify the Texaco Supervisor and the on-duty Contractor Tool Pusher.

b. The on-duty Texaco and contractor supervisors will bring gas detectors to the rig floor in order to find the source of H_2S.

c. Upon notification of the Moderate Danger condition, the Driller will shut down the mud pumps and continue to rotate the drill pipe off bottom while donning his breathing equipment.

d. The following personnel will immediately put on breathing-air masks:

(1) All personnel on the rig floor. (As soon as he has his air mask on, the Driller should pick up the kelly, check for flow, and then keep the pipe moving by reciprocating).

(2) All personnel at the mud pits.

(3) All personnel in the BOP area.

(4) All personnel required to work below and downwind.

e. The Texaco Supervisor will alert all personnel that a Moderate Danger condition exists.

f. No smoking is allowed at any location on the platform.

g. The Mud Engineer will run a sulfide determination on the flowing mud. A pH of 10 or above is to be maintained in any

water-based mud system unless a lower pH is specifically authorized by the MMS.

h. A maximum effort must be made by supervising personnel to resolve the cause of the H_2S as quickly as possible. Drilling must not proceed until the cause of the H_2S is determined and the well is circulated. Personnel on the rig floor, in the mud pit area, and in the BOP area will keep their breathing equipment on while monitoring this circulation.

i. The Texaco Supervisor and the on-duty Contractor Tool Pusher will make sure that all non-essential personnel are out of the potential danger areas, i.e., mud pit area, shale shaker area, and all areas below and downwind. All persons who remain in the potential danger areas must utilize the "Buddy System."

j. The Texaco Supervisor will order all personnel to check that their safety equipment is in the proper location and that is working properly.

k. The Texaco Supervisor will notify the Texaco Assistant District Manager of current conditions and actions taken.

l. The Texaco Supervisor will see that all monitoring devices are functioning properly and reading accurately and will increase gas monitoring activities with portable gas detection units.

m. The Texaco Supervisor will notify work boats in the area to go upwind, to stay on power, and to maintain a continuous radio and visual watch.

n. The Texaco Supervisor will alert the heliport dispatcher to assure continuous radio watch. The Minerals Management Service and the U.S. Coast Guard must also be notified.

C. MODERATE TO EXTREME DANGER - H_2S EXCEEDS 20 PPM

1. Warning Sign:

   MY-6 Flag System, 2' x 3' red flags at each corner of the platform.

2. Alarm:

   Continuous ringing of alarm bell and siren and flashing lights. Flashing red lights on Control Room and Rig alarm panels.

3. Characterized by:

   Poisonous gasses are present or expected to be present at or above 20 ppm (critical well operations, well control problems or, in the extreme, loss of well control).

4. General Procedures:

   If the H_2S concentration exceeds 20 ppm (from an increase in gas cut mud) and the well is not attempting to flow, the following steps will be taken:

   a. The person detecting the H_2S must immediately notify the Driller. He must then notify the Texaco Supervisor and the on-duty Contractor Tool Pusher.

   b. The Texaco Supervisor and the on-duty Contractor Tool Pusher will assess the situation and assign duties to each person to bring the situation under control. When the severity of the situation has been determined, all persons will be advised. The Texaco Supervisor and the on-duty Contractor Tool Pusher will:

      (1) Direct corrective action (including H_2S source detection and blower deployment and operation).

      (2) Notify the Texaco Assistant District Manager and the Contractor Drilling Superintendent.

c. The Driller will shut down the mud pumps and continue to rotate the drill pipe while donning his breathing-air mask.

d. The following personnel will immediately put on air breathing units:

(1) Texaco Supervisor.
(2) Contractor Tool Pusher.
(3) Driller.
(4) Derrick Men.
(5) Floor Hands.
(6) Mud Pit Personnel.
(7) Any other personnel in the high concentration area should put on breathing units or hold their breath and evacuate to the upwind Safe Briefing Area.

e. Once his breathing-air equipment is on, the Driller should:

(1) Stop the rotary and pick up the kelly.
(2) Check for flow.
(3) If well control problems develop, follow the appropriate well control procedures.

f. The Texaco Supervisor will alert all personnel that an Extreme Danger condition exists.

g. All personnel <u>not</u> listed above must get to the upwind Safe Briefing Area for further instructions from the off-duty Contractor Tool Pusher or supervisor. If it becomes necessary to go through the rig/floor substructure area to get to the Safe Briefing Area, breathing equipment should be put on as soon as the equipment is reached. If you are located on the downwind side of the platform or below the drilling deck when the Extreme Danger condition alarm is sounded, hold your breath and proceed to the upwind Safe Briefing Area, donning the nearest breathing equipment if readily available.

h. Always put on a portable air-breathing mask before proceeding to assist a person affected by the gas and utilize the "Buddy System." If the affected person is stricken in a high concentration area, put on a safety belt with 50' of tail line and obtain standby assistance before entering the area. Always use the "Buddy System" when entering possible contaminated areas.

i. Notify work boats to go upwind, stay on power and maintain a 24-hour radio and visual watch. Fly the MY-6 warning flags and 2' x 3' red flags at each corner of the platform. Notify all aircraft and watercraft in the immediate vicinity of the conditions.

j. Notify the heliport dispatcher to establish a 24-hour watch.

k. All personnel will go and stay in the upwind Safe Briefing Area if not specifically assigned to correct or control the situation. If deemed advisable by the Texaco Supervisor, all personnel not assigned to the well control operations will be evacuated. The MMS requires immediate evacuation of nonessential personnel if the H_2S concentration reaches 50 ppm.

l. In the extreme event of total loss of well control, the flowing well will be diverted out the flare line. If this and all else fails, the Texaco Supervisor will determine if ignition of the well is deemed necessary and will conduct any necessary operations with an absolute minimum of personnel. All persons working in the hazardous area will wear self-contained breathing apparatus. All other personnel will restrict their movements as directed by the Texaco Supervisor and the on-duty Contractor Tool Pusher.

m. If the well is ignited, the burning hydrogen sulfide will be converted to sulfur dioxide which is also poisonous. Therefore, DO NOT ASSUME THAT THE AREA IS SAFE AFTER THE GAS IS

IGNITED. CONTINUE TO OBSERVE EMERGENCY PROCEDURES. FOLLOW THE INSTRUCTIONS OF SUPERVISORS.

n. The Texaco Supervisor will be responsible for notifying the following regulatory agencies as required by the MMS:

(1) Minerals Management Service.
(2) U.S. Coast Guard.

If a 50 ppm concentration is recorded, also notify:

(3) California Office of Emergency Services (they will contact EPA)
(4) Western Space and Missile Test Center
(5) Pacific Missile Test Center
(6) U.S. Navy Fleet Air Control and Surveillance Facility

Telephone numbers are included in Section VII of this H_2S Contingency Plan.

IV. RESPONSIBILITIES OF KEY PERSONNEL

A. ALL PERSONNEL

It will be the responsibility of all personnel on board Platform Harvest (including Company personnel, vessel personnel and visitors) to familiarize themselves with the information contained in this Hydrogen Sulfide Contingency Plan. They will be responsible for the maintenance and accessibility of their safety equipment. In addition, they will be responsible for familiarizing themselves with all other safety equipment kept on the platform. However, their most important task will be to report any indications of H_2S to those in the immediate area of the occurrence and to notify the Texaco On Board Supervisor/ Drilling Foreman of the situation.

B. TEXACO SUPERVISOR

1. Normal Operations

- To understand and enforce all aspects of H_2S Contingency Plan.

- To see that operating procedures outlined on the H_2S Contingency Plan are observed by all personnel associated with the drilling operations.

- To advise appropriate persons/agencies whenever outlined procedures are not, or cannot, be complied with.

- To insure that all hardware in the choke manifold lines, flare lines and all other piping which may be exposed to pressurized H_2S contaminated fluid be suitable for H_2S service, and that all replacement parts be similarly suitable.

- To ensure that all H_2S alarms and detectors are functioning properly.

- To immediately advise the Contract Foreman of any abnormal H_2S concentrations.

- To inventory and inspect on a weekly basis all on board H_2S safety equipment and to insure its proper maintenance.

- To restrict the number of non-essential personnel on board to a minimum during operations where H_2S conditions are to be hazardous.

2. Moderate Danger or Moderate to Extreme Danger

- Assess the situation, and immediately advise all personnel of the presence of H_2S.

- Designate Safe Briefing Areas.

- Shut off any forced air circulating systems.

- Go to designated briefing area and give instructions relative to the nature of the situation.

- All personnel required to be in briefing area must be accounted for. If a person is absent from this area, check with his working partner and immediately locate the individual.

- Ensure that personnel have in their possession the proper self-contained breathing apparatus.

- Alert standby boats and work boats, and communicate with all air and watercraft in the immediate vicinity of the platform.

- Assure clear passageways to all safety and emergency equipment.

- Display operational danger signs, on board signs and red flags, as appropriate.

- Notify Texaco District office.

- Proceed to derrick floor and supervise operations.

- Increase gas monitoring activities, and continue operations with caution.

- Make sure <u>all</u> non-essential and non-working personnel are in a designated Safe Briefing Area.

- Ensure essential working personnel are using protective equipment if the concentration of H_2S is 20 ppm or greater.

C. CONTRACT FOREMAN

1. Normal Operations

- Shares responsibility for crew training with Texaco Supervisor.

2. Moderate Danger or Moderate to Extreme Danger

- In absence or incapacitiation of on board Senior Texaco Supervisors, the Contract Foreman will assume all responsibilities and duties related to H_2S safety and control.

D. TOOLPUSHER

1. Normal Operations

- Shares responsibility with Texaco Supervisor to ensure all equipment and procedures specified in this H_2S plan are operational.

2. Moderate Danger or Moderate to Extreme Danger

- Proceed immediately to rig floor, and give instructions on H_2S containment to rig crews.

- Assure only essential personnel remain in the danger area. Send remainder of crew to designated safe briefing area.

- Assure that all crew members remaining in the vicinity of the contaminated area have self-contained breathing apparatus available and ready for immediate use.

- Initiate measures necessary to eliminate H_2S concentrations (position fans to eliminate gas pockets, etc.).

- Assist the Senior Texaco Supervisor upon his arrival at the rig floor.

E. DRILLER

1. Normal Operations

- Will be familiar with all aspects of this H_2S plan, and will be practiced with the procedures to be followed under emergency conditions.

- The Driller must be completely familiar with his special duties while coring and testing an H_2S well as outlined under "SPECIAL OPERATIONS."

- The Driller must be completely familiar with his duties during well control and lost circulation problems as outlined under "SPECIAL OPERATIONS."

2. Moderate Danger or Moderate to Extreme Danger

- In the absence or incapacitation of all Texaco Supervisors and Contractor Toolpushers, the Driller will assume their responsibilities as designated in this H_2S Contingency Plan.

- Shut down mud pumps and continue to rotate the drill pipe while donning breathing equipment.

- Proceed with appropriate well control operations.

F. MUD ENGINEER

1. Normal Operations

- Ensure that the drilling rigs have a sufficient supply of caustic soda, zinc carbonate, and iron sponge.

- Be familiar with mud treating procedures for H_2S cut mud.

- Be familiar with the barite plug setting procedure.

- Have two "Garret Gas Train" kits.

- Maintain a pH of 10 or above in water-based mud systems unless a lower pH is specifically authorized by the MMS.

2. Moderate Danger or Moderate to Extreme Danger

- To proceed to the rig floor and assist Contract Foreman.

- Control mud pH by adding appropriate amounts of caustic soda to drilling fluids to reduce possibility of sulfide stress cracking in the mud pit, drill pipe and flow lines.

- If caustic soda cannot control the H_2S, then add zinc carbonate to mud in flow lines.

- Check mud to determine concentration of H_2S, then add zinc carbonate to mud in flow lines.

- Add additional scavanging chemicals if necessary.

- Use portable gas detector to determine size of area contaminated by H_2S.

G. CEMENTING MEN

1. Normal Operations

- Be familiar with the barite plug setting procedure.

2. Moderate Danger or Moderate to Extreme Danger

- Follow instructions from the Driller concerning barite plug setting or other operations.

H. VISITORS AND SERVICE PERSONNEL

1. Normal Operations

- Be familiar with this H_2S Contingency Plan.

2. Moderate Danger or Moderate to Extreme Danger

- Visitors and service personnel will be issued a card signifying presence of H_2S.

- Visitors and service personnel will report to a safe briefing area.

- These personnel may stay on the platform if a potential hazard prevails, however, under no circumstances will visitors, service personnel or others enter a danger zone unless specifically instructed to do so by the Texaco Supervisor and only then with safe entry equipment.

- These personnel will be immediately evacuated from the platform should an extreme danger of H_2S exist.

- Should it become necessary for any visitor, service personnel or other, to enter the danger zone when an extreme hazard exists, they may do so after being properly instructed in use of safety equipment, and provided with necessary protective equipment.

- Visitors will not be allowed on the platform should Moderate or Extreme Danger conditions be encountered.

V. SPECIAL OPERATIONS

A. Coring

During drilling operations below the intermediate casing, a decision to core may be made. This operation takes on critical complexities when attempted

in a sour gas well. Specific coring procedures will be issued for cutting cores. The following practices should be followed during coring operations.

1. After a core has been cut, circulate the bottoms up and monitor the mud for H_2S.

2. Unless hole conditions (and/or H_2S detectors) indicate extreme conditions, put on breathing-air equipment at least 10 stands of drill pipe before the core barrel reaches the surface. If worse conditions are suspected or the H_2S detector reaches 20 ppm, breathing-air equipment should be put on earlier. Breathing-air equipment should be worn by all personnel in the area while the core barrel is pulled, broken out and opened. Gas detection units and individual ampoules should then be used to monitor the H_2S around the core barrel. When these detectors indicate a safe atmopshere, the breathing-air equipment can then be removed.

The following practices must be followed for every core barrel pulled.

a. Due to the difficulty in communicating with breathing-air equipment on, it is required that a chalk board and chalk or note pads be provided during coring operations.

b. The importance of leaving the breathing-air equipment on must be stressed to personnel connected with the coring operation. The most critical moment is when the core barrel is opened.

c. All personnel on the platform not wearing breathing-air equipment should stay a safe distance upwind of the core barrel.

d. The cores to be transported must be sealed and marked to indicate the possible presence of H_2S.

B. Well Testing

1. Well testing must be performed with the minimum number of personnel required in the immediate vicinity of the rig floor and test equipment. This minimum number of personnel must be able to safely and adequately perform the test and to adequately maintain the equipment.

2. Prior to initiation of the test, special safety meetings must be conducted for all personnel who will be on the drilling facility during the test, with particular emphasis placed on the use of personnel safety equipment, first aid procedures and the H_2S Contingency Plan.

3. During the test, the use of H_2S detection equipment will be intensified. All produced gasses must be vented and burned through a flare system equipped with a continuous pilot and an automatic igniter. Back-up ignition must be provided. Produced fluids which are stored must be vented into the flare system.

4. "No Smoking" rules will be rigorously enforced.

C. Well Control

The following well control practices should be initiated below the surface casing level.

Any influx of foreign fluid into the wellbore below the intermediate casing should be considered to contain H_2S. If the decision is made to circulate out the kick, all personnel involved in the well control will wear breathing-air equipment until it is known that H_2S is not present. The following steps should be taken when the influx occurs:

a. Close in the well by using normal well control techniques. Record the drill pipe pressure, the casing pressure and the volume of influx.

b. Notify the Texaco Supervisor and the on-duty Contractor Tool Pusher.

c. Purge the flare system. Put the automatic ignitors and pilots into operation to burn the H_2S bearing gas from the gas buster during kick circulation.

d. Proceed with standard well control procedures.

In the event that the mud has been contaminated with H_2S, it will be necessary to treat the mud with caustic soda or zinc carbonate to remove the H_2S from the mud system. If H_2S is known to be present and a kick is taken, the size of the bubble, the intermediate casing depth, the leak-off test results, the amount and type of open hole, and the weather conditions will enter into the decision of whether to circulate out or "pump away" the bubble.

D. Lost Circulation

In the event lost circulation occurs, proceed with standard corrective procedures. The individual Well Drilling Program will have additional information relative to the probability of lost returns for each well.

VI. EVACUATION PLAN

In the event of a hydrogen sulfide emergency, orders to evacuate and methods of evacuation will be issued by the Texaco Supervisor on board the platform. Standard evacuation routes, procedures and alarms will be posted at selected locations on Platform Harvest. Evacuation procedures are as follows:

- Upon issuance of orders to evacuate, all persons, unless otherwise directed by the Senior Texaco Supervisor, will immediately report to the designated upwind safe briefing areas.

- Actual debarkation of personnel will begin upon specific direction from the Senior Texaco Supervisor.

- Evacuation will take place from the upwind side of the platform.

- At no time will the evacuation equipment be overloaded.

- Non-essential personnel will be offloaded first.

- Essential personnel will be evacuated when, and if, the Texaco Supervisor orders all personnel off the drilling facility.

- All personnel will wear protective breathing apparatus until safely transported out of range of danger.

- The standby boat will be the primary vessel used for evacuation. The platform crane, if it can be operated safely, will be used to transfer personnel to boats; otherwise, rope ladders or nets will be utilized. Other vessels available for evacuation can be obtained by calling:

U.S. Coast Guard	Santa Barbara	(805) 962-7430
Tidewater Marine	Santa Barbara	(805) 963-3808
Clipper Fleet	Carpinteria	(805) 644-1061

- When boats cannot be used, or the Senior Texaco Supervisor directs otherwise, helicopters will be the means of evacuation.

- Helicopters should be considered as an alternate method of evacuation if wind speeds are less than 30 mph. Helicopter services available include:

U.S. Coast Guard	Santa Barbara	(805) 962-7430
Petroleum Helicopters	Santa Barbara	(805) 964-0684
		(805) 964-6396
Permian Helicopters	Santa Maria	(805) 928-5927
Rotor Aids	Santa Maria	(805) 922-0384
	Santa Barbara	(805) 967-6384
		(805) 964-6793

VII. AGENCY NOTIFICATION

The following state and federal agencies should be notified immediately by the Senior Texaco Supervisor or his deputies if the alert conditions indicated exist:

Moderate Danger

MMS District Supervisor OCS District Office Ventura, California	(805) 648-5131 (24 hour)
U.S. Coast Guard Captain of the Port Santa Barbara, California	(805) 487-9822
National Response Center	(800) 424-8802

Moderate to Extreme Danger

MMS OCS District Office Ventura, California	(805) 648-5131
U.S. Coast Guard Captain of the Port Santa Barbara, California	(805) 487-9822
National Response Center	(800) 424-8802
California Office of Emergency Services (will also contact EPA)	(800) 852-7550
Western Space and Missile Test Center Vandenburg Air Force Base Attention: Mr. Bud Abbott	(805) 866-3602
Pacific Missile Test Center Naval Air Station Pt. Mugu, California Attention: Mr. Paul Foster	(805) 982-8731
Commander Fleet Air Control and Surveillance Facility Naval Air Station N. Island, San Diego, California 90882 Attention: Lt. Vanderpool	(714) 437-5939

VIII. MEDICAL FACILITIES NOTIFICATION

The following medical facilities should be notified immediately by the Senior Texaco Supervisor or his deputies under conditions of extreme alert:

Medical Facilities

Marian Hospital 1400 E. Church Santa Maria, CA	(805) 922-5811
Valley Community Hospital 505 E. Plaza Drive Santa Maria, CA	(805) 925-0935
Cottage Hospital Pueblo at Bath Santa Barbara, CA 93105	(805) 682-7111
Goleta Valley Community Hospital 351 Patterson Avenue Goleta, CA 93117	(805) 967-3411

APPENDIX D

OIL SPILL CONTINGENCY PLAN

(Has been submitted under separate cover).

GEOLOGIC AND RESERVOIR INFORMATION

PLATFORM HARVEST

PROPRIETARY GEOLOGIC AND RESERVOIR INFORMATION

Presented in this Appendix is detailed geologic and reservoir information which is considered proprietary by Texaco. This information may not be disclosed in whole or in part beyond the Minerals Management Service (MMS) without prior written authorization from Texaco.

POINT ARGUELLO FIELD
RESERVOIR DEVELOPMENT PLANS

1. INTRODUCTION

This section describes plans for developing reservoirs in the Monterey and Foxen Formations on OCS-P-0315, and the potential for developing additional reserves, should they be identified.

2. POINT ARGUELLO FIELD RESERVOIR DESCRIPTION

Platform Harvest will develop the northwesterly portion of the Point Arguello field on Lease OCS-P-0315. As defined by Texaco's exploratory wells, Chevron's wells on leases OCS-P-0316 and -0450, and conventional geophysical data, the reservoir is an anticlinal structure with its axis tending northwest-southeast across the northeast portion of Lease OCS-P-0315. The structure is slightly asymmetric; the southwest limb dips more steeply than the northeast. A northwest trending reverse fault bounds the structure along its southwest flank and anticlinal closure exists in potential reservoirs from near the ocean floor to depths below 13,000 ft. The structure extends beyond Lease OCS-P-0315 to the northwest and to the southeast. Structural cross sections and their locations are shown in Figures 1, 4 and 5. Seismic sections are reproduced in Figures 6 and 7.

Hydrocarbon fluids have been tested in multiple zones on the structure between depths of 1900 and 8300 ft. Oil was tested in horizons within the Monterey and Sisquoc formations; natural gas was tested in the Foxen sands. These units are shown on the annotated type log in Figure 8.

2.1 Monterey Formation

Platform Harvest will develop the portion of the Point Arguello Field located on Lease OCS-P-0315. The primary production zone is the Monterey Formation which is ±1770 feet thick with an extensive fracture system. This reservoir rock is composed of chert, siliceous shale, calcareous shale, and dolomite. The contoured top Miocene Monterey is shown in Figure 3.

The most significant reservoir characteristic influencing the volume of in-place hydrocarbons, recovery, and reservoir drive mechanism in the Monterey Formation is the dual fracture-matrix porosity system. Conventional log analysis does not provide a satisfactory quantitative interpretation of water saturation.

The Monterey crude is a low gravity, highly viscous, sour crude which contains sulfur at 2 to 5 weight percent. Measured oil gravities on drill stem tests have ranged from 24.5° API to as low as 8.5° API. The producing drive mechanisms are anticipated to be combination of solution gas drive, rock and fluid expansion, and gravity drainage with limited pressure support by natural water drive. Additional details concerning fluid properties are presented in Tables 5, 6, 7 and 8.

2.2 Sisquoc Formation

The Sisquoc Formation is late Mohnian to Delmontian (late Miocene) in age; potential reservoirs in the formation occur at depths between 5700 and 6700 ft. The Sisquoc Formation is comprised mainly of fine-grained diatomaceous mudstone and siltstone, with porcelaneous, dolomitic, and sandy interbeds.

Oil was tested at commercial rates in OCS-P-0315 Well No. 3. The areal extent of oil accumulations and other reservoir characteristics are still being evaluated. Details of reservoir fluid properties are presented in Table 5.

2.3 Foxen Sands

The Foxen Sands are middle to early Pico (middle Pliocene) in age and occur at depths of between 1900 and 3000 ft. The Foxen sands consist principally of gray and brown mudstone and clayey siltstone and include fine-grained sands. The unit overlies the Sisquoc Formation and is about 400 to 500 ft. in thickness in the Lease OCS-P-0315 area. Natural gas has been tested from OCS P-0315 Well No. 2; oil shows in the other wells indicate that an accumulation of liquid hydrocarbons may also be present. The areal extent of the gas and possible oil entrapment is still being evaluated. The contoured near top Pliocene Foxen Sand is shown in Figure 11. Detailed reservoir fluid properties are presented in Table 4.

3. PROPOSED DEVELOPMENT

The northwestern portion of the field on Lease OCS-P-0315 will be developed with a 50-slot, dual-rig platform, in approximately 670 ft of water.

3.1 Primary Recovery

Current plans call for drilling 42 wells, reserving 8 slots for possible future use. Thirty-six wells will be initially completed as Monterey producers; 4 as shallow gas (Foxen sands) producers; and 2 will be used for gas injection, which would be conducted in the event that the produced gas could not be transported off-platform for any reason, or should gas reinjection enhance reservoir recovery.

Drilling is scheduled to begin in the first quarter 1986 and continue for approximately 48 months into mid-1989. Planned bottom-hole well locations are shown in Figures 9 and 12, and are listed in Table 9. Average measured depth of the Monterey wells will be about 11,200 ft, reaching true vertical depths of up to approximately 8500 ft. Average measured depth of the Foxen wells will be about 3200 ft., reaching true vertical depths of up to 2500 ft.

Production from the platform is scheduled to begin during the first or second quarter 1986. Oil production is expected to peak at approximately 46 MBD in 1988 and continue at a decreasing rate through about 2015. Gas production (sweet plus sour) would peak at 42 MMSCFD also in 1988 and then decline with the oil production. Details are presented in Figure 10.

3.2 Well Spacing - Monterey Formation

Texaco has carefully evaluated the location of its wells for its Point Arguello Field reservoir development plan in accordance with the terms of OCS Order 11 and 30CFR250.17 and 250.34. The locations and spacing of the development wells have been determined with the expressed intent of locating the wells in the optimum structural locations for the most effective production of reservoir fluids and to avoid the drilling of unnecessary wells.

Initial plans are to drill and complete 36 single oilwells in the Monterey Formation with 80-acre spacing. The reservoir performance will be continually reevaluated during the life of the reservoir. If prudent reservoir management so indicators, additional in-fill wells will be drilled to improve recovery.

In general, naturally fractured reservoirs can be effectively drained with larger spacing than homogenous reservoirs[1], and economic evaluation is utilized to determine the optimum number of wells to be drilled in a field.

A reservoir simulation model was developed for the portion of the Point Arguello Field on OCS-P-0315 using the Black Oil Simulator, BOSS. It is estimated that developing the reservoir with 40-acre spacing instead of 80-acre spacing results in an increase in the ultimate primary recovery of 0.3% of the original oil in place. This increase is not significant and does not justify drilling an additional 17 wells to develop this reservoir with 40 acre spacing. Provided reservoir continuity is assured, 80 acre spacing is optimal for Platform Harvest development.

To insure reservoir continuity, interference tests will be run after development drilling begins from Platform Harvest. If necessary, there are sufficient slots in the Platform Harvest design for infill drilling. Several well locations on the 80 acre grid are close to the oil/water contact and may not be drilled. Referring to Figure 9, these wells include No. 13 (Block 8A), No. 29 (Block 16), No. 33 (Block 16A), No. 30 (Block 23), No. 32 (Block 29), No. 36 (Block 34), No. 35 (Block 33), No. 34 (Block 32), and No. 31 (Block 31). Accordingly, using the slots previously allocated to those wells for infill drilling, it is possible to develop the majority of the reservoir on 40 acre spacing (a total of 17 infill wells could be drilled). Until the data from the proposed interference tests actually proves reservoir discontinuity, however, the proposed development will remain based on 80 acre spacing.

Given the geological and other reservoir characteristics of the Point Arguello Field, the desire to avoid the drilling of unnecessary wells, the minimization of unreasonable interference with other uses of the OCS, and the mitigation of environmental impacts, Texaco submits its well spacing program as a reasonable one which properly develops the lease considering all relevant factors.

3.3 Well Spacing - Foxen Formation

Initial plans are to drill and complete 4 single gas wells in the Foxen Formation with nominal 140-acre spacing. These wells have been planned based on the same considerations regarding efficient reservoir development as those discussed in Section 3.2, above. Two of these wells, numbers 1 and 3 as shown on Figure 12, will be drilled first. Based on their performance, the proposed locations of wells 2 and 4 will be reevaluated and revised as necessary, thereby optimizing well spacing as dictated by prudent reservoir management.

3.4 Secondary Recovery

Current production plans do not include provisions for secondary recovery operations. However, the feasibility and desirability of gas injection and waterflooding will be continually evaluated during the production lifetime. If appropriate to maintain optimum reservoir performance, such operations could be initiated at a later stage in the field's life. Platform Harvest includes compression equipment to allow gas injection, if required. Current plans call for removal of one drilling rig in about 1990, at which time waterflooding equipment could be installed if so desired. Before depletion of the reservoir, other enhanced oil recovery methods would also be evaluated. Successful application of such recovery measures could extend the field life beyond 2015.

[1]Aguilera, R., 1980, Naturally Fractured Reservoirs. Pennwell Publishing Company, Tulsa, Oklahoma.

TABLE I

POINT ARGUELLO - DST SUMMARY - WELL OCS P-0315 #1

TEST	(INTERVAL)	FLUID	GRAVITY (°API)	GOR (SCF/STB)	Q (BOPD)	FTP (psig)	STATIC PRESSURE GRADIENT	COMMENTS
1	(11950-12070)	H_2O	-	-	-	-	0.429	Died after 63 bbl.
2	(10750-10860)	H_2O	-	-	-	-	0.425	Died after 37 bbl.
3	(10240-10440)	H_2O	-	-	-	-	0.421	Died after 72 bbl. Test tool malfunction.
4	(9860-10080)	H_2O	-	-	-	-	0.421	Acidized before testing. Died after 64 bbl. Recovered 1248 bbl. w/N_2 lift.
5	(9140-9470)	H_2O	-	-	-	-	0.420	Died after 59 bbl.
6	(8900-9100)	H_2O	-	-	-	-	0.423	Died after 46 bbl. Recovered 200 bbl. w/N_2 lift.
7	(8650-8850)	H_2O	-	-	-	-	0.431	Died after 72 bbl. Recovered 270 bbl. w/N_2 lift.
8	(8320-8450)	H_2O	-	-	-	-	0.425	Died after 62 bbl. Recovered 227 bbl. w/N_2 lift.
9A	(8090-8270)	Oil	13.8-16.2	-	1430	170	0.432	Flowed, 50% oil.
			14	-	1929	190	-	Flowed 100% oil.
9B	(7800-8040)	Oil	10-14.8	-	-	-	-	Died after 58 bbl. Recovered 80 bbl. w/N_2 lift. Test tool malfunctioned.
10	(7550-7750)	Oil	18.2-21.8	-	3305	560	0.44	Flowed, 100% oil.
					4034	340		
11	(7400-7511)	Oil	18.6-21.5	169	2492	5600	0.42	Flowed, 100% oil.
				210	3292	285		
12	(7170-7350)	Oil	13.8-20.5	478	1107	150	0.445	Before acid.
13	(7170-7350)	Oil	18.5-21.5	207	3163	300	0.446	After acid.
				175	5431	290		

TE4/j07

TEST	(INTERVAL)	FLUID	GRAVITY (°API)	GOR (SCF/STB)	Q (BOPD)	FTP (psig)	STATIC PRESSURE GRADIENT	COMMENTS
13	(6900-7140)	Oil	-	-	-	-	0.452	Tool malfunction. Producted 45 bbl. oil.
13A	(6900-7140)	Oil	18.2-21.1	221	4342	300	0.447	After acid.
14	(660-6850)	Oil	20.3	-	173	5	0.451	Slugging, near dead.
14A	(6600-6850)	Oil	19-22.6	229	2720	180	0.458	After acid. Flowed 100% 22.6° oil after cleanup of acid water.
15	(6350-6550)	H_2O	-	-	-	-	0.469	Tool malfunction. Reversed out 72 bbl.
15B	(6350-6550)	H_2O	-	-	-	-	-	Rerun. Recover 1 bbl. 20.1° oil, 34 bbl. water. Tight. No shut-in.

TABLE II

POINT ARGUELLO - DST SUMMARY - WELL OCS P-0315 #2

TEST	(INTERVAL)	FLUID	GRAVITY (°API)	GOR (SCF/STB)	Q (BOPD)	FTP (psig)	STATIC PRESSURE GRADIENT	COMMENTS
1	(9315-9560)	H_2O	-	-	-	-	0.429	Died after 107 bbl. Recovered 175 bbl. w/N_2 lift.
2	(8370-8575)	H_2O	-	-	-	-	0.43	Died after 99 bbl. Recovered 360 bbl. w/N_2 lift. Test tool malfunction.
3A	(8237-8272)	-	-	-	-	-	0.431	Test tool malfunction.
3B	(8137-8272)	Oil	9.3-12.1	-	-	-	0.432	Produced 70 bbl. in 11 hrs. Recovered 7-8 bbl. fluid w/N_2 lift. Reversed out 70 bbl. oil (9.3-12.1).
4	(7890-8100)	Oil	17-18.7	-	1714	240	0.433	Flowed, 100% oil.
5	(7600-7850)	Oil	8.5-11.5	-	701	100	0.436	Flowed, 100% oil.
6A	(7375-7560)	Oil	16.1-19.2	-	777	80	0.44	Non-stable flow, values questionable. 20% water cut.
6B	(7175-7560)	Oil	17.-17.9	259	3090	650	0.44	After acid. Charts not read properly for analysis. Rereading not recommended - no down hole shut-in.
7A	(7248-7330)	Oil	17.3	-	-	-	0.438	Died after 22 bbl. Oil and 56 bbl. water.
7B	(7248-7330)	Oil	19.5	393	1452	330	-	After acid. 25% water cut.

TE4/j07

TABLE II (Continued)
POINT ARGUELLO - DST SUMMARY - WELL OCS P-0315 #2

TEST	(INTERVAL)	FLUID	GRAVITY (°API)	GOR (SCF/STB)	Q (BOPD)	FTP (psig)	STATIC PRESSURE GRADIENT	COMMENTS
8	(6950-7200)	Oil & H_2O	16.3	-	-	-	0.449	Died. Recovered 27 bbl. on N_2 lift. Reversed out 46 bbl.
8A	(6950-7200)	Oil & H_2O	18.4-24.5	158	671	190	0.454	After acid. Prod. 87 bbl. and died. Flowed after unloading w/N_2 lift.
9	(6700-6900)	H_2O	-	-	-	-	0.47	Died after 35 bbl. 7.6° oil on reversal.
10	(1900-2200) Pliocene	Gas	0.636 (air-1.0)	-	1.2 MMCFD	630	-	Flow rates never stabilized. Well appears to be dying due to liquid buildup. No analysis possible.

TE4/j07

TABLE III

POINT ARGUELLO - DST SUMMARY - WELL OCS P-0315 #3

TEST	(INTERVAL)	FLUID	GRAVITY (°API)	GOR (SCF/STB)	Q (BOPD)	FTP (psig)	STATIC PRESSURE GRADIENT	COMMENTS
1	(8360-8450)	H_2O	-	-	-	-	0.427	123 bbl. water recovered.
2	(8050-8250)	Oil	11.1-12.3	-	-	-	0.430	Rec. 4 bbl. on N_2 lift. Total rec. 49 bbl.
2A	(8050-8250)	Oil	11.0-21.1 (18)	178	974	80	0.425	Flowed after acid, all charts bad - No analysis.
3	(7870-8000)	Oil	15.3-15.7	-	-	-	0.432	Rec. 4 bbl. oil, 12 bbl. H_2O on N_2 lift. Total 60 bbl. oil, 27 bbl. water.
4	(7400-7600)	Oil	18.1-22.8	612 623	821 1096	195 200	0.448 0.448	Flowed, cut down to 2% at end.
5	(7140-7340)	Oil	13-13.3	-	-	-	0.450	No rec. on N_2 lift, rev. 18 bbl. oil, 30 bbl. H_2O.
5A	(7140-7340)	Oil	14.9-21.9	372	1840	385	0.458	Kicked off w/N_2 lift after acid, cut down to 7% at end.
6	(6890-7070)	Oil	15.4-20.7	-	-	-	0.453	Rec. 96 bbl., N_2 and rev.
6A	(6890-7070)	Oil	21.1-23.9	-	-	-	-	Rec. 724 bbl. on N_2 lift, 12% cut at end. No. analy. Acidized.
7	(6380-6615) Sisquoc	Oil	19.1-19.5	-	-	-	0.458	Rev. 21 bbl. Oil, 4 bbl. H_2O.
7A	(6380-6615)	Oil	16.9-21.2	-	121	70	-	On N_2 all but last 6 hrs., cut 30% acid water.
8	(6150-6330)	Oil	18.7-18.8	-	-	-	0.451	Rec. 4 bbl. oil, 7 bbl. H_2O.
8A	(6150-6330)	Oil	19.8-22.1	468	788	235	-	Flowed after acid. Recovered 1219 bbl. total. Stable flow last 12 hours w/7.6% water cut.

TE4/j07

TABLE III (Continued)
POINT ARGUELLO - DST SUMMARY - WELL OCS P-0315 #3

TEST	(INTERVAL)	FLUID	GRAVITY (°API)	GOR (SCF/STB)	Q (BOPD)	FTP (psig)	STATIC PRESSURE GRADIENT	COMMENTS
9A	(5750-5950)	Oil	19.2-21.6	492	850	80	-	No pressure data. Inc. prod. data. Acidized.
10	(4400-4570)	H_2O?	-	-	-	-	-	Acidized. Rec. 80 bbl. 100% SW. Inconclusive.
11	(3170-3780)	Oil	15.7-16.1	-	-	-	0.432	Acidized, rec. 44 bbl. oil, 310 bbl. H_2O on N_2 , 60% + cut.
12	(3170-3380)	Oil	?	?	?	?	?	Rec. 23 bbl. SW total. Could not extrap. P_1.
14	(2150-2370) Foxen	H_2O	-	-	-	-	0.430	Rec. 57 bbl. SW & sand. Tool did not close.

TABLE IV

GAS ANALYSIS
POINT ARGUELLO FIELD
FOXEN ZONE

Compound	Mole Pct.
Oxygen	0
Nitrogen	.146
Carbon dioxide	7.828
Methane	91.921
Ethane	.057
Propane	.042
Iso-butane	.006
Normal-butane	0
Iso-pentane	0
Normal-pentane	0
Hexane +	0

Calculated Gravity = .631

Calculated B.T.U. = 932.516

TABLE V

GAS ANALYSIS
POINT ARGUELLO FIELD
MONTEREY (TRANSITION ZONE)

Compound	Mole Pct.
Oxygen	0
Nitrogen	.666
Carbon dioxide	7.944
Methane	73.374
Ethane	6.949
Propane	6.468
Iso-butane	1.008
Normal-butane	2.443
Iso-pentane	.568
Normal-pentane	.506
Hexane +	.075

Calculated Gravity = .802

Calculated B.T.U. = 1189.63

TABLE VI

GAS ANALYSIS
POINT ARGUELLO FIELD
MONTEREY (MAIN ZONE)

Compound	Mole Pct.
Oxygen	0
Nitrogen	6.385
Carbon dioxide	13.418
Methane	67.274
Ethane	5.946
Propane	3.854
Iso-butane	.626
Normal-butane	1.198
Iso-pentane	.338
Normal-pentane	.282
Hexane +	.678

Calculated Gravity = .838

Calculated B.T.U. = 1010.51

TABLE VII

RESERVOIR FLUID CHARACTERISTICS

An overview of the fluid properties is presented below. Generally the fluid properties vary both areally and with depth.

Oil Properties	Monterey Main Zone	Monterey Transition Zone	Sisquoc
Avg. Gravity (^{o}API)	17	21.0	19.0
GOR SCF/Bbl	300	400	400
FVF RB/STB	1.197	1.233	Not Available
Viscosity @ 230^{o}F (CP)	10.0	8.9	Not Available
Sulfur Wt. %	3.4	2.6	Not Available

Gas Properties	Monterey (Main Gas) Solution Gas	Monterey (Transition Zone) Solution Gas	Foxen Gas
Specific gravity	0.838	0.802	0.631
Formation temperature	(230) @ 7400' VSS	(230) @ 7400' VSS	(103) @ 2050' VSS
Formation pressure	(3290) @ 7400' VSS	(3290) @ 7400' VSS	(1025) @ 2050' VSS
H_2S content PPM	7000	None	None

TABLE VIII

FORMATION WATER ANALYSIS
PIONT ARGUELLO FIELD
(Monterey Zone)

Analyzed for	Milligrams* Per Liter	Precision of Method %	Reacting Value	Per Cent
Sodium	9,790	5	425.87	43.55
Potassium	1,690	5	43.21	4.42
Ammonium	180	10	9.98	1.02
Calcium	140	5	6.99	0.71
Magnesium	34	5	2.80	0.29
Barium	8	10	0.12	0.01
Iron	7.3	10	-	-
Sulfate	100	20	2.08	0.21
Chloride	15,200	2	428.798	43.84
Iodide	25	10	0.20	0.02
Borate	260	10	3.35	0.34
Hydroxide	0	-	0	-
Carbonate	0	-	0	-
Bicarbonate	1,800	10	29.50	3.02
Organic Acids**	970	10	-	-
Silica	130	5	-	-
Excess Ionic Strength			25.15	2.57
Arsenic				
Total Solids	29,365			
Salinity as NaCl	25,005			
Specific Gravity	@ 60°F.			
Resistivity	ohm m @ 75°F			
pH Value	6.75			

GROUPS			CHEMICAL CHARACTER		
Alkalies	48.99	%	Primary Salinity	93.38	%
Earths	1.01	%	Secondary Salinity	0.00	%
Strong Acids	46.64	%	Primary Alkalinity	4.70	%
Weak Acids	3.36	%	Secondary Alkalinity	2.02	%

* Milligrams per liter divided by 17.12 equals grains per U.S. gallon
** Calculated as acetic acid.

TABLE IX

POINT ARGUELLO - OCS P-0315

Development Wells - Bottom Hole Locations

Block #	X Coordinate	Y Coordinate
1	668,500.85	866,038.12
2	666,685.20	866,069.34
3	664,806.94	866,100.49
4	662,928.68	866,100.49
5	661,113.03	866,069.34
6	659,234.77	866,069.34
7	657,293.90	866,069.34
8	655,415.64	866,100.56
8a	653,975.63	866,100.56
9	668,563.46	864,227.14
10	667,186.08	864,227.14
11	664,806.94	864,227.14
12	662,928.68	864,227.14
13	661,113.08	864,227.14
14	659,172.16	864,227.14
15	657,325.21	864,289.64
16	655,478.25	864,320.86
16a	654,020.00	364,695.35
17	668,563.46	862,353.79
18	666,685.20	862,353.79
19	664,806.94	862,416,38
20	662,928.68	862,228.90
21	661,050.42	862,241.28
22	659,172.16	862,241.28
23	657,293.90	862,353.84
24	668,532.16	860,480.44
25	666,685.20	860,480.44
26	664,806.94	806,480.44
27	662,928.69	860,480.44
28	661,019.12	860,542.92
29	659,172.16	860,542.92
30	668,500.85	858,669.56
31	666,873.03	868,607.09
32	664,731.82	868,794.44
33	662,866.07	848,919.32
34	661,090.00	859,210.00

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See Fig. 9 for map of well locations

TABLE IX

OCS P-0315
Point Arguello Field
Development Wells - Proposed Locations

Drilling Order Well No.	80 Acre Block No.	Lambert Coordinates of Well at Mid-Completion Interval X	Y
1	Foxen	660,510	865,675
2	Foxen	662,420	863,795
3	12	663,373	864,738
4	9	668,973	864,649
5	30	659,640	861,065
6	17	668,973	862,782
7	7	657,773	866,693
8	25	668,973	860,915
9	4	663,373	866,604
10	1	668,973	866,515
11	6	659,640	866,663
12	3	665,240	866,574
13	8	655,906	866,722
14	2	667,107	866,545
15	5	661,506	866,634
16	33	668,973	859,048
17	10	667,107	864,679
18	14	659,640	864,797
19	16	655,906	864,856
20	35	665,240	859,110
21	28	663,373	861,006
22	19	665,240	862,842
23	21	661,506	862,902
24	26	667,107	860,947
25	23	657,773	862,961
26	27	665,240	860,967
27	22	659,640	862,931
28	11	665,240	864,708
29	29	661,506	861,036
30	15	657,773	864,827
31	34	667,107	859,081
32	13	661,506	864,768
33	18	667,107	862,813
34	36	663,373	859,140
35	20	663,373	862,872

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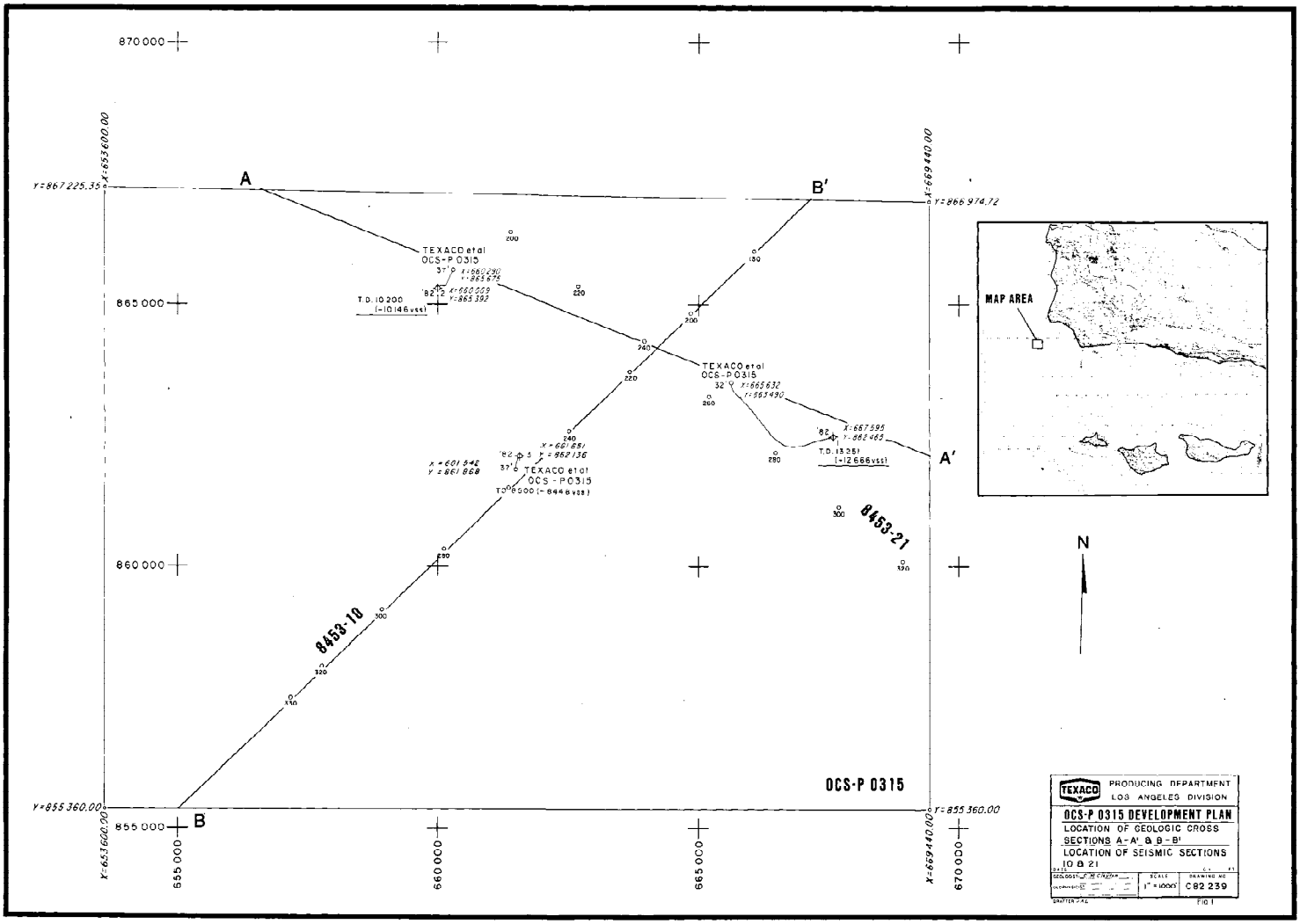


TEXACO PRODUCING DEPARTMENT
LOS ANGELES DIVISION

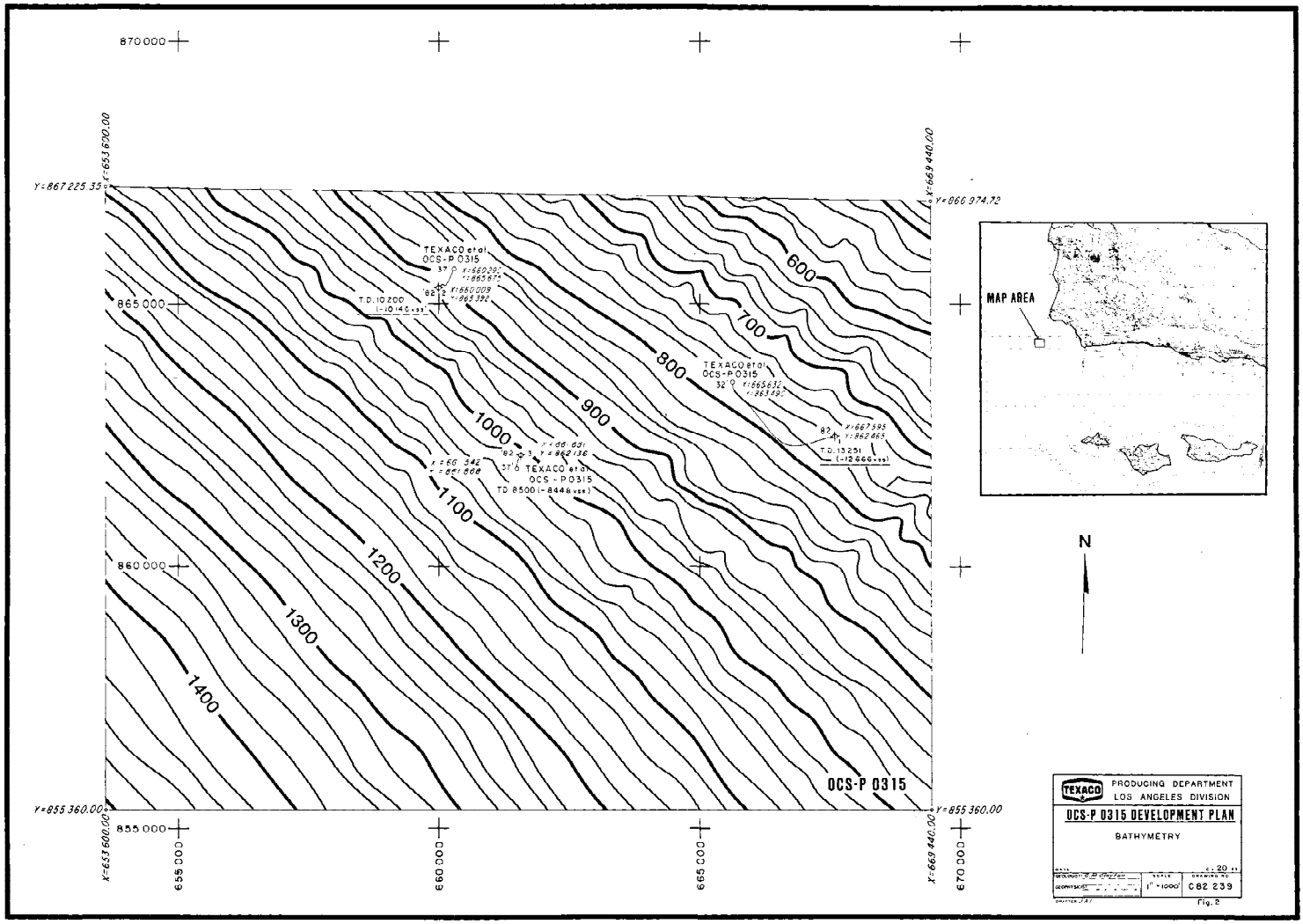
OCS-P 0315 DEVELOPMENT PLAN

LOCATION OF GEOLOGIC CROSS SECTIONS A-A', & B-B'

LOCATION OF SEISMIC SECTIONS 10 & 21

GEOLOGIST	SCALE	DRAWING NO
	1" = 4000'	C 82 239

Fig 1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855 000
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660 000
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670 000
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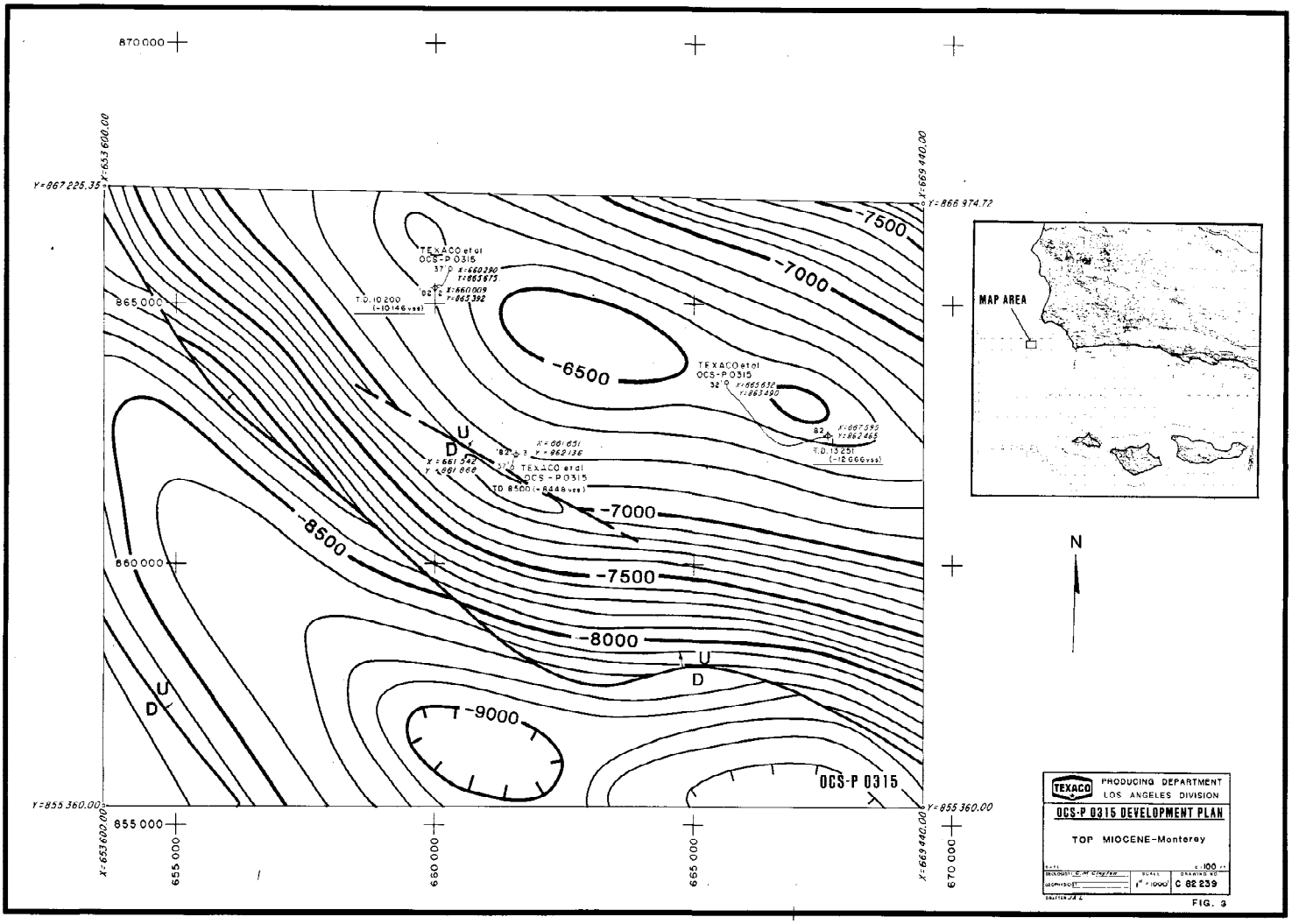
X=669 440.00
Y=866 974.72
Y=855 360.00
X=651 600.00
X=669 440.00
Y=855 360.00
600
700
800
900
1000
1100
1200
1300
1400
TEXACO et al
OCS-P 0315
T.D. 10 200
(-10 145 v.s.s)
TEXACO et al
OCS-P 0315
T.D. 13 251
(-12 666 v.s.s)
TEXACO et al
OCS-P 0315
TD 8500 (-8448 v.s.s)
OCS-P 0315
MAP AREA
N
TEXACO
PRODUCING DEPARTMENT
LOS ANGELES DIVISION
OCS-P 0315 DEVELOPMENT PLAN
BATHYMETRY
1" = 1000'
C62 239
Fig. 2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Y=867 225.35
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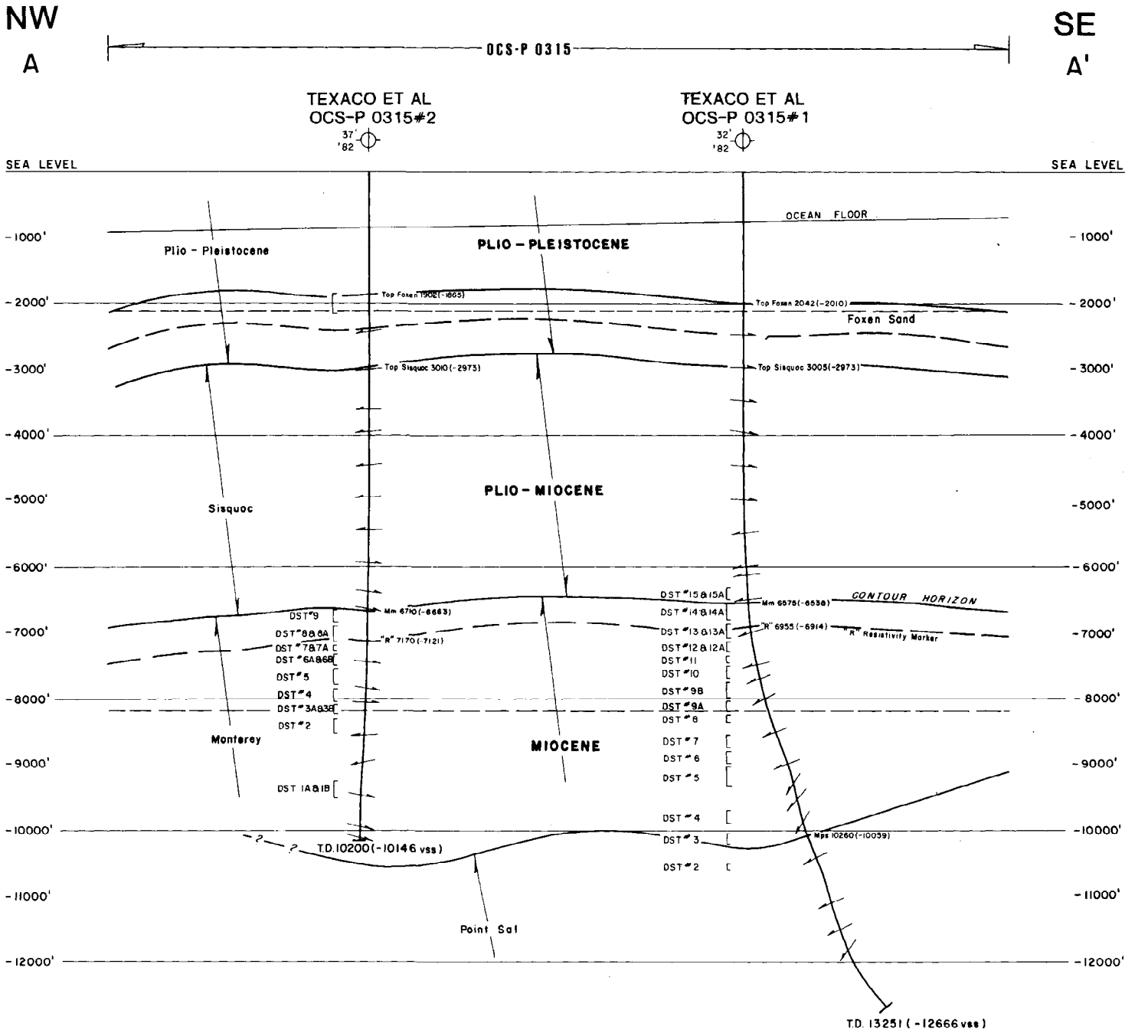
Y=855 360.00
X=653 600.00
X=669 440.00
Y=855 360.00
-6500
-7000
-7500
-8000
-8500
-9000
TEXACO et al
OCS-P 0315
37
X=660 290
Y=865 675
T.D. 10 200
(-10146 vss)
82
X=660 009
Y=863 392
TEXACO et al
OCS-P 0315
32
Y=865 632
Y=863 490
82
X=667 395
Y=862 465
T.D. 13251
(-12666 vss)
X=661 651
Y=862 136
X=661 342
Y=861 862
TEXACO et al
OCS-P 0315
TD 8500 (-8248 vss)
U
D
OCS-P 0315
MAP AREA
N
TEXACO
PRODUCING DEPARTMENT
LOS ANGELES DIVISION
OCS-P 0315 DEVELOPMENT PLAN
TOP MIOCENE-Monterey
DESIGNED C.M. Kingrea
DRAWN
CHECKED
SCALE 1" = 1000'
DRAWING NO C 82 239
DRAFTER J.A.L.

FIG. 3



SCALE: 1" = 1000'
HORIZ. & VERT.
0 2,500
FEET

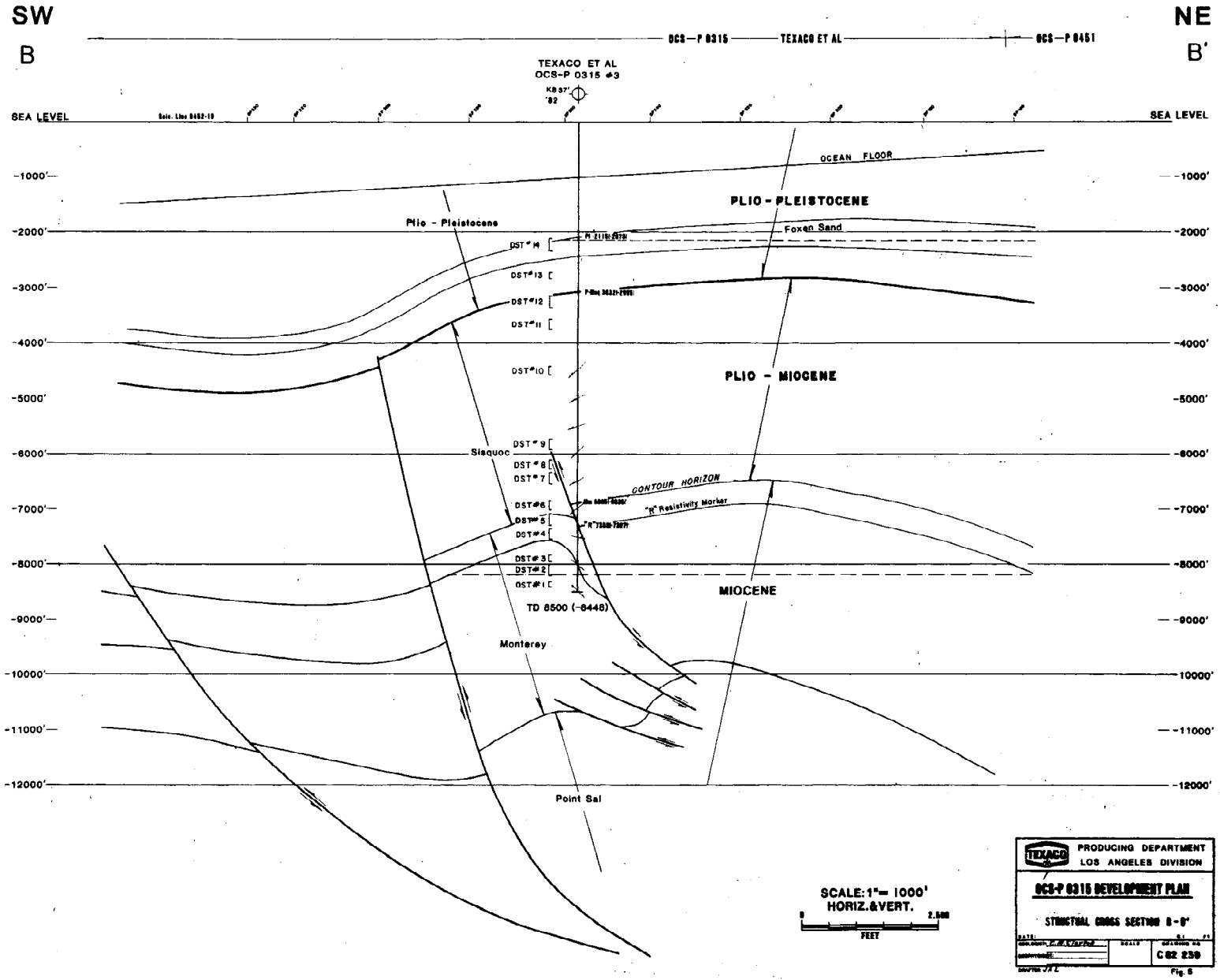
TEXACO PRODUCING DEPARTMENT
LOS ANGELES DIVISION

OCS-P 0315 DEVELOPMENT PLAN

STRUCTUAL CROSS SECTION A-A'

DATE:
GEOLOGIST: C. M. Clayton
GEOPHYSICIST:
DRAFTER: J.A.L.
SCALE 1" = 1000'
DRAWING NO C82 239

Fig. 4


SW
NE
B
B'
OCS—P 0315
TEXACO ET AL
OCS—P 0451
TEXACO ET AL
OCS-P 0315 #3
KB 87'
'82
SEA LEVEL
SEA LEVEL
OCEAN FLOOR
PLIO - PLEISTOCENE
Plio - Pleistocene
Foxen Sand
DST #14
DST #13
DST #12
DST #11
DST #10
PLIO - MIOCENE
Sisquoc
DST #9
DST #8
DST #7
CONTOUR HORIZON
"R" Resistivity Marker
DST #6
DST #5
DST #4
DST #3
DST #2
DST #1
MIOCENE
TD 8500 (-8448)
Monterey
Point Sal
-1000'
-2000'
-3000'
-4000'
-5000'
-6000'
-7000'
-8000'
-9000'
-10000'
-11000'
-12000'
SCALE: 1"= 1000'
HORIZ.&VERT.
FEET
PRODUCING DEPARTMENT
LOS ANGELES DIVISION
OCS-P 0315 DEVELOPMENT PLAN
STRUCTURAL CROSS SECTION B-B'
C 82 239
Fig. 6

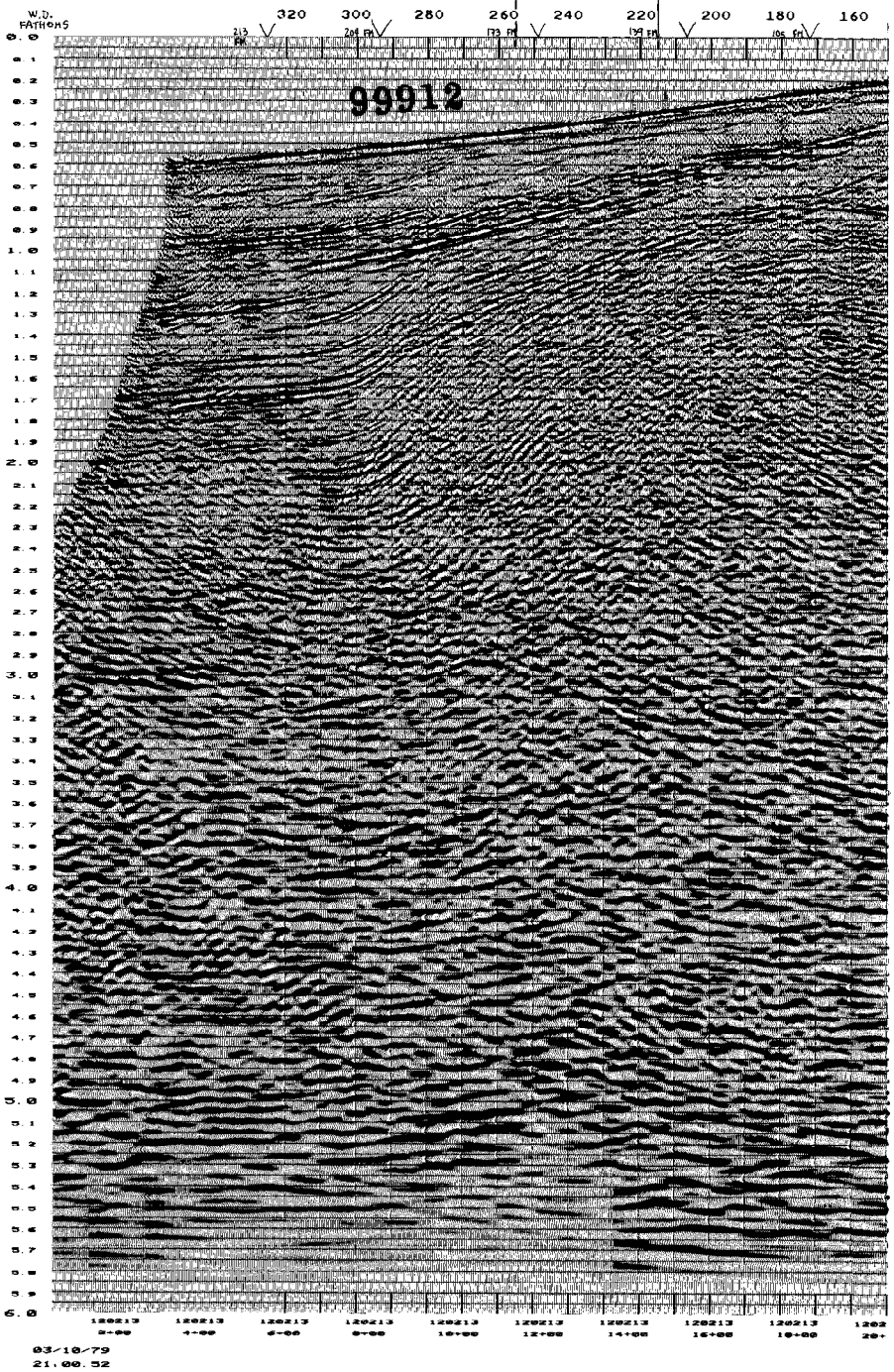
OCS-P 0319 — TEXACO et al OCS-P 0315 — OCS-P 0451

SW

NE

1 MILE

OCS-P 0315 #3 Line 21-sp244



SANTA BARBARA CHANNEL
1979
PROJECT 8453
LINE 10

MULTIPLICITY 48 COP DATUM SEA LEVEL

RECORDING INFORMATION

CABLE GEOMETRY

SHOTPOINTS ARE SHIP ANTENNA LOCATIONS

1 MILE = 120 TRACES

PROCESSED BY EMH
TEXACO INC.
GEOPHYSICAL CENTER
BELLAIRE, TEXAS

APPROVED BY JEE
TAPE SECTION WEA
SECTION NO. 9912V

SEA LEVEL DATUM

PRE-PROCESSING SEQUENCE

DEMULTIPLEX

DATUM CORRECTION +15 MS

GUN DELAY CORRECTION 0 MS

GATHER

TCN

MIG

VELOCITY CONTROL - V

CASE
MOVEOUT AND STACK
REFER TO CASE SECTION FOR VELOCITIES

PROCESSING SEQUENCE

PREP

FILTER

CVC

VELOCITY SMOOTHING FOR WEM
WAVE EQUATION MIGRATION

CATERPAD

FILTER

TCN

DISPLAY

TEXPAR PROCESSING

TEXACO PRODUCING DEPARTMENT
LOS ANGELES DIVISION

OCS-P 0315 DEVELOPMENT PLAN

SEISMIC SECTION 8453-10

DATE

GEOLOGIST C. M. Clayton

GEOPHYSICIST

SCALE

DRAWING NO. C82 239

DRAFTER JAL

Fig.6

OCS-P 0451 — TEXACO et al OCS-P 0315 — OCS-P 0316

NW

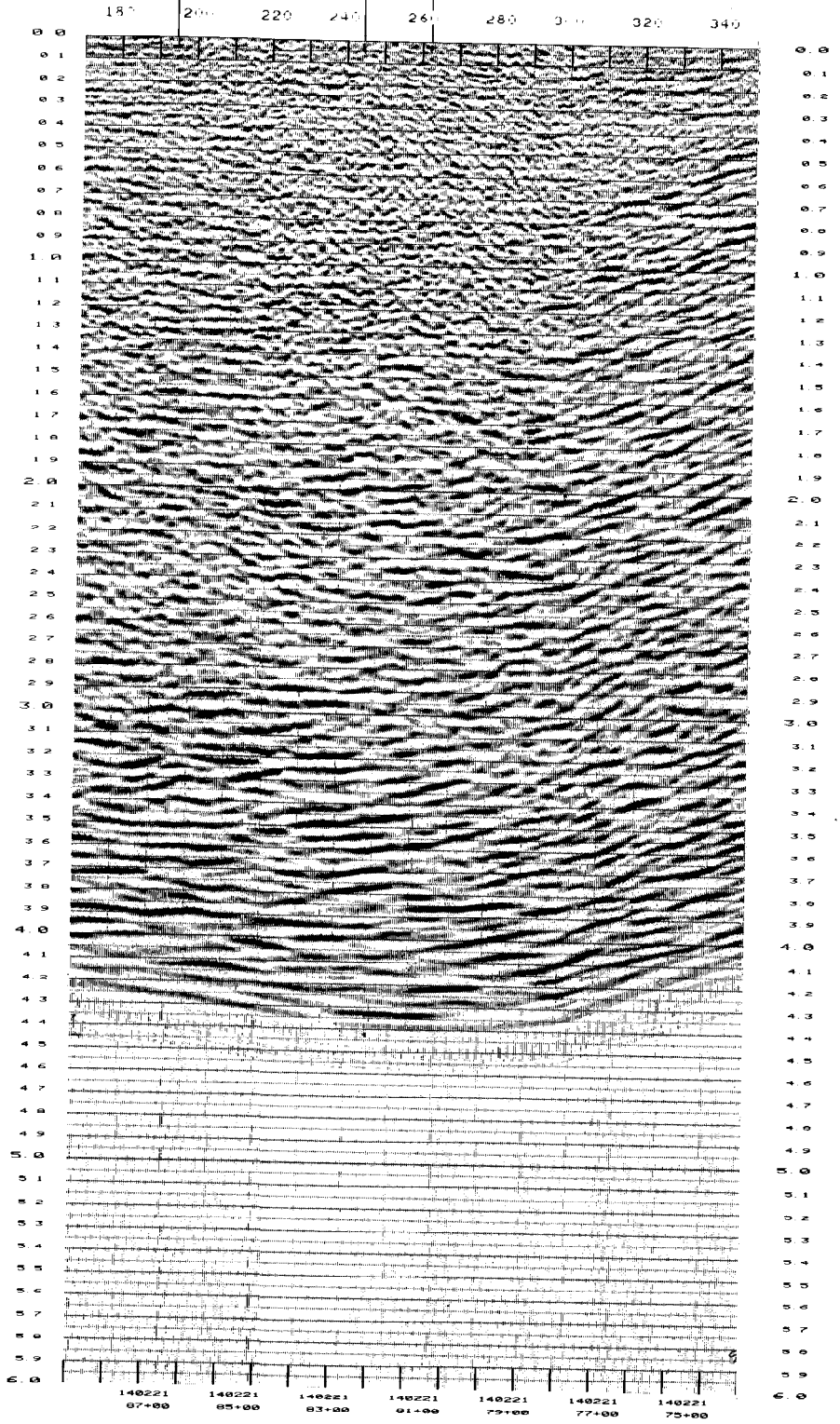
Line 10-sp 215

OCS-P 0315 #2 (Proj. 1200')

OCS-P 0315 #1

1 MILE

SE



SANTA BARBARA CHANNEL
1979
PROJECT 8453
LINE 21

MIGRATED TIME SECTION

96499 V

TEXPAR PROCESSING

TEXACO PRODUCING DEPARTMENT
LOS ANGELES DIVISION

OCS-P 0315 DEVELOPMENT PLAN

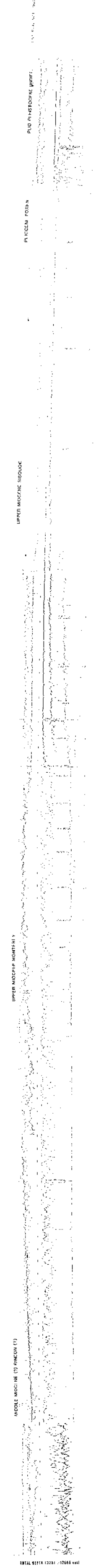
SEISMIC SECTION 8453-21

DATE: C.I. FT.
GEOLOGIST C.M. Clayton
GEOPHYSICIST
SCALE
DRAWING NO C82 239
DRAFTER JAZ

Fig.7

TYPE LOG

TEXACO INC
OCS P 0315 - 1



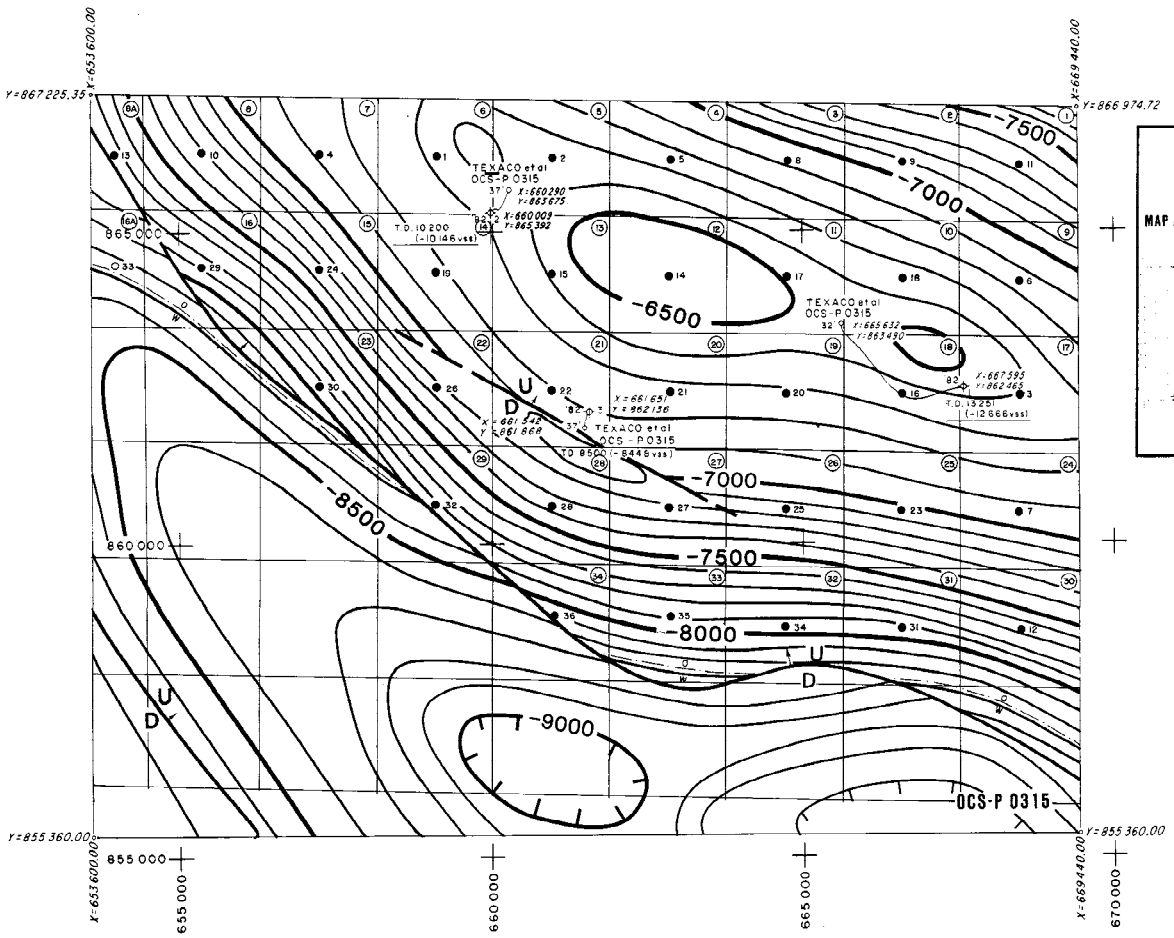


FIG. 9

1983 VERSION

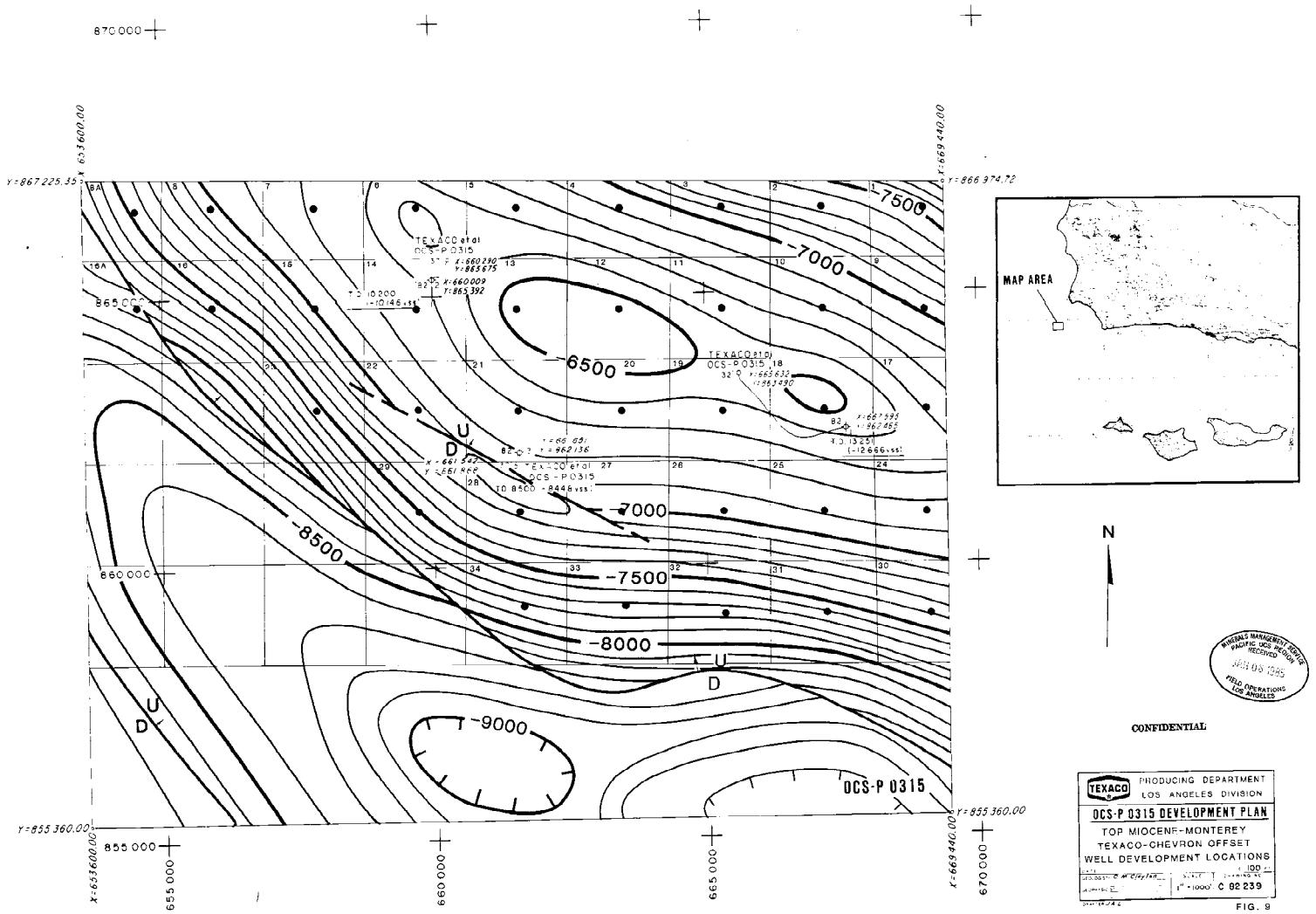


FIG. 9

Revised 1/85

PLATFORM HARVEST PRODUCTION FORCAST

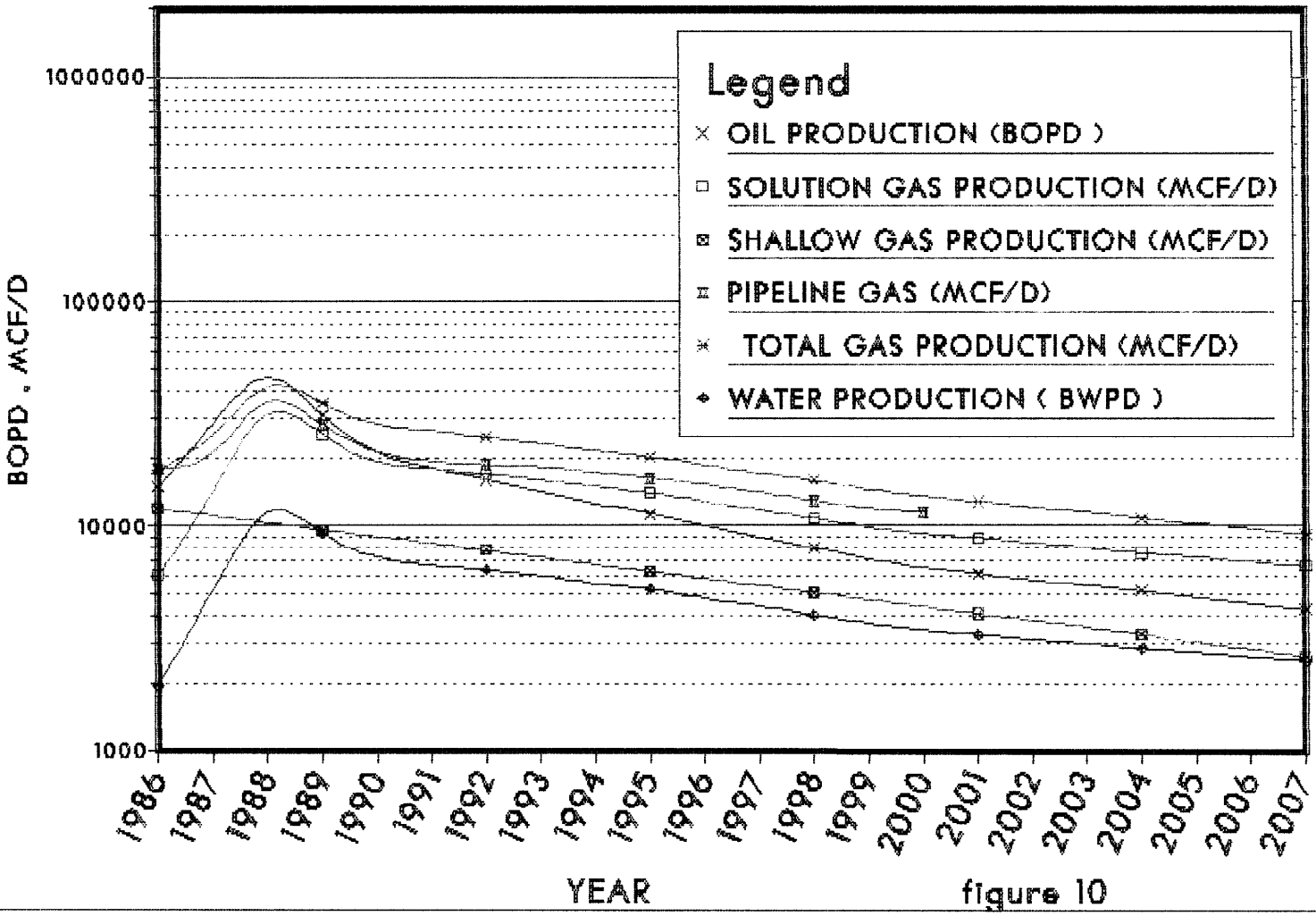
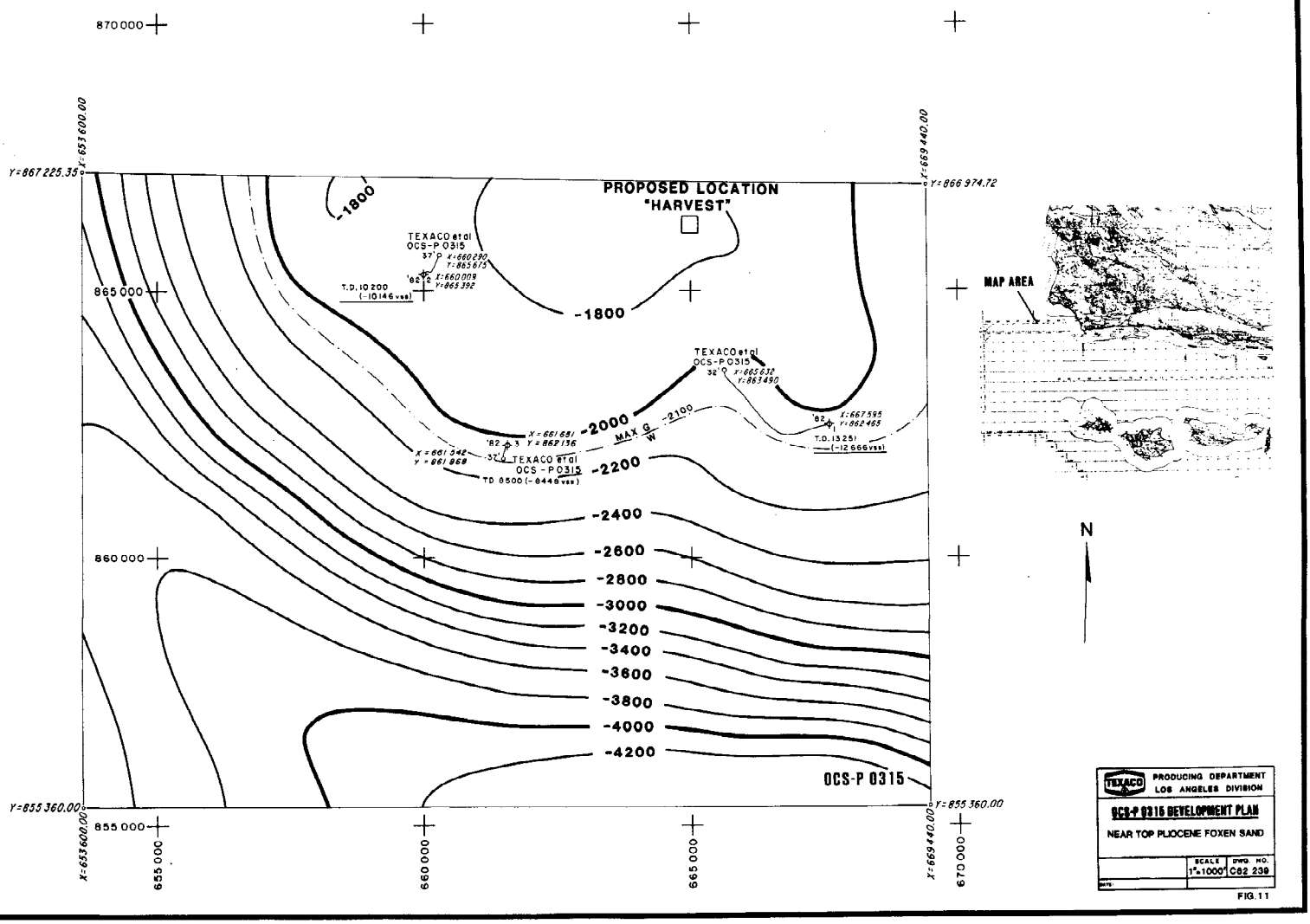


figure 10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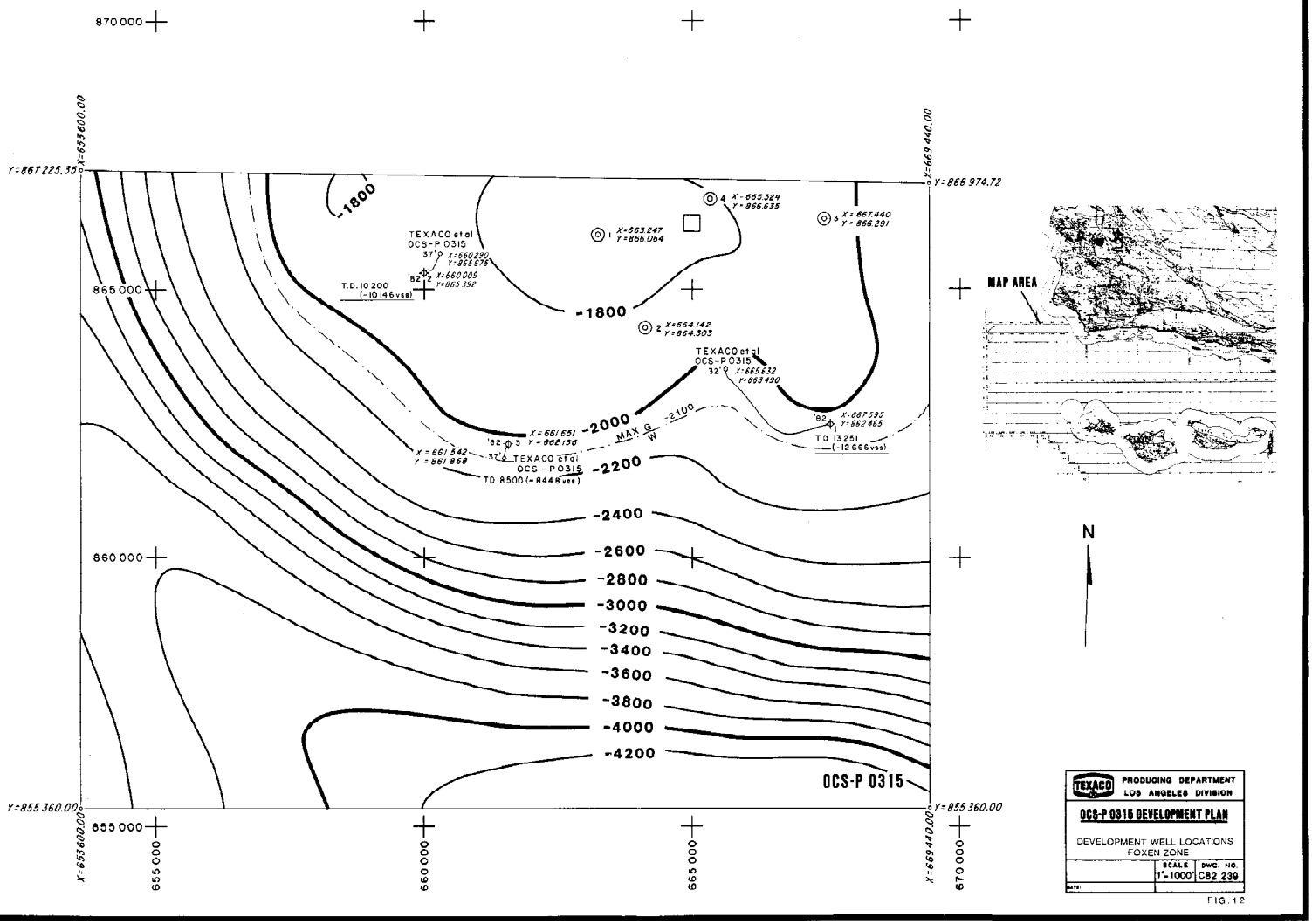
X=669 440.00
Y=867 225.35
Y=866 974.72
Y=855 360.00
X=653 600.00
655 000
660 000
665 000
670 000
PROPOSED LOCATION
"HARVEST"
-1800
TEXACO et al
OCS-P 0315
T.D. 10 200
(-10146 vss)
TEXACO et al
OCS-P 0315
T.D. 13 251
(-12 666 vss)
TEXACO et al
OCS-P 0315
TD 8500 (-8446 vss)
-2000
MAX G
W
-2100
-2200
-2400
-2600
-2800
-3000
-3200
-3400
-3600
-3800
-4000
-4200
OCS-P 0315
MAP AREA
N
TEXACO
PRODUCING DEPARTMENT
LOS ANGELES DIVISION
OCS-P 0315 DEVELOPMENT PLAN
NEAR TOP PLIOCENE FOXEN SAND
SCALE
1"=1000'
DWG. NO.
C82 239
DATE:

FIG. 11



TEXACO PRODUCING DEPARTMENT
LOS ANGELES DIVISION

OCS-P 0315 DEVELOPMENT PLAN

DEVELOPMENT WELL LOCATIONS
FOXEN ZONE

SCALE	DWG. NO.
1"=1000'	C82 239

DATE:

FIG. 12