Shell California Production Inc.
A Subsidiary of Shell Oil Company

Platform Eureka
Beta Unit

Volume I
Development and Production Plan

Hell

DEVELOPMENT AND PRODUCTION PLAN
FOR
PLATFORM EUREKA

SAN PEDRO BAY
OFFSHORE SOUTHERN CALIFORNIA
FEDERAL OCS LEASES P-0300 AND P-0301
BETA FIELD

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NOTE

Effective June 1, 1982, Shell Oil Company (Shell) transferred its oil and gas production operations in California to Shell California Production Inc. (SCPI). SCPI is owned through a subsidiary relationship by Shell.

All titles, agreements, permits, applications, drawings, references, reports, etc. originally bearing the name Shell Oil Company and which relate to this project have been transferred to SCPI. Where appropriate and reasonable, the text and other printed materials have been revised to reflect the establishment of SCPI as owner and operator of Shell's facilities and interest in the Beta Field Unit and related onshore activities. Some changes, however, may not have been made through infeasibility or oversight. All reviewers and users of this and associated documents are hereby advised of the establishment and interest of SCPI as it relates to Shell's Beta Field activities.

The application materials submitted to Minerals Management Service for the development of Platform Eureka in SCPI's Beta Field is provided in two separately-bound volumes. Volume I is the Development and Production Plan which contains a detailed description of the proposed project. Volume II is the Environmental Report and contains a summary of Volume I plus a detailed assessment of the project's environmental impacts.

BETA FIELD
DEVELOPMENT AND PRODUCTION PLAN
EUREKA PLATFORM DETAIL
SUPPLEMENT

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SECTION 1

INTRODUCTION

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SECTION 1
INTRODUCTION

Development of the Beta Field includes two drilling platforms, Ellen and Eureka, and one production platform, Elly, for Leases P-0300, P-0301, and P-0306, and one combined drilling and production platform, Edith, for Lease P-0296. The Plan of Development (POD) which addressed Ellen and Elly in detail and referred to the eventual development of Eureka was submitted in October 1977 and approved in October 1980. The Development and Production Plan (DPP) for Platform Edith was approved in 1981.

Platform Eureka is the subject of this document, which is being submitted as a supplement to the POD that was submitted in October 1977. This supplement provides the necessary details for Platform Eureka that were not available or completely defined when the original POD was prepared.

Platform Eureka is located in the NW/4,SW/4, Lease P-0301, in approximately 700 feet (213 m) of water depth. Installation of Platform Eureka with sea floor pipelines and power cables to Platform Elly will provide for complete development of the Beta Reservoir underlying Leases P-0300 and P-0301, and initial exploration of P-0306 on approximately 15-acre (6 ha) well spacing. Figure 1-1 shows the location of the Beta Field.

The Beta Field Unitization Agreement and the Participating Area has been approved, with an effective date of April 15, 1983. SCPI is the unit operator for the four leases in the Beta Unit (P-0296, P-0300, P-0301 and P-0306), and operates platforms Ellen and Elly on Lease P-0300. SCPI will also be the operator of Platform Eureka on Lease P-0301. Chevron U.S.A. is the designated agent in the operation of P-0296, and operates Platform Edith on that lease. SCPI's partners in Leases P-0300 and P-0301 are Hamilton Brothers (4.5 percent interest), Aminoil USA, Inc. (16.5 percent interest), Petro-Lewis, Inc. (17 percent interest), and Santa Fe Energy (12 percent interest). SCPI holds 50 percent interest in these leases. Lease P-0306 is held 100 percent by Chevron.

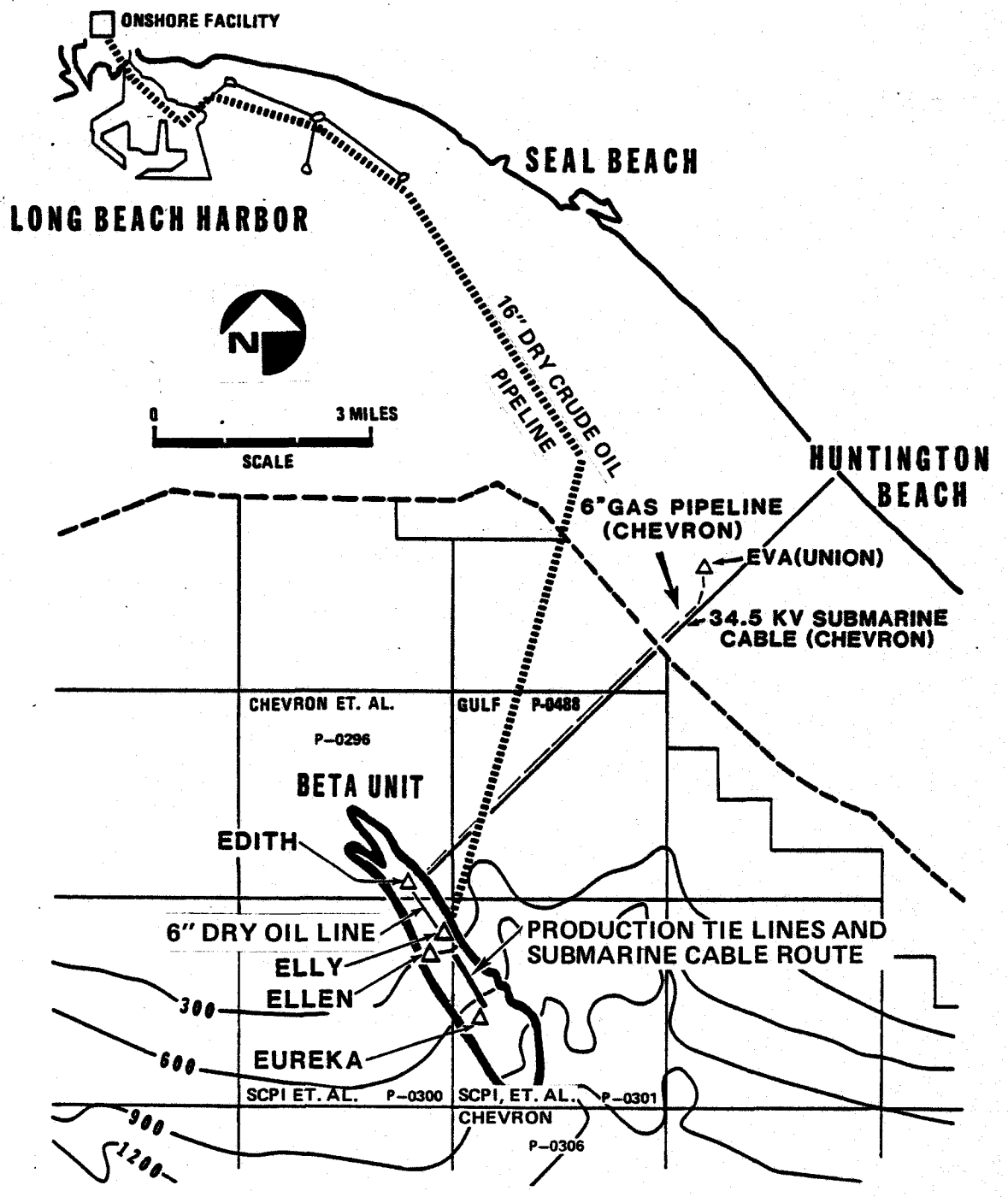
Platform Eureka detail includes:

1) Design, fabrication and installation of a drilling platform jacket and deck in 700 feet (213 m) of water, including facilities for primary separation, well testing and crew quartering.
2) Modification and installation of one API-type drilling rig, relocated from existing drilling Platform Ellen.

3) Installation of a 12-inch subsea wet oil pipeline, a 6-inch subsea wet gas pipeline, a 10-inch subsea injection water pipeline, and two 35 kV subsea electrical power cables between drilling Platform Eureka and existing Platform Elly.

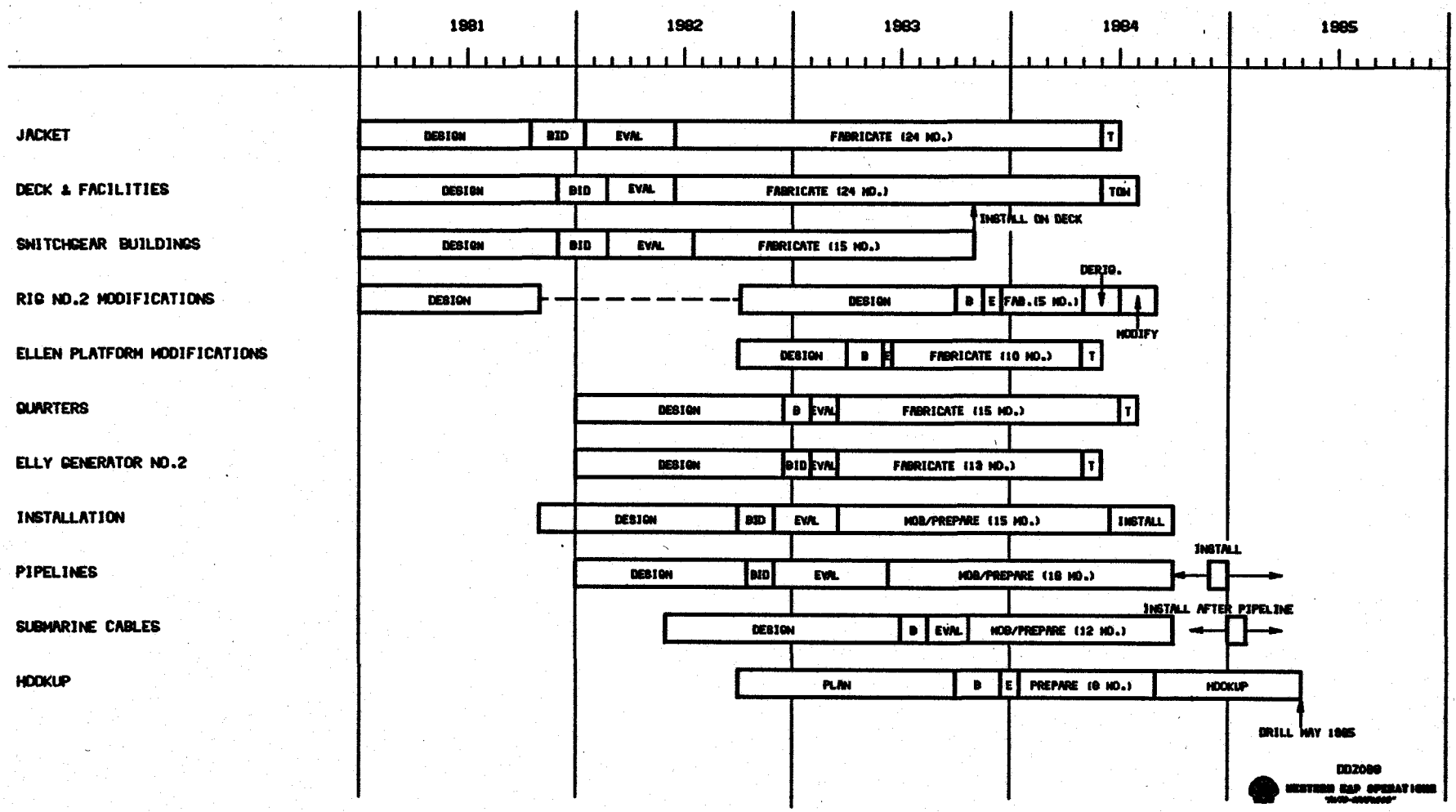
4) Design, construction and installation of additional generator capacity on existing production Platform Elly.

Platform Eureka is designed for the drilling of up to 60 wells including disposal wells. The development schedule for Platform Eureka is shown in Figure 1-2. Crude production/water injection forecasts reflecting current predictions for Platform Eureka and for both Eureka and Ellen are shown in Figures 1-3 and 1-4, respectively. Gas production from proposed Platform Eureka will be utilized by the combined Platforms Ellen, Elly and Eureka fuel demand. The gas production forecast for Ellen and Eureka is shown on Figure 1-5. The most current Beta gas production forecast is slightly lower than the August 1982 forecast which was used as the basis for the facilities design. The difference in gas rates between the two forecasts is not significant when compared to the uncertainty involved in making these projections. Therefore, the new gas production forecast does not invalidate any of the equipment design or reports/studies associated with the Eureka project. Current gas injection capacity will be adequate for Platform Eureka produced gas not used as fuel. Thus, development from Eureka will not occasion any increase in flaring, except for surges associated with new well completions.



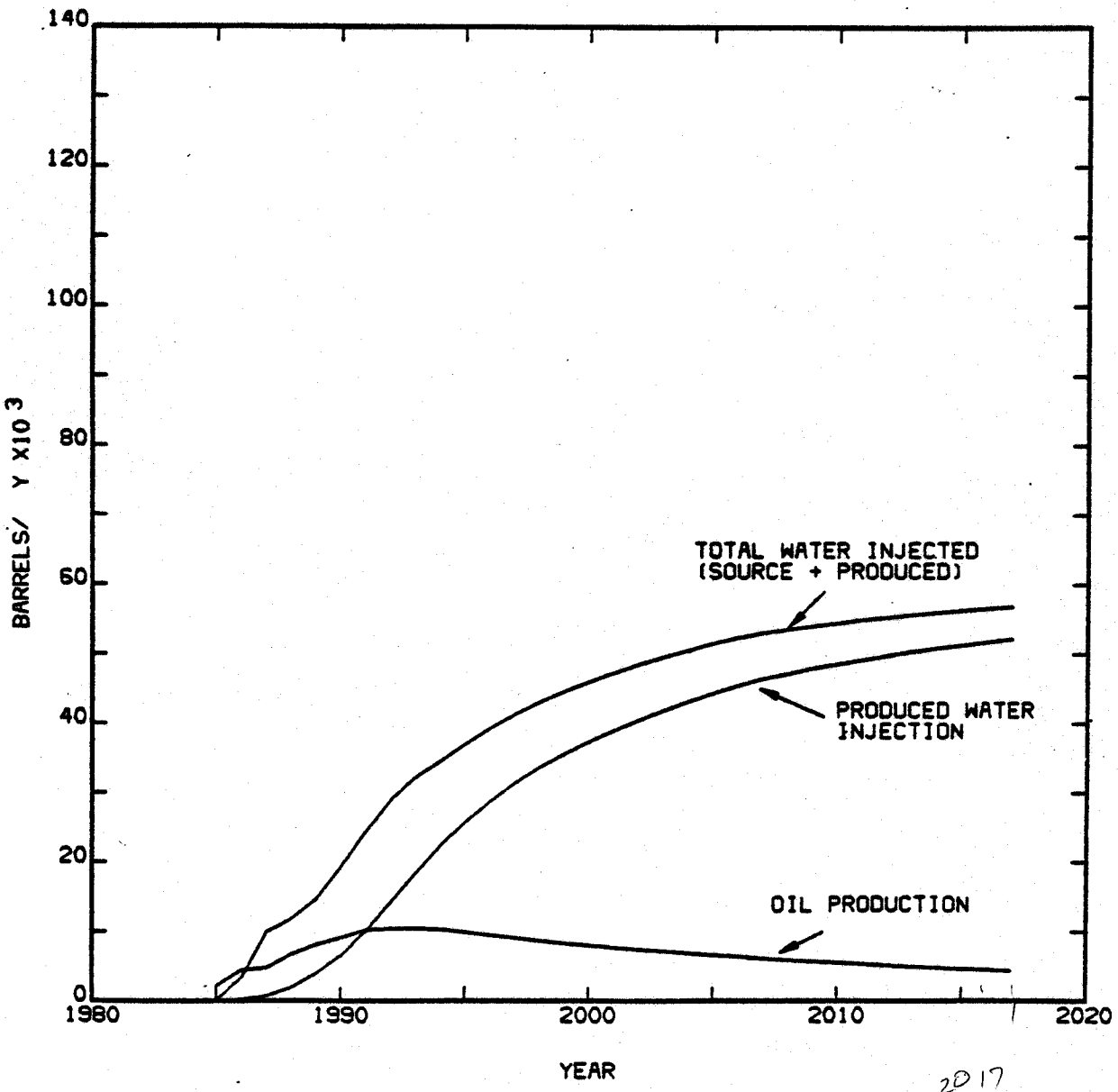
Beta Field Location and Facilities

FIGURE 1-1



Platform Eureka Development Schedule

FIGURE 1-2



2017
1785
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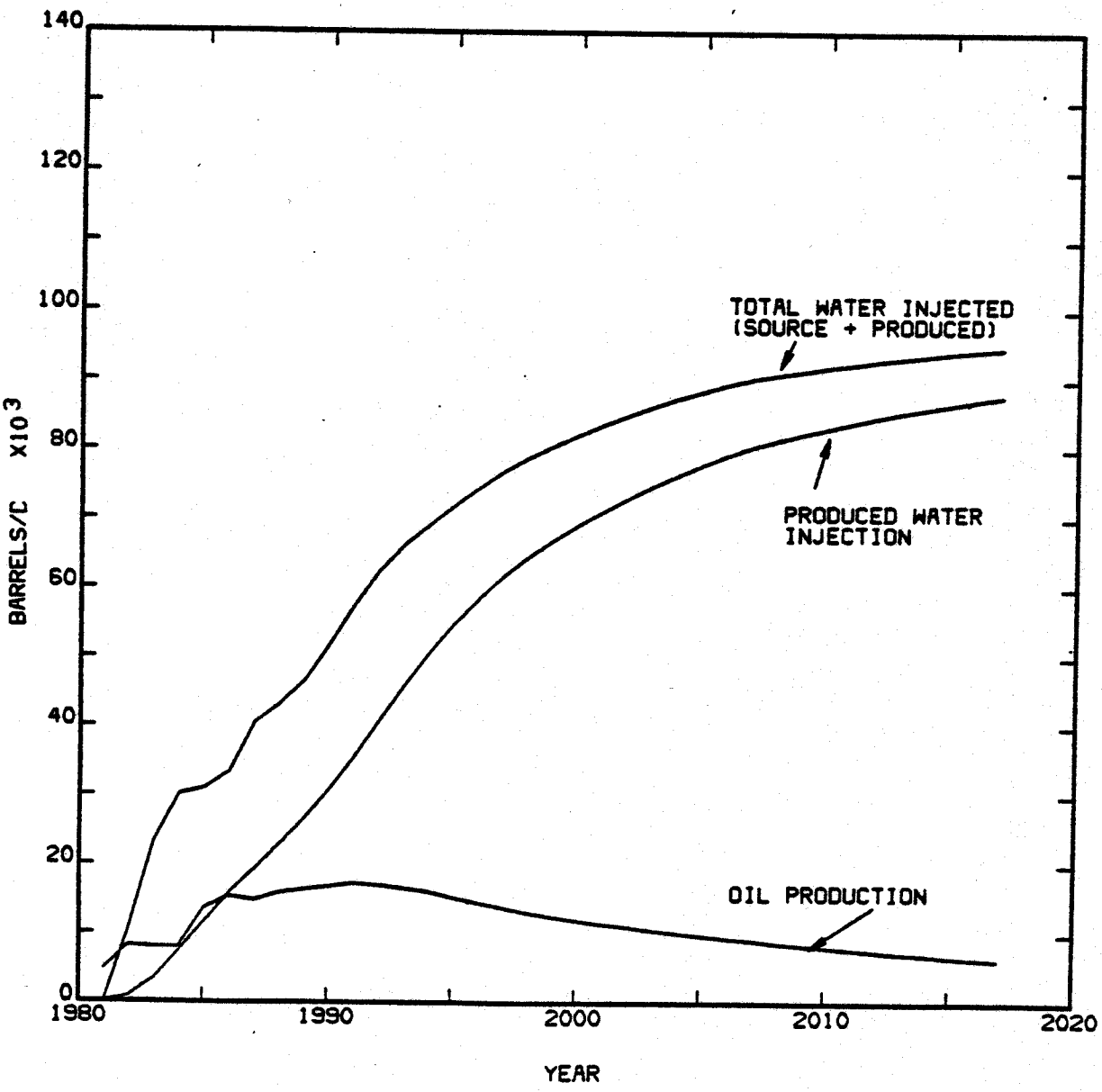
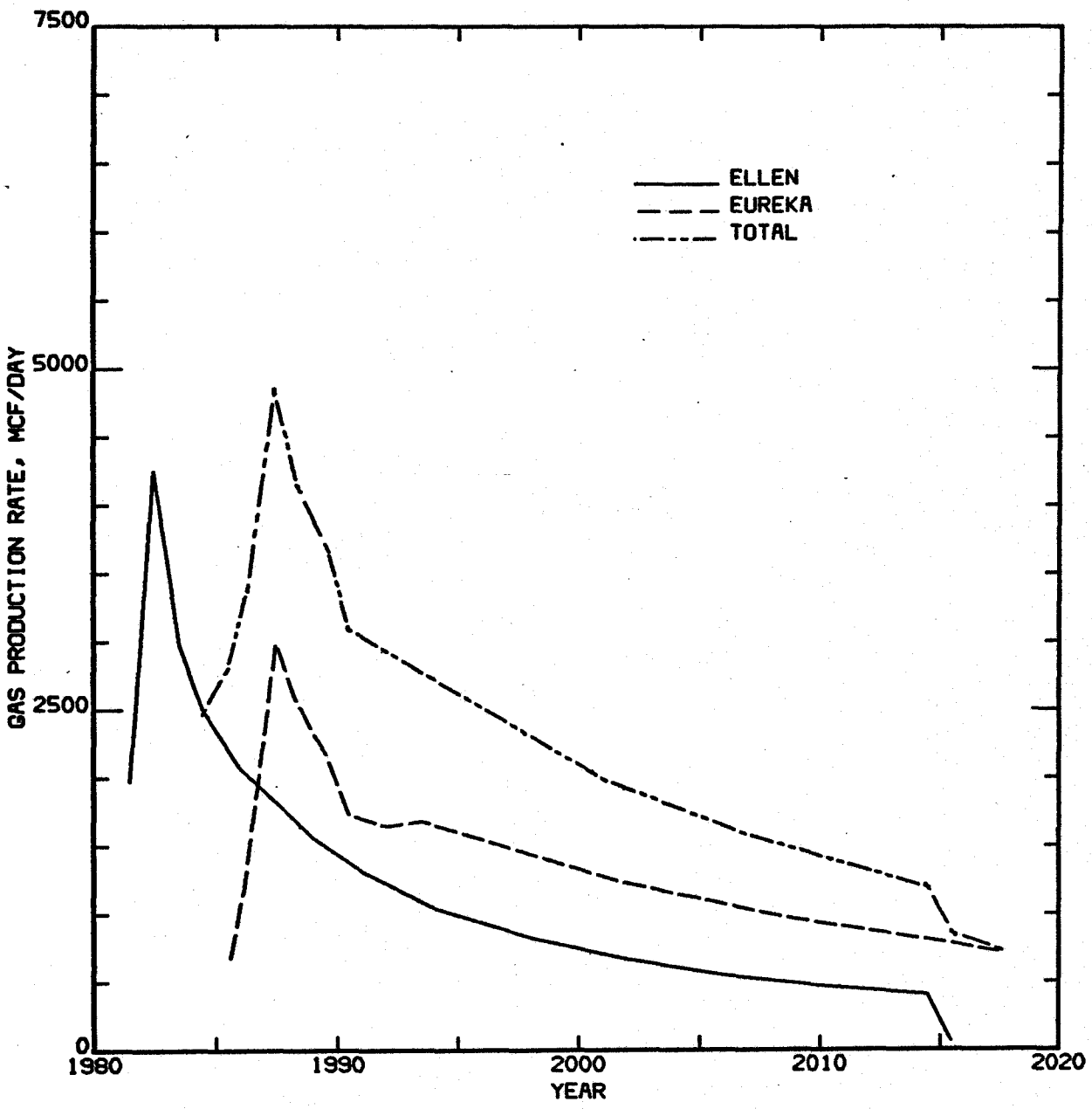
Production/Injection Forecast Platform Eureka

FIGURE 1-3



Production/Injection Forecast Platforms Ellen and Eureka

FIGURE 1-4



SCPI Gas Production Forecast Platforms Ellen and Eureka

FIGURE 1-5

SECTION 2

GEOLOGIC SETTING

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SECTION 2
GEOLOGIC SETTING

2.1 INTRODUCTION

The area of planned development is located on the northeast shelf and slope of the San Pedro Basin in the offshore portion of the Peninsular Ranges Geomorphic Province, as shown on Figure 2-1. Major structural features in the vicinity are the northwest-trending Palos Verdes and Newport-Inglewood fault zones. These zones consist of throughgoing strike-slip faults with components of vertical offset and numerous secondary faults and folds that are typical of the structural style of the region.

Oil is currently produced from accumulations in folded structures associated with the Palos Verdes and Newport-Inglewood fault zones both onshore and offshore in San Pedro Bay. SCPI et al. at Beta are presently developing an accumulation in a faulted anticline along the Palos Verdes fault zone within the Wilmington graben, as seen on Figure 2-2. The platform sites are near the modern shelf edge in an area between the Palos Verdes fault zone and the San Gabriel submarine valley. Water depths in the project area are between 250 and 1000 feet (76 and 305 m). Details of the geology of San Pedro Bay and vicinity are discussed in reports by Junger and Wagner (1977), Green (1976), and Vedder et al. (1969).

2.2 AREA GEOLOGY

Sedimentary strata in the area of development range in age from lower Miocene to Holocene. The section is predominantly interbedded turbidite sands and deep-water marine shales. The uppermost units of late Pleistocene and Holocene age include shallow water marine shale and fluvial-marine sand- and gravel-filled channel deposits. Basement rocks are blueschist and metamorphosed quartz diorite. Stratigraphic relationships of major units are illustrated in Figure 2-3 (cross section designation B-B' seen on Figure 2-3 can be located on Figure 2-5). Quaternary stratigraphy is shown in Figure 2-4 and described in detail in reports by MESA[2], Inc. ((1979, 1980, 1984a,b).

Structural closure for the oil accumulation is provided by a northwest-trending anticline in Miocene and Pliocene strata on the southwest flank of the Wilmington graben. The anticline is truncated on the southwest by a main branch of the Palos Verdes fault zone. Secondary faults with small displacements divide the structure into several blocks.

2.3 DEVELOPMENT GEOLOGY

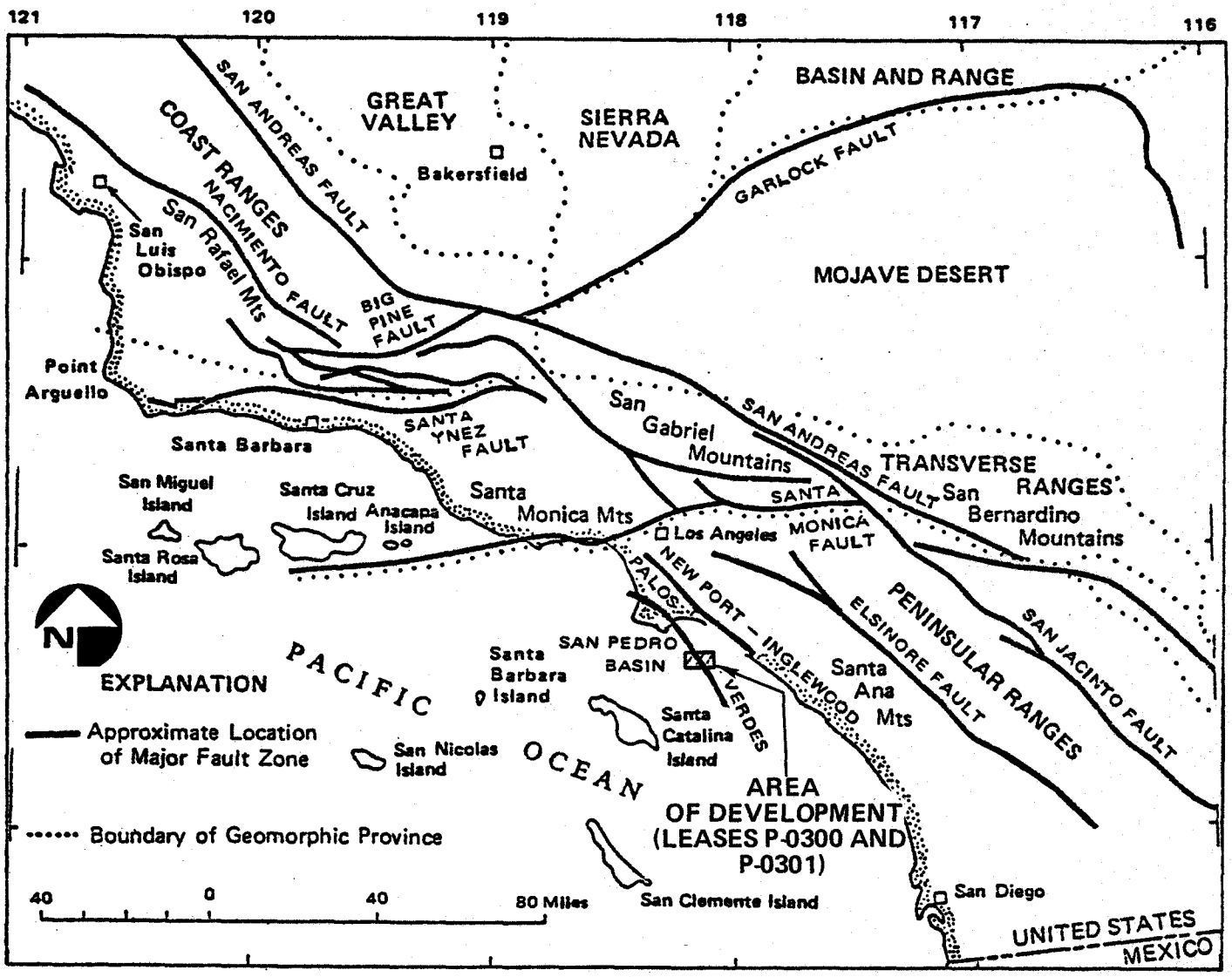
Shell Oil Company, as the initial operator for the proposed Beta Unit, submitted a Plan of Development dated October 1977 to the Department of the Interior. Shell was directed to expeditiously develop and produce reservoirs underlying Leases OCS P-0300 and P-0301 by the Assistant Secretary - Energy and Minerals, by letter dated December 10, 1979.

Shell California Production Inc., a subsidiary of Shell Oil Company, has proceeded with this development. As of the end of December 1983, 56 wells had been drilled. This total consists of 35 producers, 9 water injectors, 2 water source wells, 2 gas injection wells, 1 disposal well, 1 production testing well, and 6 dry holes. Producers will be converted to water injectors as needed. Development drilling is continuing with one rig currently in operation on Platform Ellen.

Figure 2-5 shows SCPI's present interpretation of the productive area in the field. This is essentially the same as that shown in the 1977 Plan of Development. To date, all development wells from drilling Platform Ellen have been completed east of the Palo Verdes fault zone. West of the fault, one dry hole and two water source wells have been completed. Confirmation of the productive area by developmental drilling has confirmed the need for the proposed second drilling platform.

Figure 2-5 also shows the 15-acre (6 ha) well spacing pattern extended through this potential productive area. Fifty-nine development locations and one exploratory site (for Chevron's Lease P-0306) for Eureka are shown. Some of the locations might be modified slightly as necessary to fit the geology. The objective sandstone zones lie within the approximate depth interval 3000 to 5000 feet (914 to 1524 m) true vertical.

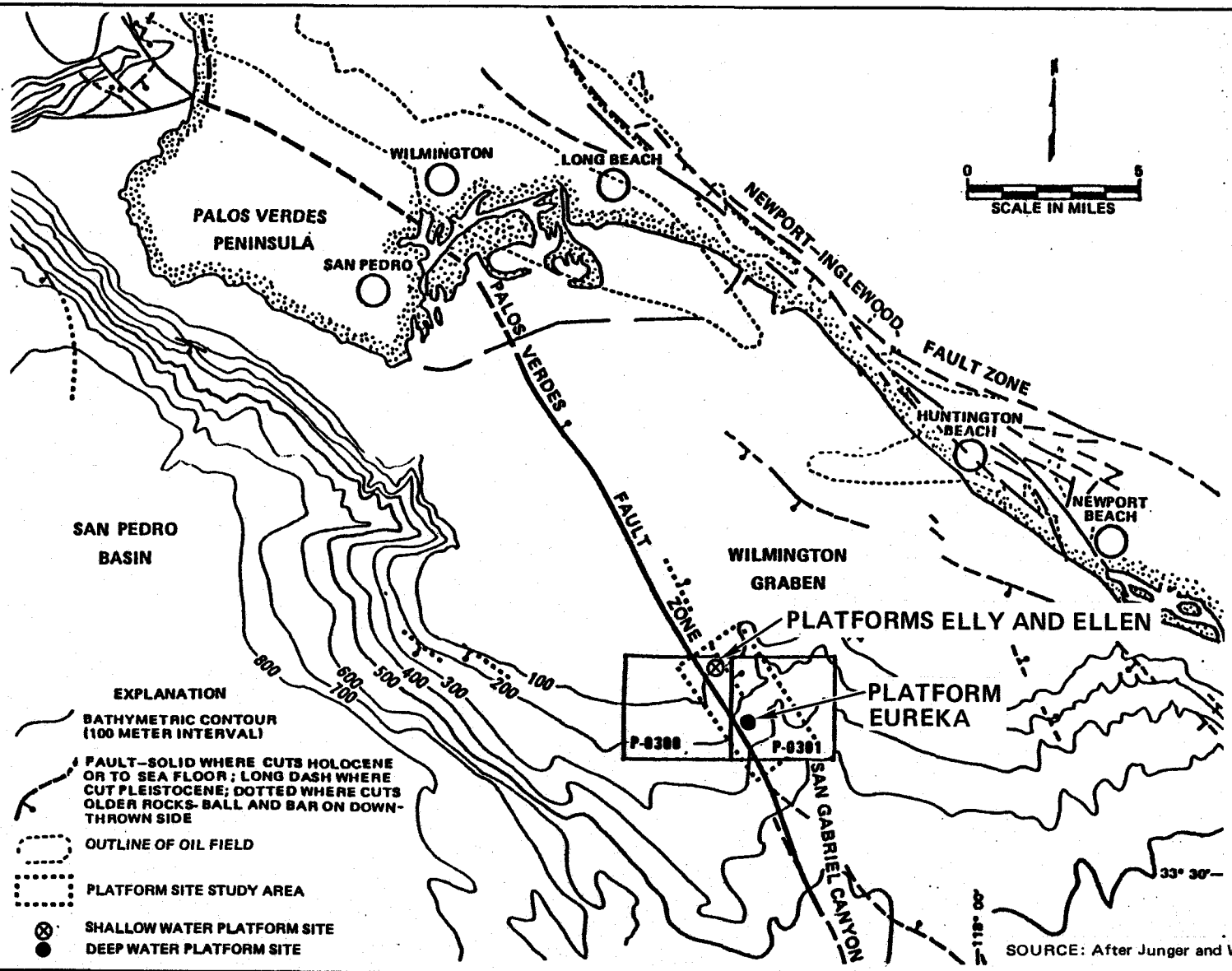
Concerning the plan for Platform Eureka, cross section A-A' (Figure 2-6) lies at the northern limit of the area to be developed from this platform (cross section locations are shown on Figure 2-5). The section shows the seven productive sandstone zones of the Miocene Delmontian (A, B, C, D, E, F, and F_4) which are the objectives of SCPI's drilling. Figure 2-7 shows a cross section (C-C') perpendicular to the A-A' cross section.



SOURCE: Modified from Yerkes and Others (1965)

Development Area, Fault Zones, and Boundaries of Geomorphic Provinces.

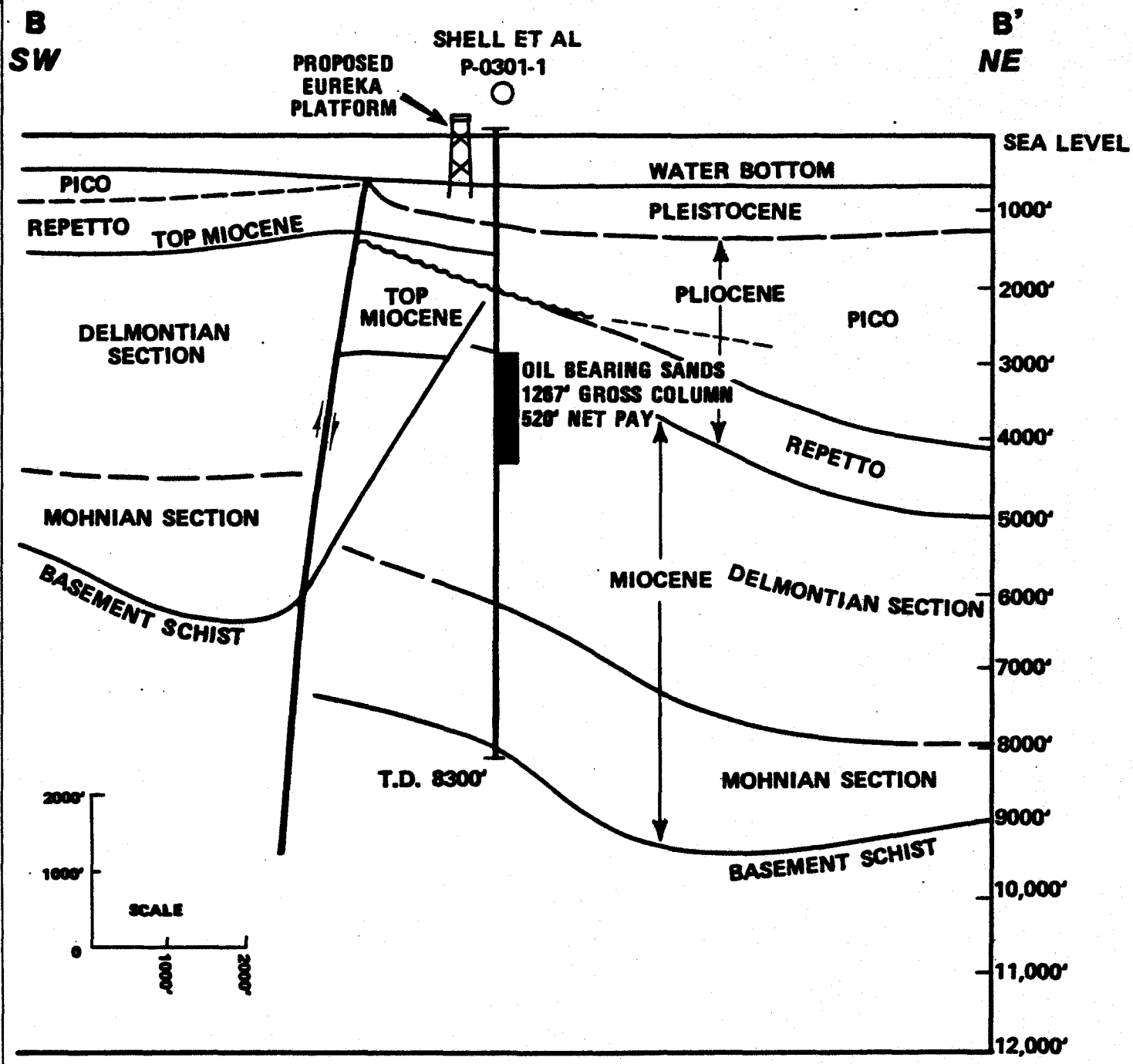
FIGURE 2-1



SOURCE: After Junger and Wagner (1977).

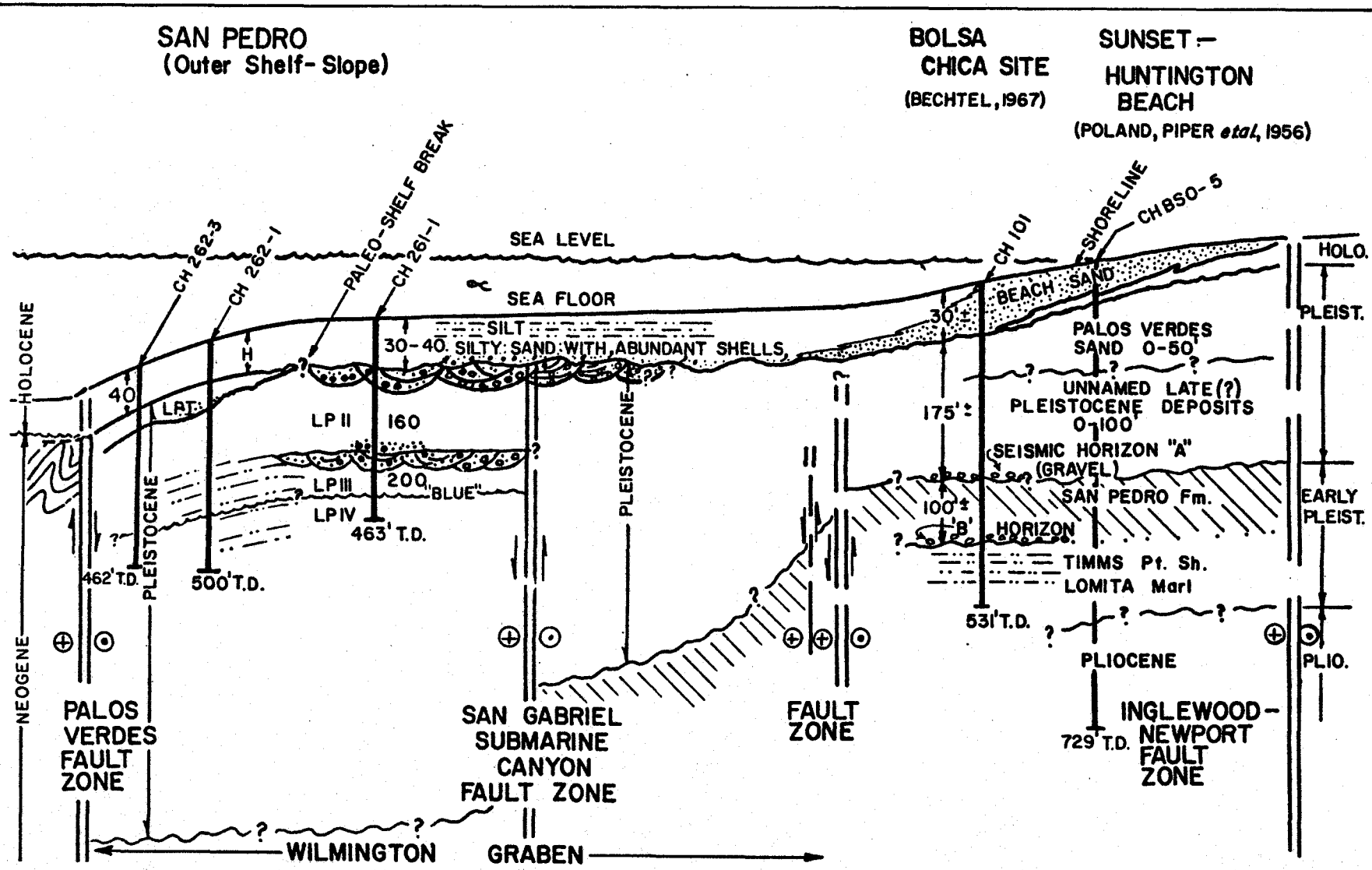
Location Map of San Pedro Bay and Vicinity Showing Structural and Geographic Features.

FIGURE 2-2



Schematic Geologic Section Beta Field

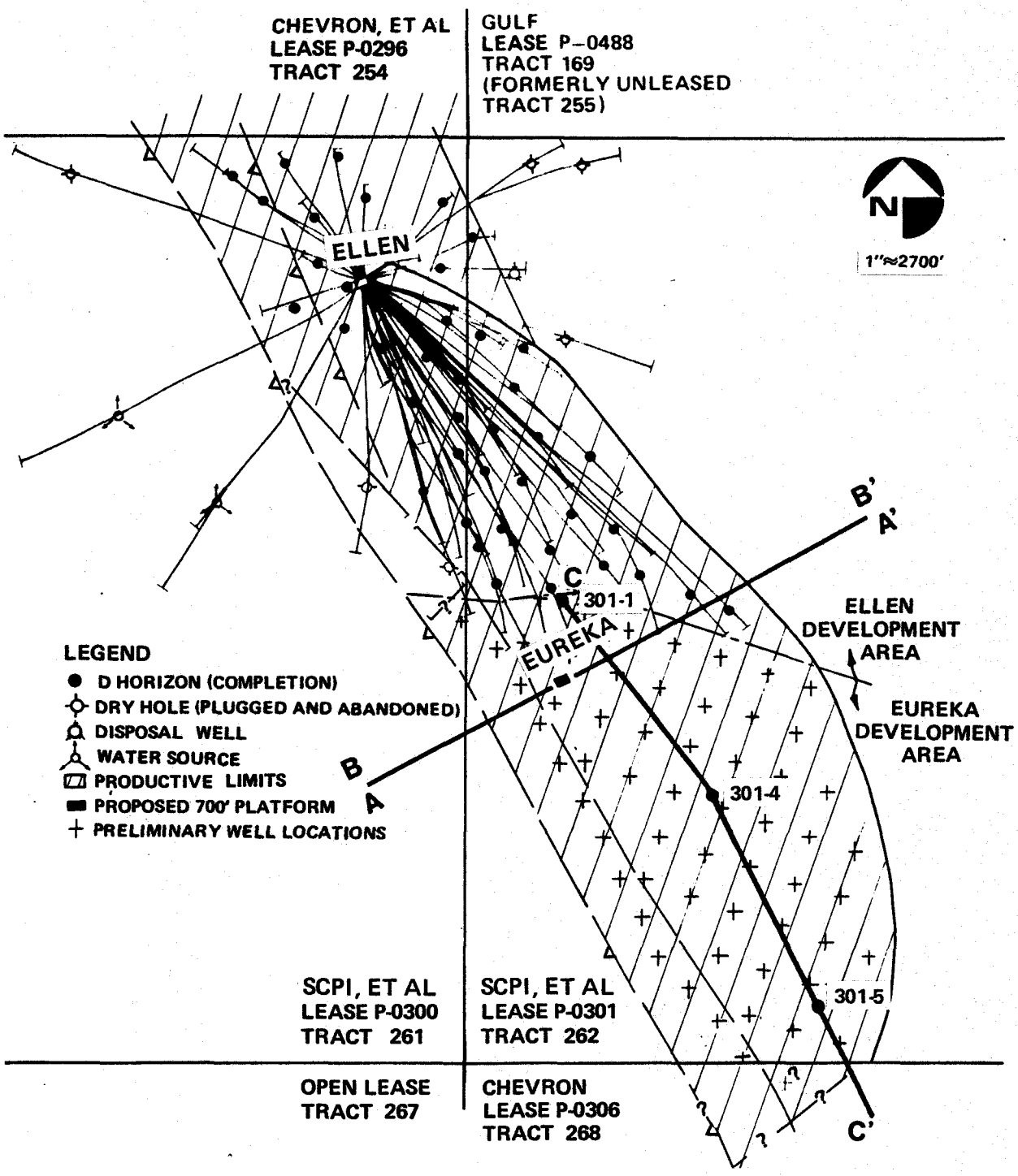
FIGURE 2-3



SOURCE: (JUNGER and WAGNER, 1977)
MESA^2 Inc., 1980

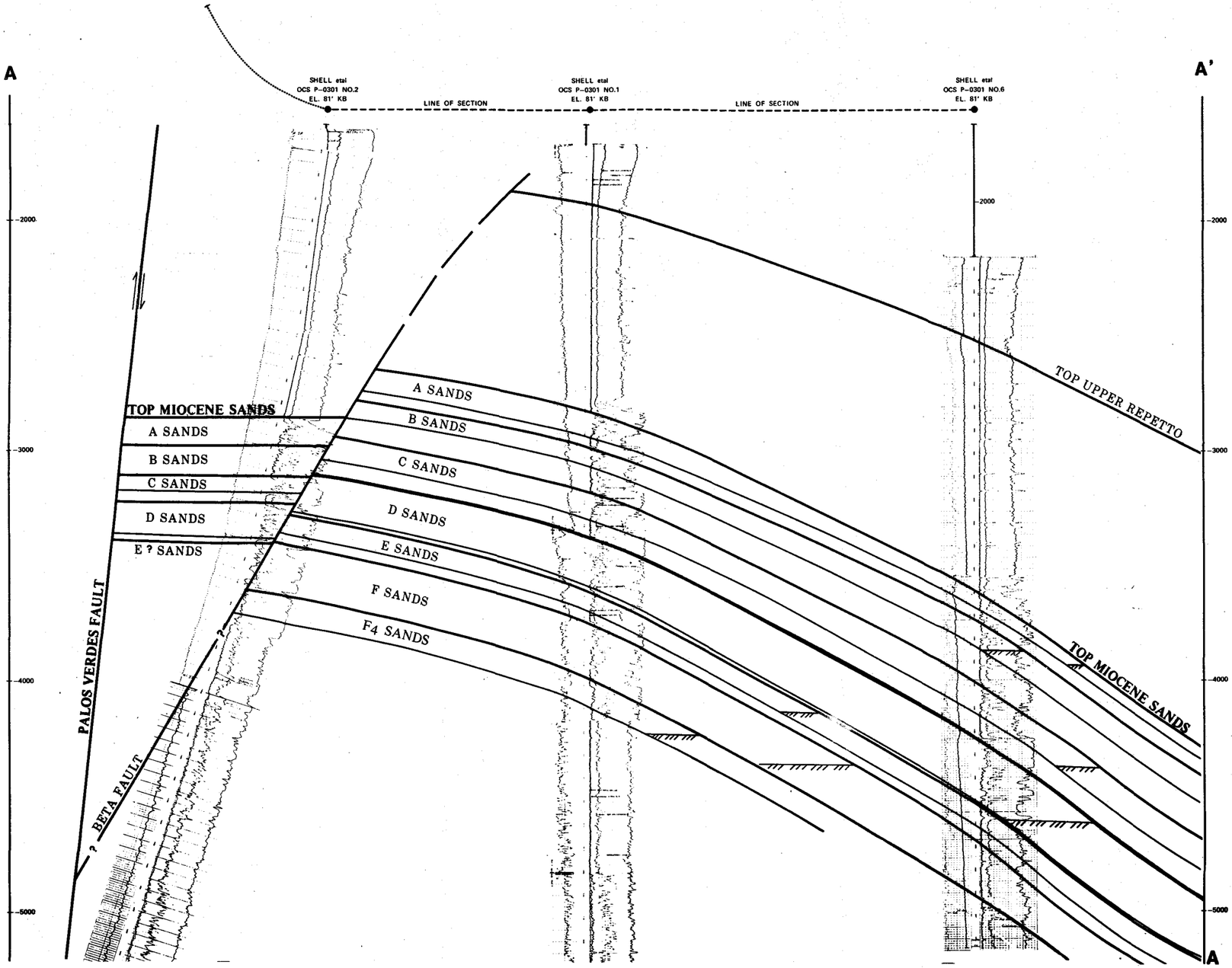
Quaternary Stratigraphy

FIGURE 2-4



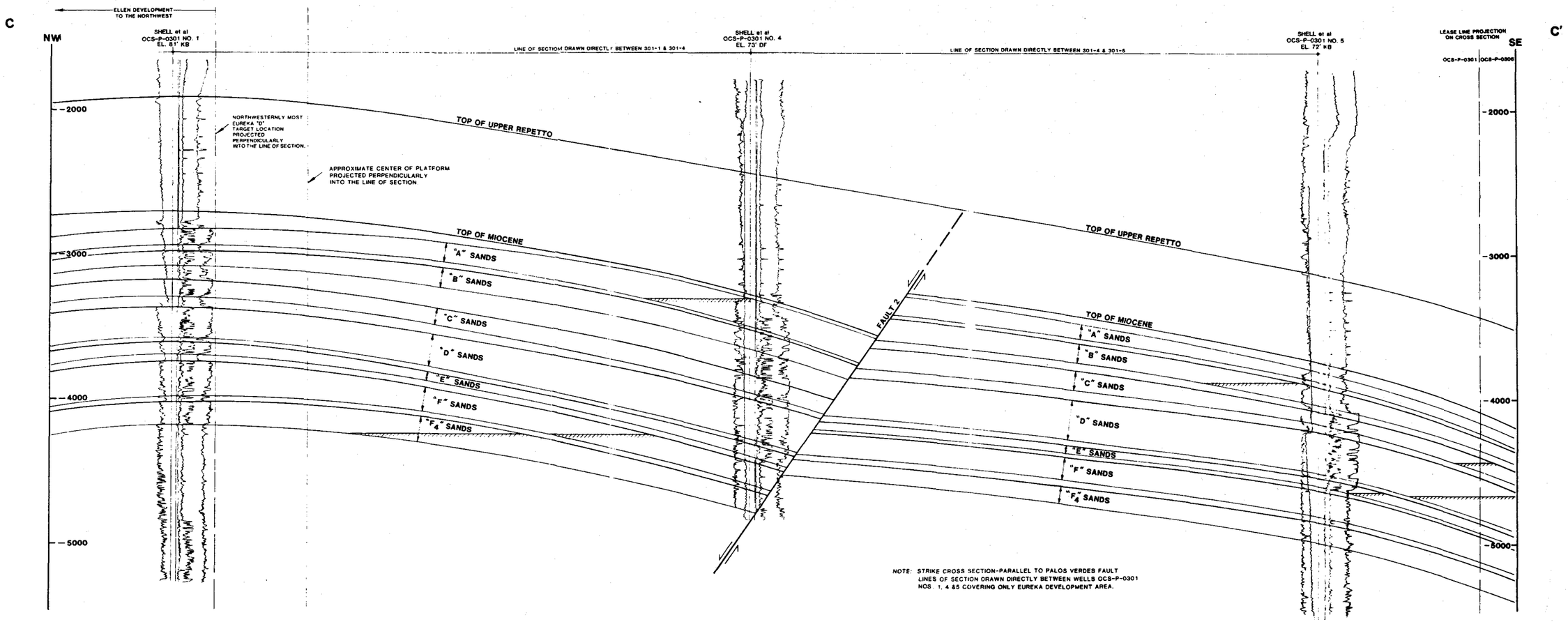
Eureka Development Well Pattern and Productive Limits Map

FIGURE 2-5



Cross-Section A-A' Beta Development

FIGURE 2-6



Strick Dip Cross Section C to C'

FIGURE 2-7

SECTION 3

FIELD HISTORY AND RESERVOIR EVALUATION

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SECTION 3
FIELD HISTORY AND RESERVOIR EVALUATION

3.1 FIELD HISTORY

In December 1975 at lease sale #35, Shell and partners (Shell 50 percent, Oxy (now Petro-Lewis) 17 percent, Aminoil 16.5 percent, Santa Fe 12 percent and Hamilton Bros. 4.5 percent) acquired two tracts of land located 9 miles offshore of Huntington Beach. These leases contain most of the hydrocarbon accumulation that is the Beta Field. Chevron et al. acquired offsetting tracts containing the remainder of the accumulation.

In an effort to evaluate these tracts, Shell et al. drilled 8 exploratory wells in water depths ranging from 400-1000 feet (122-305 m), and Chevron et al. drilled 13 wells. In July 1976, Shell's first exploratory well encountered 520 feet (159 m) of net pay in late Miocene sands.

Development studies (based on data from exploratory wells) were undertaken to determine development feasibility and the optimum development plan. The final recommendations consisted of the following:

1. Drilling platform in 265 feet (81 m) of water with 80 slots (Ellen).
2. Production facilities platform in 255 feet (78 m) of water (Elly).
3. Drilling platform in 700 feet (213 m) of water with 60 slots (Eureka).
4. Sixteen inch clean oil pipeline to shore.
5. Two rigs on each drilling platform during development.
6. Implementation of a waterflood on a 5 spot, 15 acre spacing pattern.

Reservoir performance was modeled with a Shell numerical simulator, developed on data gathered from the exploration wells and modified as new geological and well performance data were obtained.

Drilling on Ellen started August 8, 1980. As of the end of December 1983, 56 locations have been drilled and are completed as follows:

No. of Wells	Status as of 12/31/83
35	Producing wells
1	Production testing well
9	Water injection wells
2	Gas injection wells
2	Water source wells
1	Disposal well
6	Dry holes
56	

The current production rate is 11,000 to 12,000 barrels of oil per day and 3500 to 4000 thousand cubic feet of gas per day with very little water.

Water injection began in October 1982. As documented in the Beta Field Plan of Development Main Fault Block Waterflood Amendment, the plan of development provides for reservoir pressure maintenance by injecting produced water and source water into selected wells. It is expected that the combination of converting the high gas/oil ratio wells to water injection wells and pressure maintenance through water injection procedures will reduce the Beta Field gas production rates such that during normal operations any production in excess of fuel requirements can be re-injected rather than flared. The waterflood will also increase the ultimate oil recovery efficiency.

In addition to the drilling activity the following events have occurred since the original EIR/EA on the Beta Field:

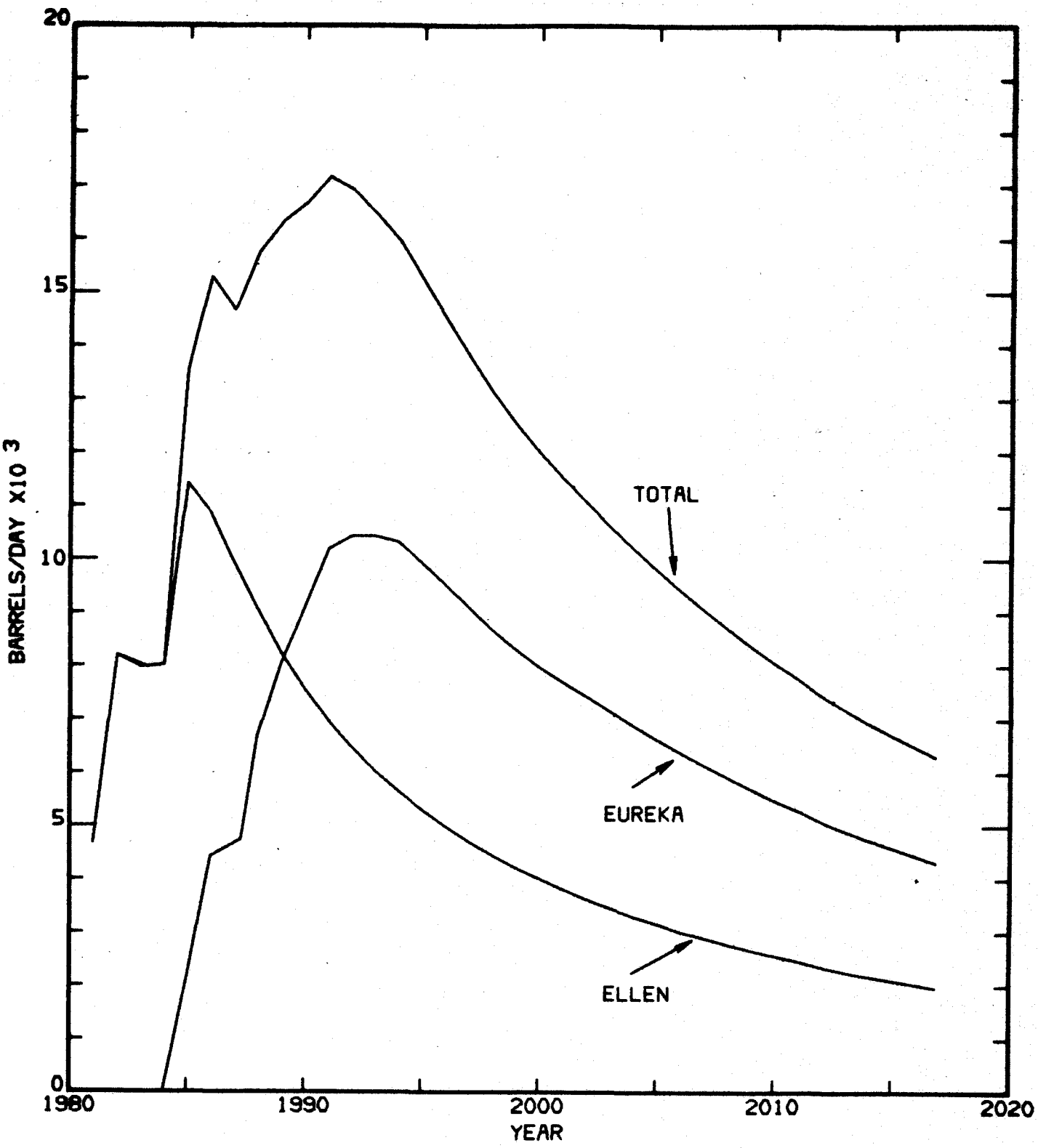
- Chevron USA has determined that development of OCS Lease P-0296 is justified, and their drilling Platform Edith has been installed.
- The Beta Field Unitization Agreement has been approved, with an effective date of April 15, 1983. Two suboperators have been designated: SCPI is the Beta unit operator, and operates platforms on Leases P-0300 and P-0301; Chevron U.S.A. is SCPI's designated agent to operate Lease P-0296.
- Former unleased Tract 255 was re-offered in a recent lease sale as Tract 169 and has been leased to Gulf Oil as OCS Lease P-0488.

3.2 ANTICIPATED PRODUCTION

The estimated peak oil production rate from Eureka is about 10,500 barrels per day (bpd) in 1992. The estimated peak oil production rate for both Eureka and Ellen is 17,200 bpd in 1991. Forecasts of production rates are shown in Figure 3-1.

3.3 DEVELOPMENT PLANS - PLATFORM EUREKA

Up to 60 wells can be drilled from Platform Eureka. This will provide for completion of the southern portion of the Beta reservoir based on an approximate 15-acre (6 ha) well spacing pattern and drilling up to a 72° maximum angle (see Figure 2-5). Well spot target location will be based upon all available geological and well performance data from wells drilled from Platform Ellen and experience from Platform Eureka as drilling and production progress.



Crude Production Forecast Platforms Ellen and Eureka

FIGURE 3-1

SECTION 4

PLATFORM STRUCTURE AND SITE

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SECTION 4
PLATFORM STRUCTURE AND SITE

4.1 INTRODUCTION

Complete development of the SCPI operated portion of the Beta Field will be accomplished with the addition of proposed drilling Platform Eureka, located southeast of the existing drilling and production Platforms Ellen and Elly. Eureka, as shown in the photograph provided as Figure 4-1, will be an eight leg jacket structure located in 700 feet (213 m) of water. The platform will have two deck levels each about 170 feet by 200 feet (52 m by 61 m), with space for 60 wells which will be drilled by one drilling rig. Production from the platform will be transferred through subsea field gathering pipelines and handled by existing production facilities on Platform Elly.

The Eureka platform is designed in accordance with MMS OCS Order No. 8 and API RP 2A to safely withstand the loads caused by installation, severe storm waves or earthquakes. The platform's main legs are framed with diagonal and horizontal bracing which provides a high level of redundancy and adds substantially to the structural integrity. The structure will be secured to the ocean bottom with 24 skirt piles situated near the four corners of the jacket. Special attention was paid to seismic design criteria and soil stability analysis. Further details on oceanographic criteria, platform analyses, fabrication and installation are summarized below.

4.2 GEOTECHNICAL CONSIDERATIONS

Detailed studies have been conducted on the geophysical, geotechnical and soil characteristics of the Eureka platform site and pipeline routes. Study results confirmed that the Eureka site is in a safe area. The studies include Woodward-Clyde (1979) and MESA^2, Inc. (1979, 1980, 1984a,b).

4.2.1 Bathymetry

The seafloor in the immediate area of the project site is essentially featureless and slopes to the southeast at about 3 degrees. Figure 4-2 depicts bathymetry in the project study area.

4.2.2 Soil Conditions

Three soil borings have been drilled in the vicinity of the site as shown on Figure 4-2. Boring 262-2 was drilled to 292 feet (89 m) below the mudline, 262-3 to 461.5 feet (141 m) and 262-3A to 84 feet (25 m). Detailed logs of these borings and results of static and dynamic (cyclic) laboratory test are given in Woodward-Clyde (1979). Briefly, the soils at the proposed platform site consist generally of a uniform, continuous layer of medium plasticity silty clay and clayey silt.

4.2.3 Slope Stability

In the study area, the slope has been determined to be stable (MESA[2], 1979, 1984a). There is no evidence of slumping or downslope movement in the strata at the project site. As indicated in the referenced reports, there is no reason to anticipate liquefaction or other ground instabilities in the vicinity of the proposed platform.

4.2.4 Erosion

Areas of active or potentially active erosion were identified by MESA[2] (1979, 1980, 1984a,b). Erosional flows are not a design hazard at the proposed platform site.

4.2.5 Faulting

As mapped on Figure 4-3, several well-defined faults are found in the project area. Although major faults in the platform vicinity display evidence of Holocene movement and are therefore considered to be active, they have been avoided by careful site selection and include appropriate setbacks (MESA[2], 1979, 1980, 1984a,b).

4.2.6 Earthquake Design Criteria

The location of the Beta Field within an area of recognized seismicity requires that all structures be designed to withstand the expected seismic groundshaking. The platform has been designed for a two-level design requirement as outlined in API RP 2A. For the Beta Field, these criteria are defined by Zone 4 and Soil Type C in API RP 2A.

For the first level earthquake criteria, the design peak horizontal mudline acceleration is 0.25g. The probability that the platform will experience this earthquake activity is about 0.005 per year - a 200 year recurrence interval. The platform will be designed to withstand first-level groundshaking without damage. All platform structural members will remain elastic.

The platform will also safely withstand the second level criteria, associated with a rare intense earthquake, without collapse. In this unlikely event, some structural members may experience inelastic deformation but the platform possesses the necessary ductility and redundancy to prevent collapse. Energy absorbed by the platform in this event is in excess of four times that generated by the first level criteria. At the Beta Field, the probability of an earthquake exceeding this criteria is less than 0.001 per year - a recurrence interval greater than 1000 years.

4.2.7 Subsidence

A 1 to 2 foot (0.3 to 0.6 m) per 100 year rate of natural subsidence is estimated between faults F2 and F4 in the project area (see Figure 4-3). The design of the

platform will accommodate this subsidence. The potential for surface subsidence due to reservoir fluid withdrawal is negligible. A pressure maintenance program using water injection will begin soon after the start of production and continue throughout the life of the field.

4.3 OCEANOGRAPHIC DESIGN CRITERIA

The proposed platform has been designed for severe storms having less than a 1 percent chance of exceedance in a given year. The design wave, wind, current, and tide criteria for the site are as follows:

Wave		
Maximum Height (Crest-Trough)	43	feet (13.1 m)
Period of Maximum Wave	11.5	seconds
Wind (5 second average; assumed in the wave direction; measured at +30 feet (9 m) elevation)	64	knots
Current (assumed in the wave direction)		
Surface	4.0	fps (1.2 mps)
Elevation - 20 feet (6.1 m)	4.0	fps (1.2 mps)
Elevation - 150 feet (45.7 m)	0	fps
Bottom	0	fps
Tide (including storm surge)	7.0	feet (2.1 m) above MLLW

These oceanographic design criteria were derived from studies by Evans Hamilton, Inc. (1976) and Shell Oil (1977, 1978, and 1980). Normal oceanographic/meteorological conditions were found to be favorable for operations.

4.4 CORROSION CONTROL

The platform will be protected from corrosion by coatings in the splash zone and above, and by cathodic protection below mean sea level. Also, an extra 3/4 inch (1.9 cm) of steel is provided in the splash zone for all braces and all legs.

The protective coating system is an established concept and employs standard materials used in accordance with conventional corrosion protection practices. It has been used successfully for over 10 years in the Gulf of Mexico. Two types of protective coatings are used:

1. Galvanizing applied to grating, ladders, cages and other difficult to paint hardware.
2. The exterior surfaces of the structure will be multi-coated from the minus 8-foot (2.4-m) elevation to the top of the structure with an

inorganic zinc-polyamide epoxy paint system. Additionally, "Splashtron" with CuNi wrap will be applied to all conductors from about elevation +5 feet (1.5 m) to minus 16 feet (4.8 m) to inhibit marine growth and protect conductors from corrosion.

A conventional sacrificial anode system will provide corrosion protection for the below-water portion of the platform. Aluminum anodes will be located throughout the structure as a function of the structure's surface area and project life.

4.5 SHIPPING LANES

While the planned location of Platform Eureka is within the Gulf of Santa Catalina Traffic Separation Scheme, it is clear of both traffic lanes and their buffer zones (see Figure 4-4). Navigation aids will be installed and maintained on the platform as required by the Coast Guard.

4.6 PLATFORM VISIBILITY

The painting of Platform Eureka will conform to the color scheme approved for Platforms Ellen and Elly. The color scheme, as approved by USGS letter dated February 12, 1979, is (see Figure 4-1):

Jacket up to lower deck - yellow

Deck Structures, Rigs, Quarters, other facilities - white

4.7 CULTURAL RESOURCES

A cultural resource assessment has been completed covering the proposed Beta intrafield pipeline route, Eureka platform site and adjacent areas which could be affected by project construction or operation activities (MESA^2, 1984c). A number of features of possible cultural origin were found in the survey area, and are believed to be primarily debris from recent oil exploration and production activities or modern maritime operations.

One feature of undetermined significance (referenced as Feature A in the cultural resource report) was encountered approximately 5000 feet (1524 m) southerly of the Platform Eureka site in a water depth of 825 feet (251 m). This feature consists of six major linear and possibly cylindrical elements, each 114 to 131 feet (35 to 40 m) in length and 7 feet (2.1 m) high. Until the precise nature of Feature A can be determined, it will be avoided by all activities related to the proposed project. No other features noted in the study area appear to be of cultural significance (MESA^2, 1984c).

4.8 PLATFORM ANALYSIS

The proposed platform structure has been designed for the appropriate combination of environmental conditions, operational loads, gravity, buoyancy, and hydrostatic pressure associated with fabrication, transportation, installation, and use at the

proposed offshore location. Analytically determined member stresses are limited to the allowable stresses and other design limitations set forth in API RP 2A.

The design wave condition was analyzed utilizing two three-dimensional computer programs. The dynamic response characteristics of the structure under random, multi-directional seas corresponding to the design wave were determined for a simplified model of the structure. Static force patterns were developed that approximated the dynamic loading and resulted in the required base shear and overturning moment. These forces were used in a static analysis of the detailed structure that included the effects of the nonlinear load-deflection characteristics of the soil.

The earthquake analyses were performed utilizing two dynamic response computer programs. The platform was analyzed using scaled recorded time histories, artificial time histories and the response spectra as given in API RP 2A for Zone 4 and soil type C. The structure was designed for the elastic level earthquake (0.25 g peak mudline acceleration) using a three-dimensional finite element program capable of performing both time history and response spectrum analyses. Inelastic analyses were performed using a three-dimensional frame analysis program specifically developed for this type of application. Time histories of severe ground motion were input and the platform checked for the required ductility. These analyses included non-linear modeling of the structure-foundation system.

Load-out, tow, launch and installation of the platform were also analyzed and all members designed for these forces. Mudmats are designed to provide stability during installation before the pilings are fully installed.

4.9 FABRICATION AND INSTALLATION

A self-propelled crane ship will be mobilized to the Beta Field to install Platform Eureka and set or relocate various equipment components on Platforms Ellen, Elly and Eureka. The crane ship, measuring 676.5 x 121.5 feet x 50.7 feet (206.1 x 37 m x 15.4 m), will be equipped with a 1600 short ton (1451 metric ton) lift capacity crane, anchoring system and accommodations for approximately 200 construction personnel. The basic sequence of the installation work is described below. The entire installation phase is scheduled to be completed in approximately 80 days.

4.9.1 Platform Ellen

The crane ship will initially set up adjacent to Platform Ellen to remove one of the two drilling rigs. The drilling rig consists of four major packages - Substructure, Pump Package, Engine Package and Safe Welding Skid. The drilling rig components, weighing approximately 1500 tons (1360 metric tons), will be loaded onto a cargo barge

and transported to shore where modifications will be made to adapt the rig for Platform Eureka's use.

After the drilling rig is offloaded, several new packages will be installed on Platform Ellen. A Pipe-rack Package and Skid Adapter Panel will be installed to allow one drilling rig to service all the platform wells. A Beam Package with a recreation building will also be installed to cover an open area on the upper deck vacated by one of the previously removed rig packages. The new equipment added will weigh approximately 500 tons (453 metric tons), resulting in a lightening of Ellen by some 1000 tons.

4.9.2 Platform Elly

After making all the Platform Ellen lifts, the crane ship will move to Platform Elly and set Generator Station No. 2. Generator Station No. 2, weighing approximately 850 tons (770 metric tons), will be transported on a cargo barge from the fabrication site in San Diego, California. In conjunction with installing this station, the Elly deck will be modified and locally strengthened.

4.9.3 Platform Eureka

The next phase of the installation program involves installation of Platform Eureka. The sequence of this work is described below (also see Figure 1-2).

4.9.3.1 Jacket

The Eureka jacket, weighing aproximately 21,800 tons (19,635 metric tons), will be transported on a 600 foot x 155 foot x 38 foot (183 m x 47 m x 11 m) launch barge from the fabrication site in Vallejo, California to the Beta Field. Upon arrival, the launch barge will be positioned approximately 1 mile (1.6 km) south of the installation site where the seafastenings between jacket and barge will be removed. The launch barge will then be ballasted down at the stern and the jacket will be winched off the barge. The jacket is designed to launch into the water top end first over the stern of the launch barge. The jacket will then self upend to a near vertical position floating 25-40 feet (7.6-12.1 m) higher than its final installed elevation. Approximately three tugboats will be attached to the jacket to maneuver the structure to the final installation site. When the jacket is within 1000 feet (305 m) of the installation site, the crane ship will attach lines to the jacket to assist in the final positioning of the structure. The jacket will then be lowered to the seafloor by controlled flooding of the jacket legs and buoyancy tanks.

4.9.3.2 Piling

The 24 skirt piles, weighing approximately 5000 tons (4500 metric tons), will be transported to the installation site on a cargo barge from the fabrication site

near Morgan City, Louisiana on the Gulf Coast. The skirt piles are 60-inch (152.4-cm) diameter with single section lengths of 315-400 feet (96-122 m). The skirt piles will be stabbed into guides on the jacket by the crane ship and driven with above water steam hammers to a penetration of 225-320 feet (69-98 m) below the seafloor. When the piles are driven to final penetration, they will be grouted to the jacket to permanently affix the structure to the seafloor.

4.9.3.3 Structural Well Casing

The 60 strings of offshore installed structural well casing, weighing approximately 3050 tons (2700 metric tons), will be transported in sections to the installation site on a cargo barge from the fabrication site in Northern California. The structural casings are 24-inch (61 cm) diameter and will be driven by the crane ship to approximately 160 to 200 feet (49-61 m) below the seafloor.

4.9.3.4 Deck Sections

After the structural casings are driven to final penetration, the deck sections, on site after being transported to the installation site on a cargo barge from the fabrication near Morgan City, Louisiana, will be installed. The deck, weighing approximately 4000 tons (3600 metric tons), will be lifted in four sections and stabbed onto the legs of the jacket. Structural splices between the deck sections will then be installed prior to setting the Rig 2 modules and new quarters on top of the deck.

4.9.3.5 Drilling Rig and Modules

The drilling rig (Rig 2) previously offloaded from Platform Ellen will be set on the Eureka deck once structural splices between deck sections are complete. Several new modules, which include a Pipe-rack, Skid Base, Cement Tanks, Flare Boom and Living Quarters, will also be set on the Eureka deck. This equipment will weigh approximately 2800 tons (2500 metric tons).

4.9.3.6 Supply Boat Mooring System

A mooring system consisting of an anchor with chain running up to a crown buoy will be installed southeast of Platform Eureka to allow supply boats to hold station during loading/unloading of drilling supplies. This system will be installed upon completion of the platform installation phase.

4.10 HOOK-UP

Hook-Up is the interconnection of structure, piping, wiring, instrumentation, and equipment which (1) cross the splices between the deck sections; (2) connect field installed equipment modules together and to the deck; and (3) connect the jacket (subsea portion of platform) to the deck. This construction phase will begin immediately

after the installation phase ends. The work on Elly involves connecting the new generator station module. The work on Ellen involves connecting the new pipe-rack and beam package modules and modifications to allow one rig to service both well bays. The work on Eureka involves connecting the four deck sections, the quarters building module, the Rig 2 modules, and the jacket. Hook-up is scheduled to end May 1, 1985. Precommissioning, testing, and start-up procedures for the drilling rig and facilities will be conducted during the final 2 months of hook-up.

4.11 PLATFORM REMOVAL

Following the depletion of all producing zones developed from the platforms, the site will be cleared in accordance with permit requirements.

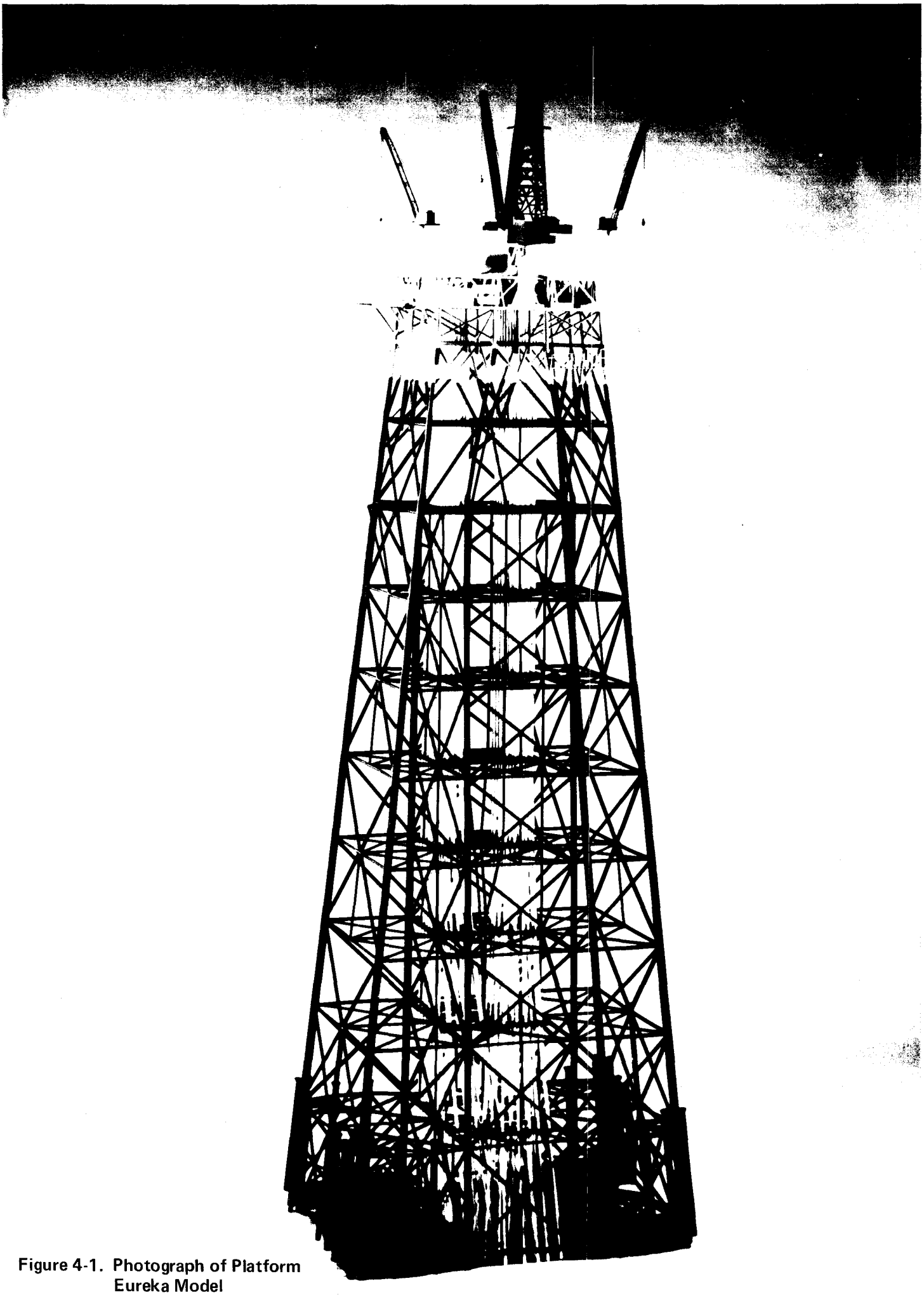
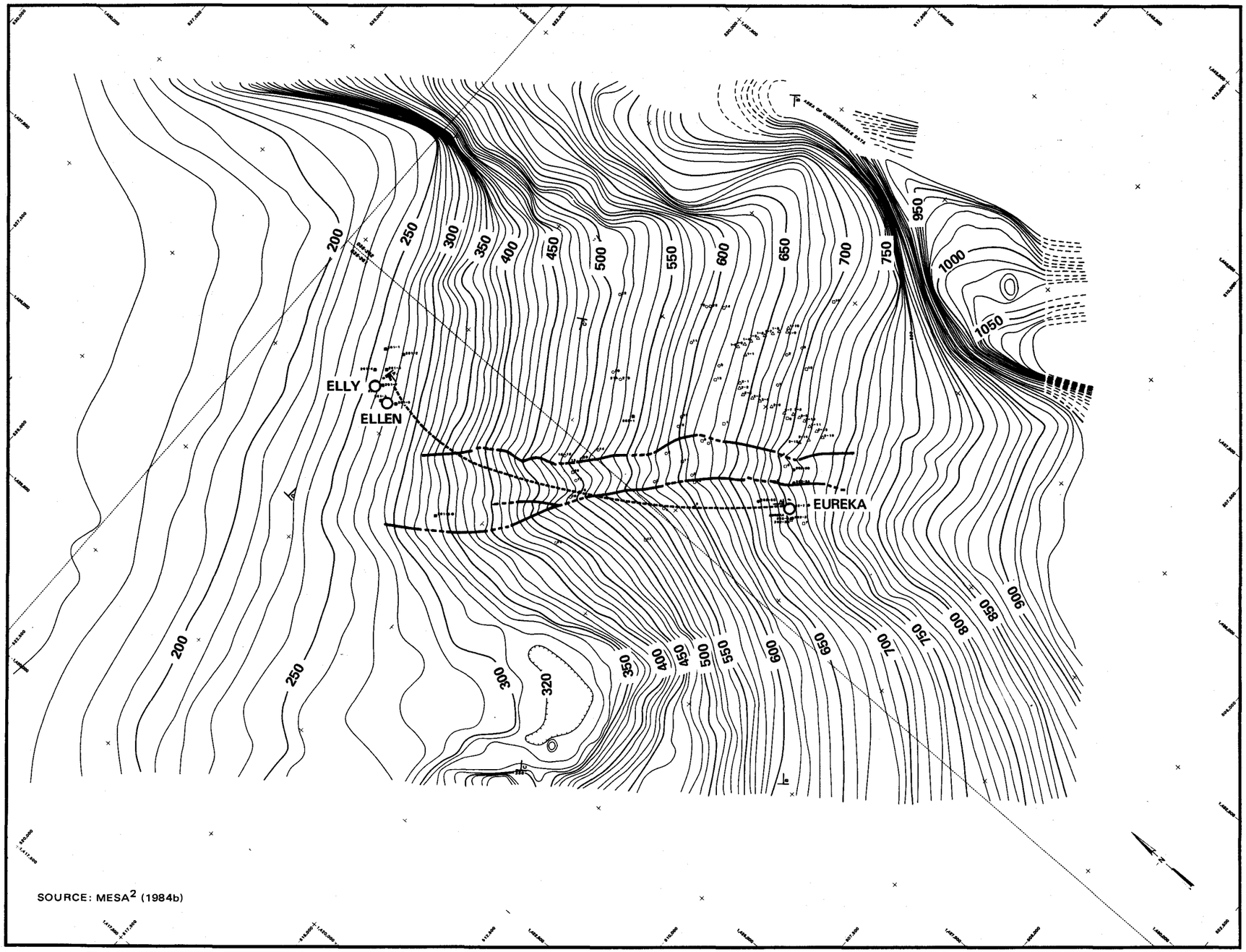


Figure 4-1. Photograph of Platform Eureka Model



EXPLANATION:

EXPLANATION FOR DATA BASE

- Lambert grid intersection, Zone 6
- Federal lease block boundary
- Proposed/existing platform location
- Proposed pipeline route

SAMPLE LOCATIONS

- Borings (Woodward-Clyde)
- Dart cores (Woodward-Clyde)
- Box cores (CSUN/MESA^2)
- Dart cores (CSUN/MESA^2)
- Bottom Photo (CSUN-MESA^2)
- Axis of Slope Gully

N

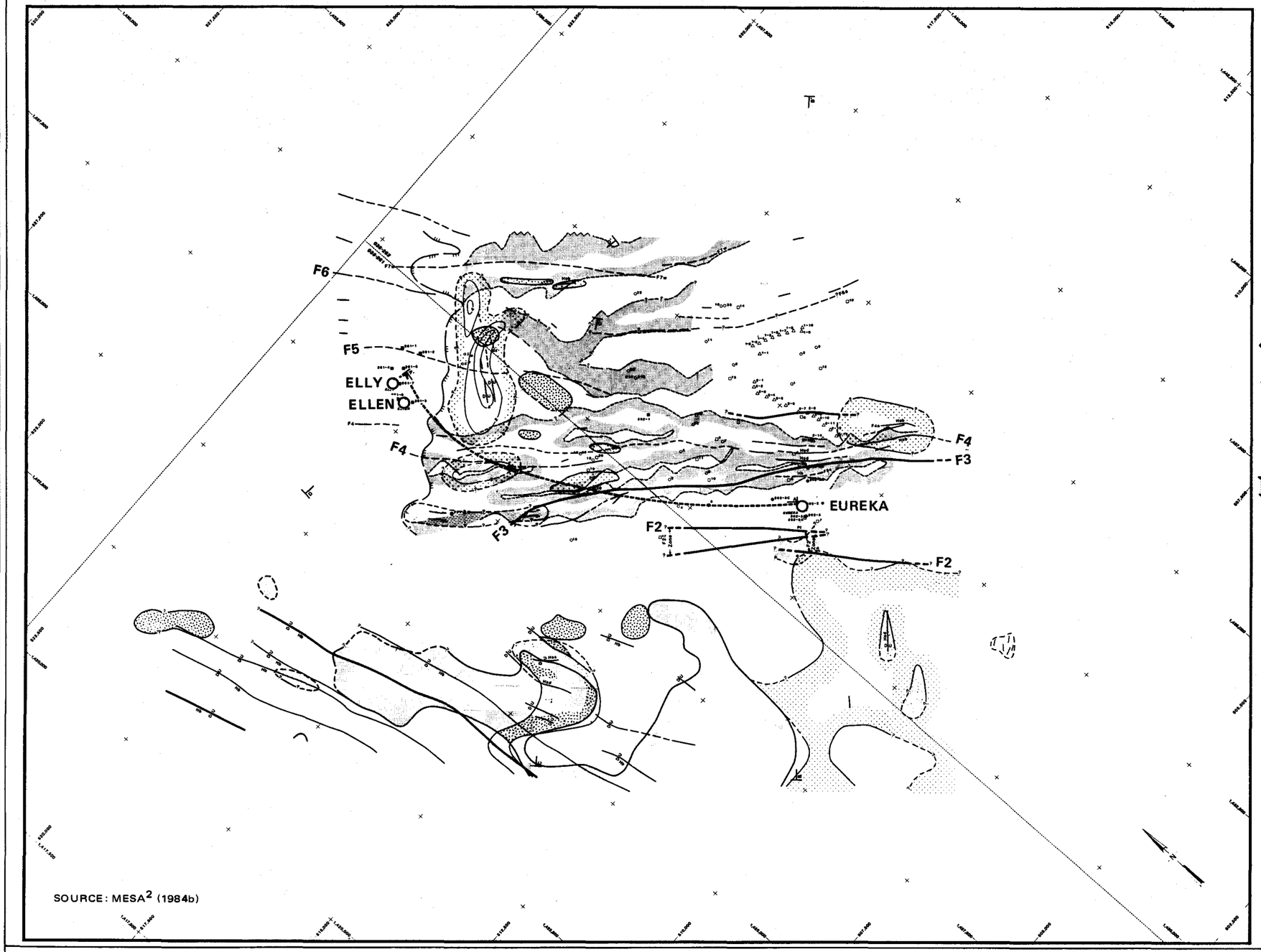
0 1000 2000

FEET

(1" = 2000')

Bathymetry Map

FIGURE 4-2



EXPLANATION:

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- Lambert grid intersection, Zone 6
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SAMPLE LOCATIONS

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- Dart cores (Woodward–Clyde)
- Box cores (CSUN/MESA^2)
- Dart cores (CSUN/MESA^2)
- Bottom Photo (CSUN–MESA^2)

Major faults: dashed where uncertain, queried where questionable.

Minor fault: dashed where uncertain, queried where questionable.

Hb Fault breaks base of Holocene.
Hsb Fault creates surface bulge.
Hsd Fault creates surface depression
Hss Fault creates surface scarp
Pl Fault breaks undifferentiated Pleistocene strata

Paleo channels

Topographic anomaly. Contour interval 2 feet. Shading indicates area greater than 2 feet. • Indicates location of selected anomalous values (in feet).

Topographic depression

Bedrock outcrop

Rough seafloor

Submarine slide

Seep area

Cultural feature (?) ~~~ indicates feature on ocean floor

N

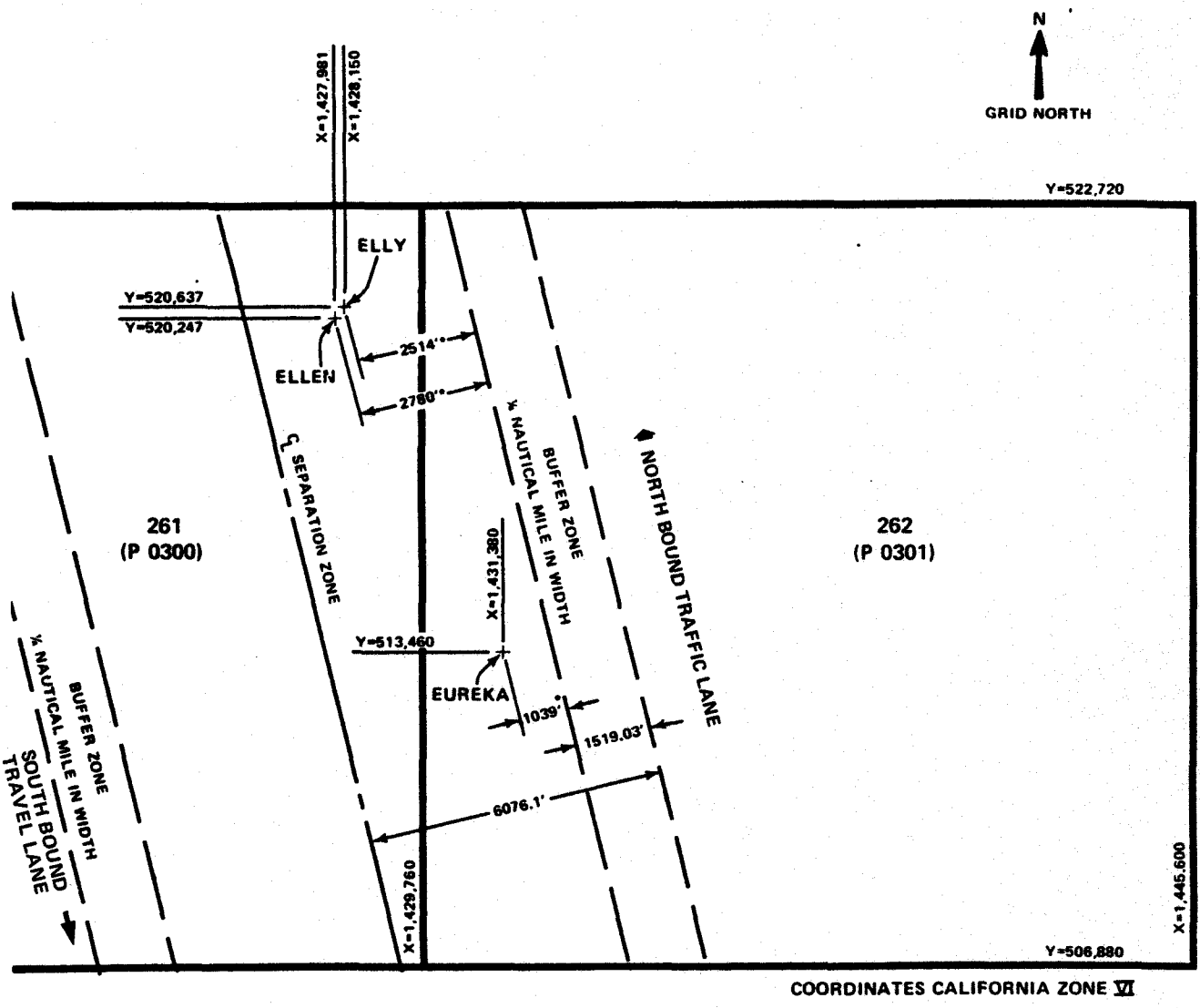
0 1000 2000

FEET

(1" = 2000')

Geologic Design Map Showing Potential Hazard Anomalies

FIGURE 4.3



*NOTE: DISTANCES ARE FROM CENTER OF PLATFORM TO BUFFER ZONE. SUBTRACT APPROX. 100' TO DETERMINE UNOBSTRUCTED DISTANCE.

Location of Beta Unit Platforms/Traffic Separation Scheme

FIGURE 4-4

SECTION 5

DRILLING FACILITIES

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DRILLING FACILITIES

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SECTION 5
DRILLING FACILITIES

5.1 INTRODUCTION

Platform Eureka will have slots for a maximum of 60 wells. One API platform-type drilling rig and associated crew and services will be required to drill the wells. The rig will be taken from Platform Ellen, modified on shore, and installed on Eureka. One rig will remain on Ellen.

Drilling operations, testing, training, pollution prevention systems, and safety systems will be in accordance with OCS and EPA regulations and industry standards.

5.2 DRILLING RIG

5.2.1 General Layout

The Eureka drilling rig will consist of the following units: pump package, engine package, skid base, substructure, pipe-rack package and derrick. The living quarters, offices and heliport will be located on the main deck. A safe welding skid will be atop the engine package. The top of the pump package and pipe-rack package will serve as the pipe racks and support the platform cranes. Rig package and equipment layouts are shown on Shell Oil Company drawings 3000-M-001 and 3000-M-003 (Figures 5-1 and 5-2). Additional cementing and completion fluid equipment are illustrated on drawing 3000-M-007 (Figure 6-3) at the end of Section 6 of this report.

5.2.2 Structure

The substructure will house the following main drilling equipment.

1. Drawworks - 2000 hp (2028 metric hp) electrically powered.
2. Rotary Table - 1000 hp (1014 metric hp) independently electrically powered.
3. Hook, Traveling Block and Crown Block, 350+ ton (317 metric ton) load rated capacity.
4. Drill Pipe - 5 inch (12.7 cm), 19.50#, Grade G-105.

The platform-type derrick, 147 feet (44.8 m) high with 1,400,000 pound (635,029 kg) API gross nominal capacity will be on top of the substructure.

The substructure will be supported on a skid base, which will rest on two elevated deck skid beams. The skid base will be equipped with a hydraulic jacking system to transport it along the platform deck beams. The substructure will be transported across the skid base by the same type jacking system.

5.2.3 Drilling Mud System

The rig will be equipped with two 1000 hp (1014 metric hp) mud pumps, a mud slugging tank, three active tanks, a reserve tank and a gel tank. In addition, a completion fluid system will be provided. The completion fluid will be used for all underreaming or perforating through the pay interval, for gravel packing operations and for well workovers.

A low solids, gas free mud will be maintained using shale shakers, desanders, desilters and a degasser. A cuttings wash system will handle any oil-contaminated cuttings for disposal. Cuttings that cannot be adequately cleaned will be diverted to the waste cuttings bin to be hauled ashore for appropriate disposal.

Mud volumes will be closely monitored using a pit volume totalizer system, an incremental flowrate indicator, and a precision fill-up measurement system. These warning systems will have visual and audible alarm signals at the driller's console. A bulk material handling system will be provided for barite. Other mud and completion fluid additives (chemicals, lost circulation material, gravel, etc.) will be palletized.

5.2.4 Rig Power

The drilling rig moved from Ellen will be powered by three 800 kW diesel powered generators, housed in its engine package. The production facility's power system (on Elly) will also serve as a backup power source for essential services via the 35 kV submarine cables. Backup power is also available from the 400 kW Rig 2 standby generator.

5.2.5 Cementing Units

Two diesel powered cementing units and four 1000 cubic feet (28 cubic m) bulk storage tanks will be provided for well cementing operations. One of the cementing units, when combined with a blender, will be used for gravel packing operations.

5.3 TYPICAL DRILLING PROGRAM

A description of a typical drilling program for Platform Eureka follows. The model well plan reflects established parameters determined through the drilling and testing of 21 exploratory wells on or through the Beta Field and 56 development wells from Platform Ellen.

5.3.1 Established Parameters

a. The oil API gravity ranges from 12° to 20°.

b. Reservoir temperature ranges from 140°F to 160°F (60°C to 71°C).

c. Reservoir pore pressure does not exceed a normal 0.465 psi/feet gradient. (Confirmed from bottom hole pressure readings on Platform Ellen.) The lightest oil (20° API gravity) has a 0.404 psi/feet gradient.

d. The bubble point of gas is at or below reservoir pressure and there is no gas cap in the field.

e. No H_2S was found in any production tests during the exploratory or development program.

f. No hydrocarbon accumulation of any kind was found above 2500 feet (762 m) subsea. The deepest hydrocarbons were found at 6000 feet (1828 m) subsea. No freshwater aquifers exist anywhere in the field.

g. The maximum expected surface pressure is 366 psi. Maximum surface pressure is the pore pressure minus the oil column pressure. (Tubing pressures on Platform Ellen vary from 0-500 psi surface pressure.) Although 20° oil was not found in the deepest hydrocarbon bearing zone, an absolute maximum surface pressure would be equal to the pore pressure gradient minus the oil gradient times the maximum depth of the hydrocarbon zone, i.e., (0.465-0.404) 6000 = 366 psi.

h. The expected fracture gradient on Platform Eureka is described in Figure 5-3. The fracture gradient curve was generated by conducting hydraulic fracture tests during the exploratory drilling phase of the field and during development on Platform Ellen (Figure 5-4).

5.3.2 Drilling Plan and Casing Program

Platform Eureka will be located in 700 feet (213 m) of water approximately 1.3 miles (2 km) south-southeast of Platform Ellen on Tract 262 in San Pedro Bay. The platform lower deck has a 43-foot (13-m) air gap; the rotary table will be at an elevation of 105+ feet (32 m). All vertical measurements are referenced from sea level. Platform Eureka will utilize 60 slots in which 24 of the 60 slots will be filled with straight conductors and the remaining 36 slots will be fitted with preinstalled curved conductors.

A 24-inch (61-cm) structural casing pipe will be driven between 160-200 feet (49-61 m) TVD below ocean floor or 860-900 feet (262-274 m) subsea. Experience on Platform Ellen indicated that conductor refusal occurred between 180 feet (55 m) and 200 feet (61 m) below the mudline. A similar occurrence is expected on Platform Eureka since soil conditions are similar.

If the structural casing cannot be driven deep enough to prevent loss circulation while drilling the surface hole, an 18-5/8-inch (47.4-cm) surface liner will be added to a depth ±300 feet (91 m) (TVD) below the mudline and cemented to the shoe of the 24-inch (60.9 cm) casing.

During the drilling of surface hole, a diverter system will be used. Use of the diverter will be contingent on experience during drilling. (Diverter use is explained in Section 5.3.7.1.)

If the drive pipe is deep enough to establish circulation or an 18-5/8-inch (47.4-cm) liner is in place, a 17-1/2-inch (45-cm) surface hole will be directionally drilled to a minimum of 1540 feet (469 m) TVD(SS) and a maximum of 2100 feet (640 m) (TVD(SS). With surface casing set at 1540 feet (469 m) TVD(SS), the well may be shut-in under worst conditions (wellbore full of 20° oil, surface pressure 366 psi). The minimum surface casing depth of 1540 feet (469 m) TVD was determined by extrapolating fracture data compiled on Platform Ellen (Figure 5-4) to Platform Eureka (Figure 5-3). The maximum surface casing depth is based on the need to obtain the necessary hole angle and direction in the surface hole.

The 13-5/8-inch (35-cm) surface casing will be cemented back to the ocean floor (700 feet (213 m) SS). The installation of the BOP system and the testing of the casing and BOP equipment will comply with Beta Field rules specification. A 12-1/4-inch (31-cm) hole will then be directionally drilled to TD. The wellbore through the production interval will not exceed 45 degrees to facilitate gravel packing when completing.

Upon reaching TD, the well will be evaluated as required. A 9-5/8-inch (24-cm) production casing will be run to surface and cemented from the shoe to the ocean floor.

5.3.3 Casing Design

Table 5-1 denotes the casing size, weight, grade, thread and design factors for Eureka oil wells. Figure 5-5 illustrates a typical Eureka oil well and casing profile. The design factors are based upon maximum loads encountered during the life of the well.

a. Tension is at a maximum at the top of the string where the topmost joint "feels" the tensile load from all the casing below, less the effect of buoyancy.

b. Collapse is at a maximum where casing is fully evacuated and an externally applied force generated by the pore pressure exists.

Worse conditions for collapse will generally take place at the bottom of the wellbore. Collapse will also be a function of the tensile load applied, such that higher tensile loads will decrease the collapse integrity. Conversely, compressional loads will increase the integrity of the collapse rating. The surface casing is designed under pump-off conditions leaving the casing evacuated to the submersible pump.

c. Burst criterion is based upon the maximum shut-in pressure encountered as described in Figure 5-3. With a 20° gravity oil column, the maximum surface pressure is 366 psi.

Table 5-1

CASING DESIGN

Interval (SS)TVD	Size (in)	Weight #/ft	Grade	Coupling	Minimum T (Tension)	Design C (Collapse)	Factor B (Burst)
860-1,000 feet	18-5/8 inch	87.5	K-55	BTC (liner)	61.3	1.3	6.2
Surface-2,100 feet	13-3/8 inch	54.5	K-55	BTC	9.2	2.0	7.3
Surface-4,200 feet	9-5/8 inch	36.0	K-55	BTC	3.7	1.0	9.6
4,200-6,000 feet	9-5/8 inch	40.0	K-55	BTC	4.1	1.1	10.1

5.3.4 Testing of Casing and BOP Assemblies

The testing of casing and BOP assemblies will be in accordance with Beta Field rules. The surface casing will be tested to 1000 psi and the production casing to 1500 psi. The annular preventer will be tested to 1000 psi, and all other BOP equipment will be tested to 1500 psi. All production casing will be inspected to ensure API specifications have been met.

5.3.5 Cement Program

All Eureka casing strings will be cemented from the shoe to the ocean floor with the possible exception of the 18-5/8-inch (47 cm) liner. All cement for surface

casing will consist of Class 'G' plus 40 percent silica flour. Cement for the production casing will consist of a 13.9 ppg lead slurry consisting of Class 'G', 40 percent silica flour, 1 percent CFR-2 (friction reducer), 3 percent prehydrated gel and 0.5 percent Hall 22A (water loss). The lead slurry will be followed by a 15.5 ppg tail slurry consisting of Class 'G', 40 percent silica flour, 1 percent CFR-2 and 0.5 percent Hall 22A. The tail slurry will cover the topmost productive interval plus 200 feet (61 m).

5.3.6 Mud Program

A seawater/fresh water prehydrated bentonite mud system will be used. The mud will comply with either EPA NPDES permit No. CA0110419 requirements (or if applicable, a General NPDES permit) for overboard discharge. Table 5-2 is a list of mud additives and concentrations that will be used. Mud weight will be maintained above 8.95 ppg (0.465 psi/feet).

5.3.7 Blow Out Prevention Systems

5.3.7.1 Diverter System

Diverter equipment will be used until one well has penetrated the three sectors shown on Figure 5-6. The intent of the plan is to sample locations within a maximum radius of 600 feet (183 m). The area of each sector was based upon expected location densities.

Regions to the west of Platform Eureka are expected to be single kick, low inclination wells. The area being sampled by drilling the surface hole is approximately 200 feet (61 m), significantly less than the maximum area of 600 feet (183 m). A larger region to the west is, therefore, suitable to establish the existence of shallow hazards.

Regions to the east of Platform Eureka are high inclination wells, approaching the 600-foot (183-m) radius of investigation. This larger area of investigation corresponds to a smaller sector due to greater well densities. In the event uncertainties still exist as to the presence of shallow hazards, SCPI will exercise the use of the diverter system.

Once it has been demonstrated that no shallow hazards exist, the use of the diverter will not be required. The diverter will consist of a Regan type KFDJ 500 psi system. A schematic is included as Figure 5-7.

5.3.7.2 BOP System

Figure 5-7 also shows the general arrangement of the BOP system. Starting at the wellhead, the BOP system consists of an extender spool rated at 3000 psi with clamp connections. This spool reaches to the main deck of the platform. Clamped to

Table 5-2

DRILLING MUD COMPONENTS

Principal Component	Trade Name[3]	Drilling Mud (lbs/bbl)
Bentonite	Aquagel	15
Lignosulfonate	QBII	2-6
Sodium Hydroxide	Caustic	2
Blend of Organic Esters	Torq Trim	2
Barite	Baroid	1
Organic Polymer	Dextrid	—
Polyanionic Cellulosic Polymer	Drispac	—[1]
Detergent	Condet	0.25
Sodium Carbonate	Soda Ash	0.10
Processed Lignite	Carbonox	5[2]
Surface-Active Dispersible Liquid Defoamer	Defoam	0.10
Causticized Lignite	CC-16	5[2]

[1] Rare usage

[2] One or the other

[3] Or equivalent

this spool is a choke with two flanged outlets for attachment of a choke line and a kill line. Above the choke spool is a double ram gate, Type U, Cameron BOP. The lower gate has drill pipe rams and the upper gate has blind rams. Above the ram gate preventer is a Hydril, Type GL, annular preventer. There is a minimum 13-5/8-inch (35-cm) bore through all of the above BOP assembly components. All components are rated 3000 psi, or greater.

From the choke spool kill line connection there are two manual gate valves (Cameron Type F), a check valve, and a line to the high pressure drilling fluid piping system. All valves have a flanged connection and all components are rated 3000 psi or greater. From the choke spool line connection there is a manual valve, hydraulically actuated valve, and then a line up to the choke assembly upstream header located on the rig floor.

A pressure gauge is located in the choke assembly upstream header. From this header the choke line flow can be directed through either of two manual chokes, or a by-pass line, or through all three at the same time. On both sides of each choke is an isolation valve to allow repairs to be made while the rest of the system is in operation. Downstream of the chokes and by-pass line, the flow can be directed either through a vertical gas separator and then to the active drilling fluid tank, or directly to the active drilling fluid tank.

All components of the kill line assembly and the choke assembly from the spool to the downstream choke valves are pressure rated at 3000 psi, minimum. In addition to the gauge on the choke upstream header there is a gauge on the wellhead for determining the annulus pressure. Other additional equipment includes kelly cock valves, inside BOP and a surface valve for the drill pipe. The inside BOP and surface valve are on the rig floor with easy access.

5.3.7.3 BOP Accumulator

The unit for operating the dual ram preventer, annular preventer and actuated valve is a 3000 psi working pressure, 175 gallon (662 l) accumulator that has an air and an electric charging pump. It is equipped with a nitrogen backup system large enough to close all of the BOP units simultaneously without going below a 1000 psi line pressure on these units. The 175 gallon (662 l) hydraulic accumulator has excess capacity to cycle (close and open) all of the BOP units without being recharged while maintaining a line pressure over 1000 psi. There is a master control station on the accumulator. There are two remote control stations. One is located on the rig floor and the other is in the Drilling Foreman's office.

5.3.8 Materials Requirements

A minimum of 800 sacks of barite, 300 sacks of gel and 85 sacks of caustic will be maintained on Platform Eureka at all times.

Sufficient mud and weighting will exist to raise the mud weight from 9 ppg to 10 ppg with a single active volume. Minimum onboard materials were based on the average well drilled off Platform Eureka. Table 5-3 shows the required materials needed to raise mud weight from 9 ppg to 10 ppg under maximum, average and minimum drilling cases.

The following assumptions were made to prepare the table:

1. Concentration of gel needed is 20#/bbl.
2. Concentration of caustic needed is 1#/bbl.
3. Concentration of barite needed is 56 sks/100 bbls.

Table 5-3

MATERIAL REQUIREMENTS

Interval	Casing	Total Active	Barite Needed 9-10 ppg	Gel 100/sks	Caustic 50/sks
Maximum Case					
0-400 feet	24 inch at 1,000 feet	1,652	925	330	99
4,000-12,000 feet	13-3/8 inch at 4,000 feet	1,982	1,110	396	119
Average Case					
0-3,200 feet	24 inch at 1,000 feet	1,414	792	283	85
3,260-8,000 feet	13-3/8 inch at 3,200 feet	1,194	667	239	72
Minimum Case					
0-2,800 feet	24 inch at 1,000 feet	1,296	726	259	78
2,800-6,000 feet	13-3/8 inch at 2,800 feet	1,099	615	220	66

5.3.9 Drilling Rig Drainage

Once through non-contact cooling water, cement, treated domestic wastes, oil free cuttings, mud and completion fluids will be discharged directly overboard. All equipment drip pans and hydrocarbons drains will be routed to the platform oil and water sumps. A mud sump will process oily well return fluids drained from the mud

pits. An application for a National Pollutant Discharge Elimination System Permit to discharge pollutants will be submitted to the United States Environmental Protection Agency to cover discharges from the platform unless an NPDES General Permit is in effect and applicable to Eureka.

5.3.10 Safety

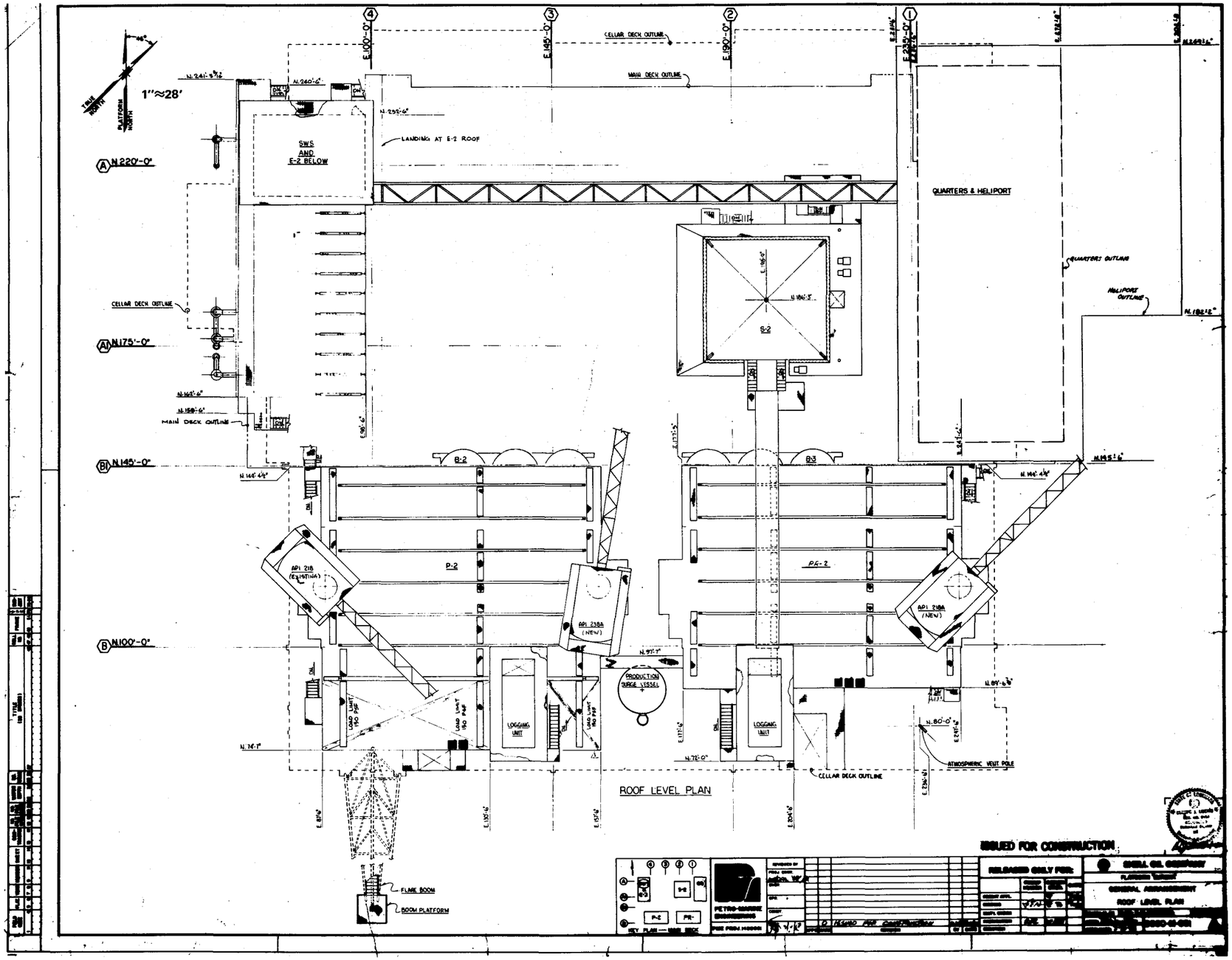
Appropriate OCS Safety Regulations and industry safety practices will be followed.

5.4 FIRE PREVENTION AND SUPPRESSION

Fire hoses will be positioned at the engine package, the pipe racks, the mud pits, the drill floor, the BOP area, the safe welding skid, and other appropriate locations. All fire hose stations will have AFFF (aqueous film forming foam) capability. A deluge system will surround each BOP area. Seawater and drillwater hoses may be used to fight fires, also. Dry chemical fire extinguishers will be present near major switchgear and in numerous locations throughout the platform. Both portable (15 pounds) and wheeled (350 pounds) units will be installed. A manual release halon system will be used in the main rig switchgear room in the engine package and in the paint locker of the pipe rack package.

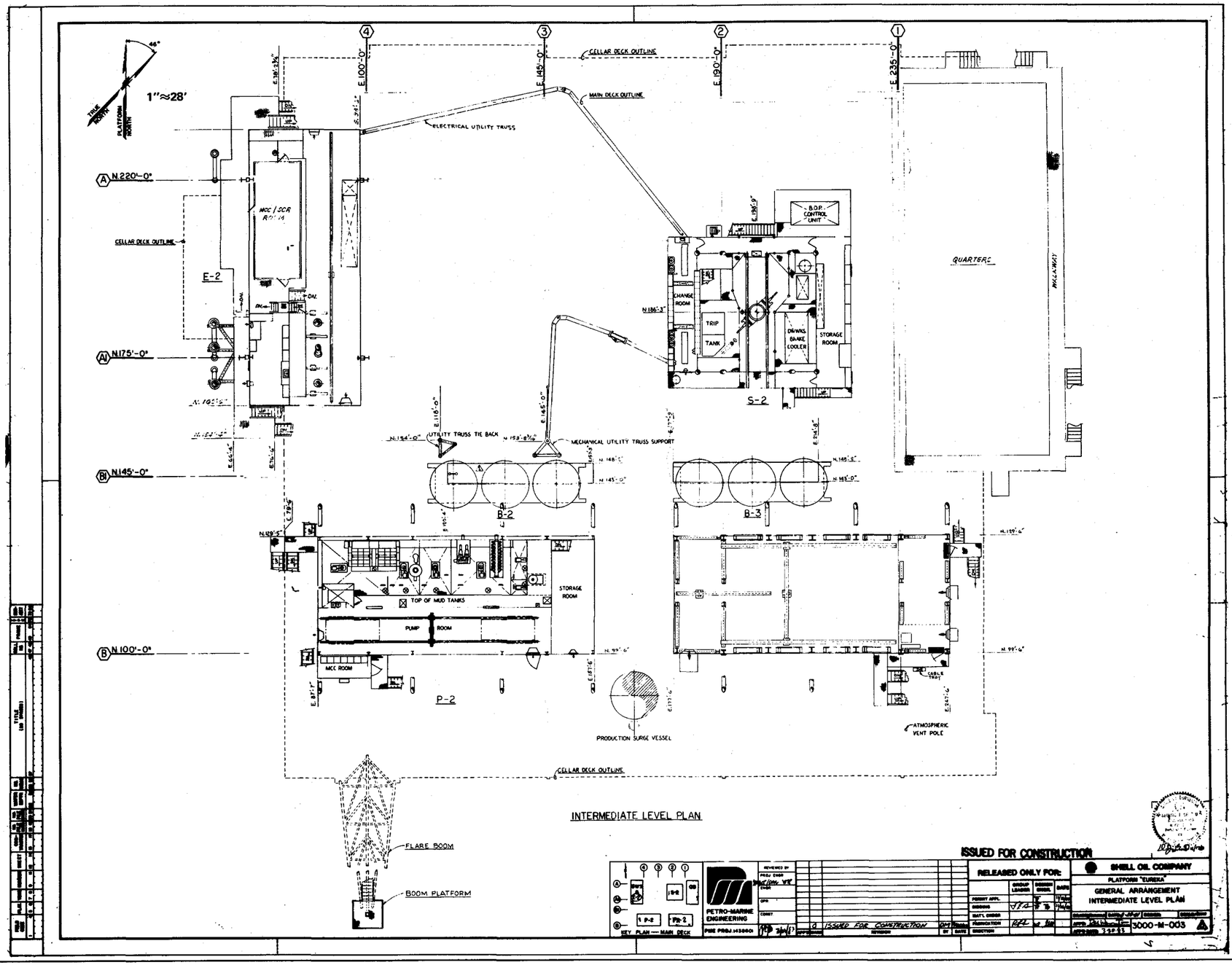
5.5 CREW AND SUPPLY TRANSPORT

Crews will be quartered on the platform and will work a 7-day offshore/7-day onshore rotation. The crew size will be approximately 70 people for the first 7 years of initial drilling and then reduced to approximately 30 people thereafter. Crew boats and/or helicopters will be used for transporting crews and supplies.



General Arrangement Roof Level Plan

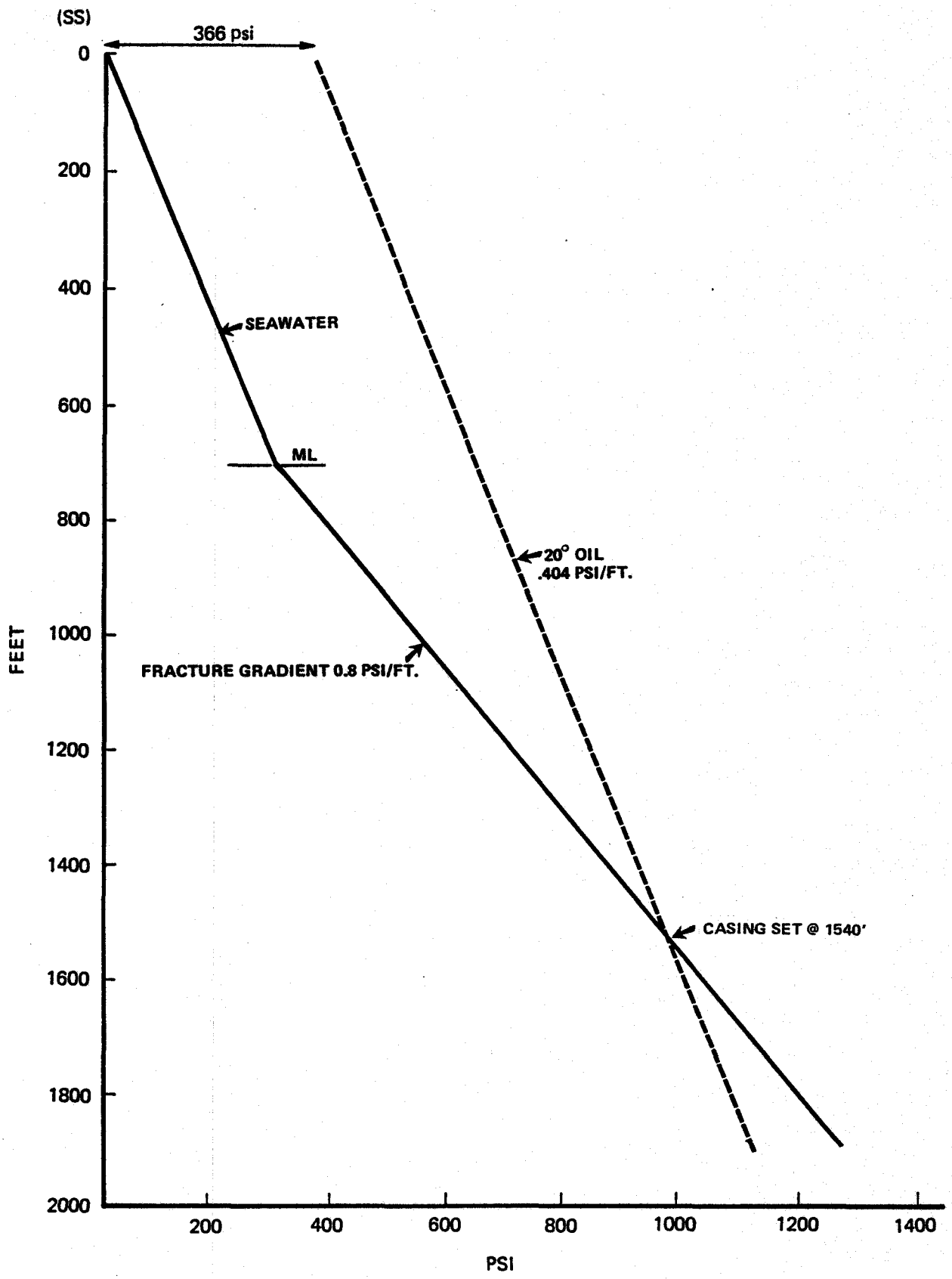
FIGURE 5-1



INTERMEDIATE LEVEL PLAN

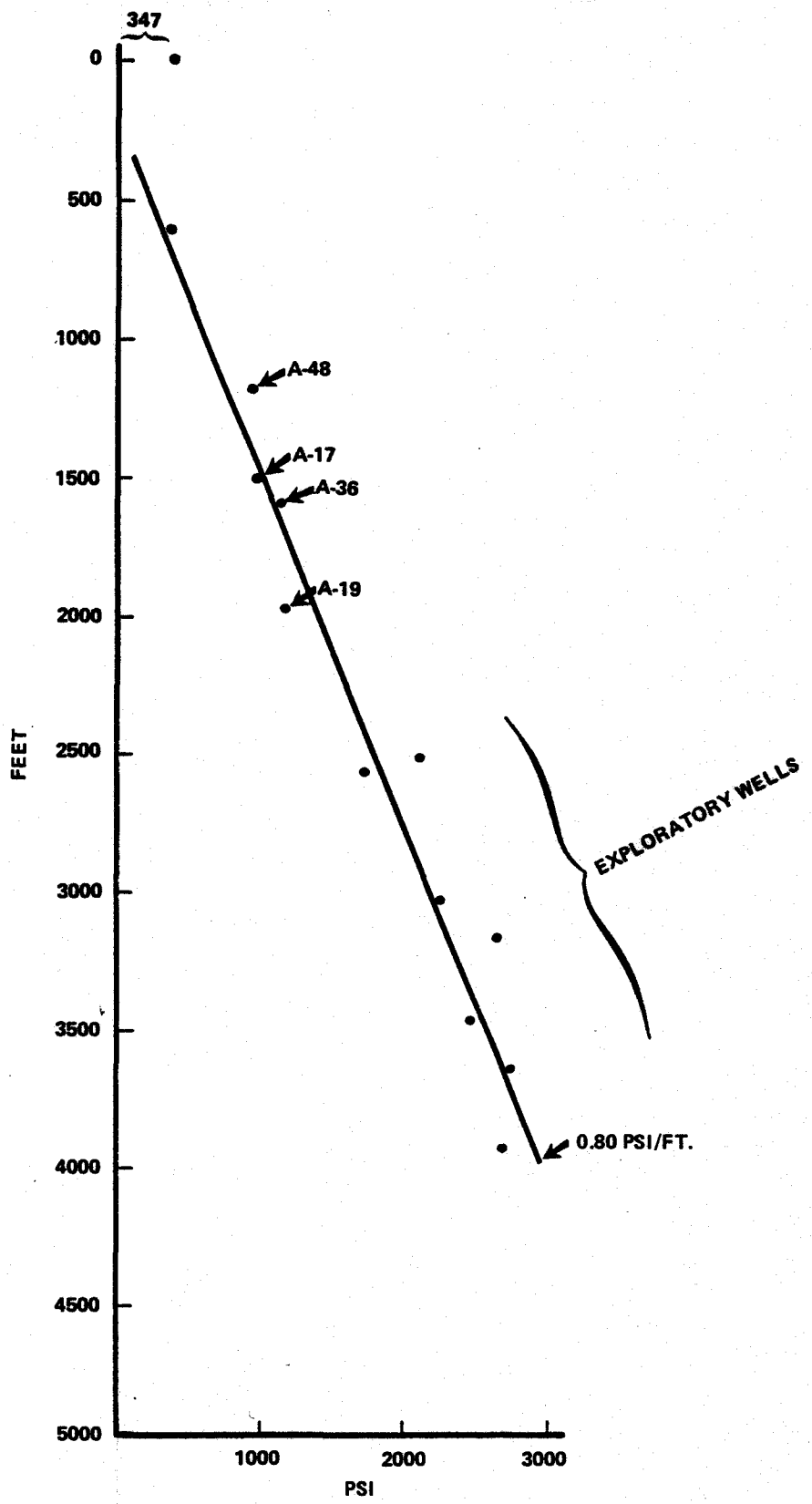
General Arrangement Intermediate Level Plan

FIGURE 5-2



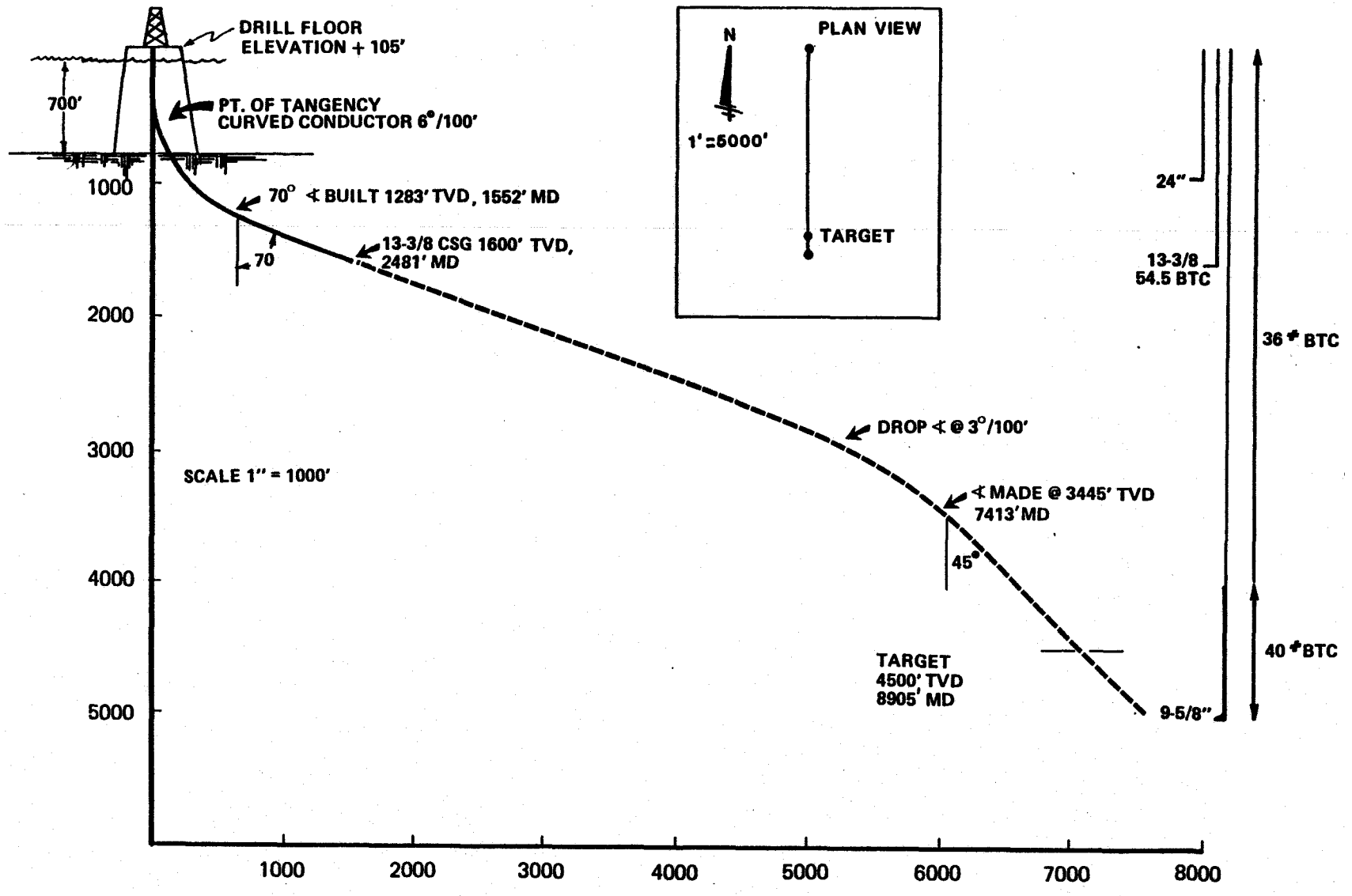
Eureka Fracture Gradient Curve and Surface Casing Depth

FIGURE 5-3



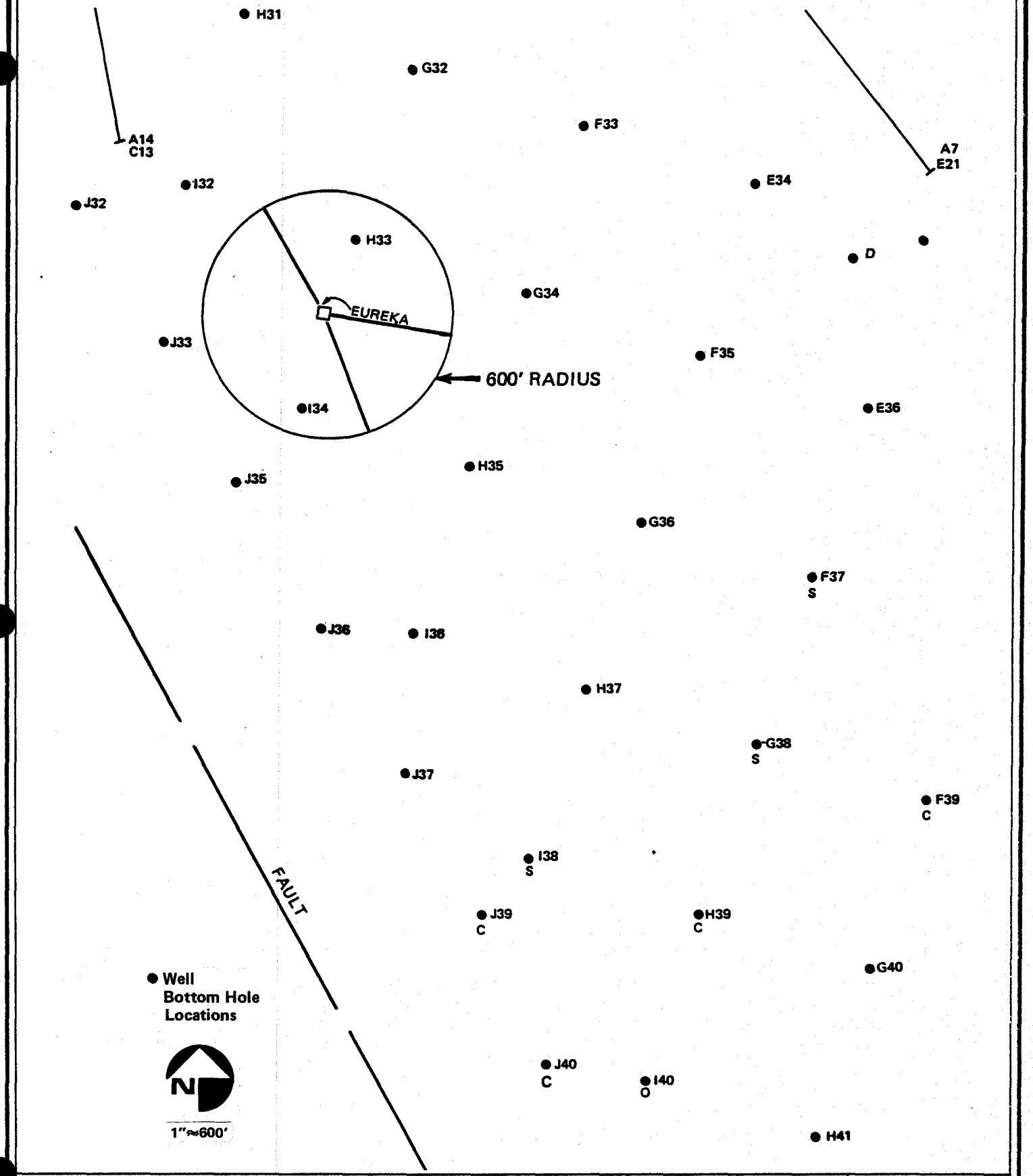
Beta Fracture Gradient Curve

FIGURE 5-4



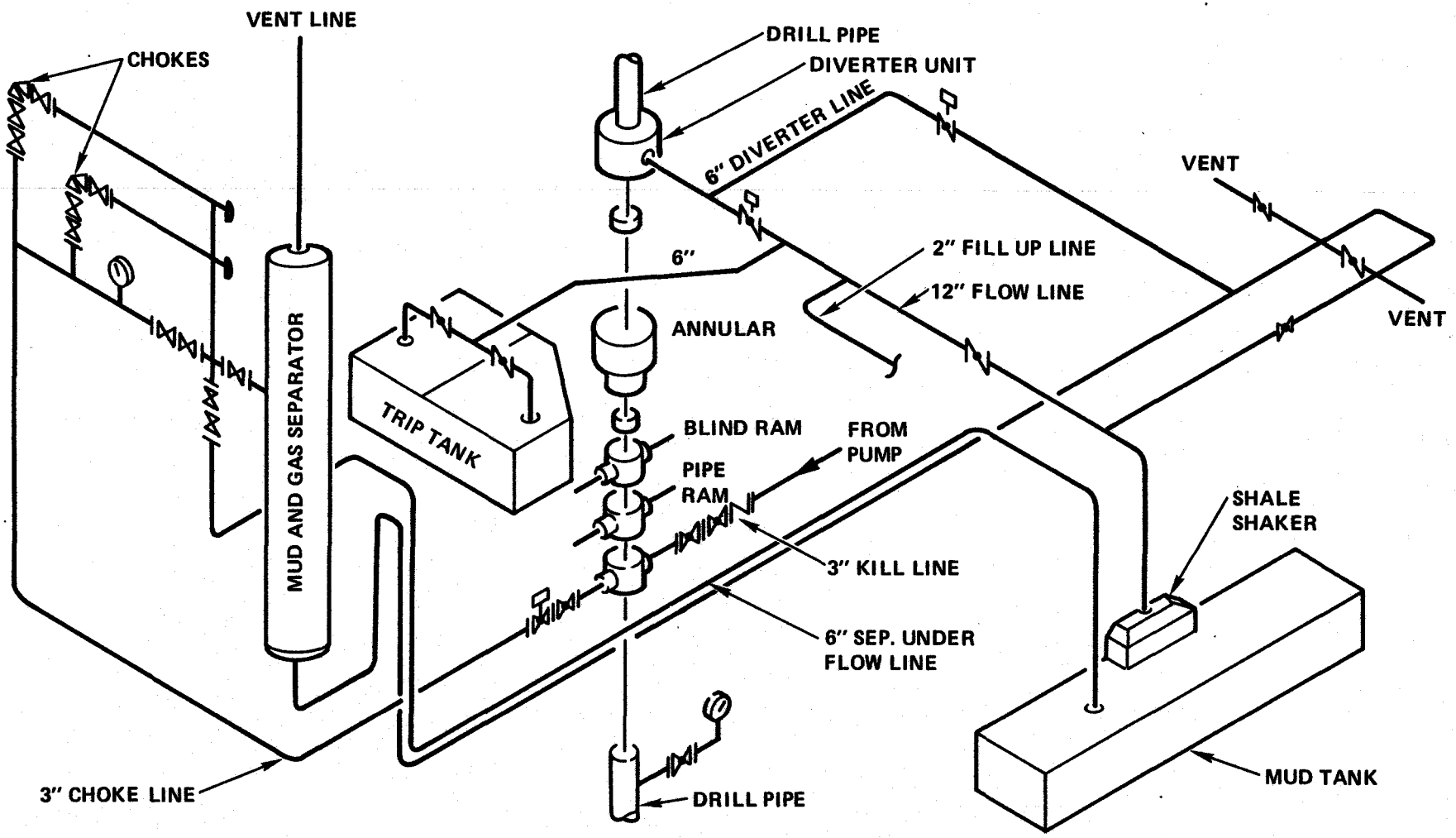
Typical Eureka Development Well

FIGURE 5-5



Three Sectors Within 600 Foot Radius for Diverter System Needs Analysis.

FIGURE 5-6



Blow Out Prevention and Diverter System

FIGURE 5-7

SECTION 6

PLATFORM FACILITIES

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PLATFORM FACILITIES

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SECTION 6
PLATFORM FACILITIES

6.1 INTRODUCTION

The majority of oil, water and gas processing will be handled on the central facilities platform (Elly). Platform Eureka will be equipped only with facilities for primary separation of gas from liquid and for well testing. Liquids and gas and will be sent to Elly via submarine pipelines for further processing. Figure 6-1 is a simplified drawing of the process flow for the Eureka facilities.

6.2 PRODUCTION PROCESS FACILITIES

SCPI Drawing 3900-F-402 (Figure 6-2) depicts the detailed process flow for Platform Eureka. Drawing 3000-M-007, "General Arrangement, Cellar Deck" (Figure 6-3), shows wellhead and process facilities.

A typical wellhead configuration for a submersible-pumped well is shown in SCPI Drawing ZF-2627 (Figure 6-4). Eureka's 60 well slots are divided into 2 groups of 30. Each group of 30 slots consists of 5 rows of 6 slots each. Each well capable of flowing will be equipped with surface-controlled downhole hydraulically-actuated safety valves in accordance with OCS Order #5.

Flowlines for the wells will connect to a manifold system. Normally, well production will be routed to the bulk production header. For testing, flow from a well may be routed to either of two test headers. A well clean-up header will be provided to route a well to a clean-up vessel immediately following completion or well servicing operations. The manifold system also allows for conversion of wells from producers to water injectors as the field matures.

A gas gathering system will be provided to collect the well casing gas and gas from the pressure vessels. A relief header will be provided to safely dispose of gas to a flare system in an upset situation.

6.2.1 Artificial Lift

Provisions are included to artificially lift all producing wells by means of electrically powered submersible pumps.

6.2.2 Liquid Processing and Shipping

A single surge vessel will be provided to separate gas from liquids. These liquids (oil and water) will be pumped to Platform Elly via a 12-inch (30-cm) diameter submarine pipeline. Shipping pumps will be screw type due to the high viscosity of the liquid emulsions produced.

6.2.3 Gas Processing, Compression, Reinjection and Flaring

6.2.3.1 Gas Processing and Compression

Produced gas from Ellen and Eureka primarily will be used as fuel for the turbine driven generators on Platform Elly. When gas is produced at a rate higher than the generator fuel demands on Elly, the excess gas will be reinjected. This is the present mode of operation on Platforms Ellen and Elly. The reinjected gas will be produced back at times when the generator fuel demands exceed gas production. Small quantities of produced gas will also be used for the flare system pilot and compressor startup purge.

By using produced gas (as opposed to diesel) for fuel, SCPI will maximize efficient hydrocarbon resource usage. The use of produced gas as fuel improves efficient hydrocarbon resource utilization by avoiding the energy consumption required to refine diesel from crude oil and to transport the diesel to the field location. Additionally, the volume of natural gas recoverable from Platforms Ellen and Eureka does not economically justify a gas pipeline to shore. By avoiding the use of diesel as fuel to the extent possible (consuming the available produced gas), pollution from the Elly generator turbine exhausts will be greatly reduced. With respect to ocean pollution, using less diesel will reduce the opportunities for an accidental spill during transport and transfer of diesel from land to the platform.

On Eureka, gas from well casings and pressure vessels will be gathered into the suction of a booster compressor. This compressor will ship the gas to Platform Elly via a 6-inch diameter submarine pipeline. The compressor will be a single stage rotary screw machine capable of discharging gas at pressures up to 350 psia and is designed to compress the peak expected Eureka gas production of 3 MMCFD at a normal 5 psig inlet pressure. Capacity can be increased by raising the suction pressure. For instance, the capacity is 5 MMSCFD when the inlet pressure is 15 psig. Condensate from the compressor scrubbers will be combined with the liquid crude stream and pumped to Platform Elly.

On Platform Eureka, there is no backup compressor for the booster compressor referenced above. On most offshore platforms, limited deck space prevents the inclusion of redundant compression capabilities in the equipment design. This is the case with Platform Eureka. Bypasses have been provided to allow higher pressure wells to flow around the compressor and thence to Elly via the gas pipeline in the event of compressor failure. The facilities will be operated at all times in accordance with MMS requirements to reduce flaring and pollution.

6.2.3.2 Reinjection

Excess produced gas not consumed as fuel will be reinjected into a well(s) from Platform Ellen. Maximum injection capacity is 8 MMSCFD. This injection rate is sufficient to reinject all gas produced and prevent flaring of excess gas.

There are two injection compressors on Platform Elly, one with 6 MMSCFD injection capacity and one with 2 MMSCFD injection capacity. The 2 MMSCFD compressor alone is expected to meet all normal injection requirements.

6.2.3.3 Methods of Flaring Prevention

The major method of flaring prevention is reinjection as discussed above.

Except for the 6 MMSCFD injection compressor on Elly, all other compressors are electric motor driven. Electric motors are highly reliable compared to reciprocating gas engines. This will help reduce the number of compressor shutdowns and subsequent emergency flaring.

Each process shutdown system is designed to shut in the production system (including wells) before relief valve set points are reached. This will limit flaring due to process upsets.

6.2.4 Well Test Facilities

Well tests will be performed by selectively routing wells to one of two test facilities. Each test facility will consist of a free water knockout, an emulsion heater and a test separator. Oil, water and gas metering will be provided on each test facility to accurately test wells.

6.2.5 Well Clean-Up Facilities

In order to properly handle the fluids produced by a well immediately after completion and/or reconditioning, a well clean-up surge vessel and tank will be provided. Wells can be selectively routed to this clean-up surge vessel and then the tank to avoid contaminating the main production stream with clean-up production. After settling, the liquids from this tank will be blended into the bulk liquid stream, and solids can be disposed of in an environmentally acceptable manner.

6.2.6 Relief and Vent Systems

All pressure vessels will be equipped with appropriately sized relief valves. These valves will discharge into a common header which will route any fluids present through a relief scrubber to prevent liquid carryover to the flare. Vapors from this flare scrubber will be burned at an ignited flare tip.

Low pressure vapors from tanks, sumps, etc. will be vented to a safe elevation through an atmospheric vent system.

6.2.7 Water Injection

Pressurized, filtered source, sea, and/or produced water will be transported to Eureka via a 10-inch (25-cm) submarine pipeline from Platform Elly. This water will be distributed and metered to the various water injection wells. Low pressure sidestreams of injection water will also be used for several utility functions on Eureka.

6.3 UTILITY SYSTEMS

6.3.1 Electrical Power

Primary electrical power for Eureka facilities will be furnished via two 35 kV submarine power cables from Platform Elly's generator station. Additional generator capacity will be added on existing production Platform Elly to provide for both Elly and Eureka power requirements. The existing generator station on Platform Elly will become standby equipment for the new station. The Platform Elly facilities power system will serve as backup power for essential services on the Eureka drilling rig.

6.3.2 Emergency Electrical Power

Backup power for critical loads on Platform Eureka such as Blow Out Prevention accumulators, lighting, navigational aids, instrument air compressor motor, fire water pumps, and communications equipment is provided by a standby diesel-driven engine and the Rig 2 generator. The units will automatically come on-line upon loss of primary power.

6.3.3 Process Heating System

Process heat requirements (primarily well test heaters and pump suction heaters) will be met by means of a closed circulation system using hot water as heat media. The source of heat for this system will be electric resistance heaters.

6.3.4 Water Systems

Potable water will be supplied from shore by means of a supply boat. Fresh drill water storage capacity will be provided in two of the jacket legs (1000 bbl each). The water will be removed from the legs by means of electrically powered submersible supply pumps in each tank. This water will be used primarily for mixing drilling muds and cement. A saltwater system will be provided for fire suppression, washdown, flushing water for cleaning cuttings and process cooling.

6.3.5 Sewage Treatment

A packaged sewage treatment unit will be provided on the platform to process sewage from the quarters building. The effluent from this unit will comply with U.S. Coast Guard requirements found in 33 CFR 159.53(b) and will be discharged to the ocean.

6.3.6 Fuel

Diesel fuel or fuel gas will be utilized for turbine generators on Platform Elly to supply necessary power to Platform Eureka. Other diesel fuel usage includes the Rig 2 generators and the diesel driven utility pump as well as intermittent users such as cementing pumps, cranes, and standby generators. Other potential uses for produced gas on the platform include the flare pilots and blanket gas. Diesel fuel will be stored in one of the platform jacket legs (1000 bbl) and supplied to the platform by an electrically powered submersible supply pump.

6.3.7 Utility and Instrument Air

Rotary screw compressors will be provided to distribute a supply of 125 psi air throughout the platform for uses such as air tools and hoists, moving drill water, air-powered hydraulic pumps, etc. An instrument air system will be provided to compress, dry, store and distribute an adequate supply of 100 psi instrument air throughout the platform process area.

6.3.8 Lighting

Platform lighting will meet or exceed the API RP14F recommended levels of illumination. Indoor lighting will consist of fluorescent fixtures and outdoor lighting will consist of mercury vapor fixtures. Critical lighting circuits will be connected to a battery system to provide emergency incandescent lighting in the event of a power failure.

6.3.9 Deck Drains and Sumps

A drainage collection system will be provided to prevent oil spillage or other pollutants from reaching the ocean. "Drain pans" built into the structure will route all spilled material through a drain system to a water sump. Oil skimmed from the water sump overflows into an oil sump where it will be pumped back into the liquid handling system. Oil free water will be discharged through an emergency sump to the ocean. Should oil migrate to the emergency sump as a result of sump system malfunction, a pump will be included to recover oil from the emergency sump.

6.4 SUPPORT FACILITIES

6.4.1 Personnel Quarters

Personnel quarters to accommodate those people who will routinely be quartered on the platform will have 79 beds. Sleeping accommodations, kitchen/dining area, recreational room, locker room, and restroom-washroom facilities will be provided.

6.4.2 Fire Suppression System

The design of the fire suppression system will include the following:

a) A looped fire water system with two fire water pumps. These pumps will be separated so that the likelihood of simultaneous damage to both is reduced.

b) Dry chemical extinguishers.

c) Fire hose stations with AFFF (aqueous film forming foam) capability.

d) Deluge system around the diesel storage tank, well clean-up tank, separators, treaters and pipeline pumps.

6.4.3 Navigation Aids

Navigation aids for Platforms Ellen, Elly, and Eureka are designed in accordance with U.S. Coast Guard Class 1 criteria. The system includes the following components:

Quantity		
Ellen/ Elly	Eureka	Description
2	2	CG-1000 Fog Signal inverter with remote control switch and two ELG-500/02 emitters. Blast characteristic is 2 seconds ON and 18 seconds OFF; 120/240 VAC 60 Hz power source required.
1	1	SF-4000 Light Controller and Monitor with photocell; 120 VAC 60 Hz power source required.
8	4	Dual Ventilated FA-250 Lanterns with 120 volt AC, 500 watt lamp with mounting stand to operate as a master and standby system. Flash characteristic is 0.04 seconds ON, 0.6 seconds OFF, 7000 effective candelas; 120 VAC, 60 Hz power source required.
1	0	HALS 15, 15 Mile Derrick Light. Dual ventilated FA-250 lantern with mounting stand and both lanterns operating simultaneously, 15,000 effective candelas. Flash characteristic 1 second ON, 2 seconds OFF; 220 VAC, 60 Hz, power source required.

The fog signals have a 2-mile (3.2-km) minimum range and are directional and synchronized. All lights will flash in unison. All navigational components are connected to the emergency standby generator buss.

6.4.4 Emergency Shutdown System (ESD) and Automatic Shut-in of Wells

All wells, including those artificially lifted, will be initially equipped with surface controlled surface and subsurface safety devices. These devices will be installed in the well below the mudline and held open by the application (from the deck

of the platform) of hydraulic and pneumatic pressure. Any accidental or deliberate bleeding off of either pressure will cause these devices to close and thereby stop any flow from the well from below the device.

The pneumatic system holding open these and other safety shut-in devices on the platform equipment is spread throughout the platform. Monitors of critical functions and manual bleed-off valves at ESD stations will cause the system pressure to bleed off if an abnormal condition is detected. Accidental breaking of the system piping will also cause the system to bleed off and shut in the wells.

6.4.5 Safety and Escape Equipment

Escape systems (life rafts and two enclosed boats), life jackets and ring buoys will be provided on the platform.

6.5 DISCHARGES TO THE OCEAN

The pollutant concentration in ocean discharges will be within the limits prescribed by the EPA. The limitations prescribed are listed below:

FAR OFFSHORE CATEGORY

	Oil and Grease (mg/l)		
Water Source	Maximum for Any One Day	Average Daily Values for Thirty Consecutive Days	Residual Chlorine (mg/l)
Produced	72	48	NA
Deck Drainage	No discharge of free oil to the surface waters	No discharge of free oil to the surface waters	NA
Drill Cuttings			
Produced Sand			
Sanitary Waste	NA	NA	1.0 Minimum
Domestic Waste	NA	NA	NA

NA - Not Applicable

6.6 OIL SPILLS CONTAINMENT PLAN AND EQUIPMENT

The Beta Unit Oil Spill Contingency Plan has been revised to include operations on Platform Eureka as a component of the SCPI Beta complex. The plan functions as an in-field manual for all personnel that could be involved in spill prevention and clean-up. It specifies all emergency telephone numbers and notification procedures. A list of job titles and a description of responsibilities for each job are provided. An

organization chart for both small and large spills assigns an employee and an alternate for each job title. Most importantly, exact site-specific clean-up procedures are provided which address both small and large spills. The location of equipment and its proper utilization is discussed.

A brief discussion of the provisions for small spill clean-up are most relevant for inclusion in this DPP for Platform Eureka. Small spills (up to about 400 gallons (1514 l)) would likely be handled by personnel from the platform while a large spill would present a unit-wide problem that has been addressed in previous documentation. In the case of a large spill, it is expected that Clean Coastal Waters (CCW), an oil spill cooperative, would become involved. A list of CCW equipment and its locations is provided in Appendix A.

The small spill plan designates an operations manager, spill cleanup manager, offshore cleanup supervisor, and oil spill control team (in descending order of authority). The operations manager has three staff positions in an advisory role including a public affairs coordinator, legal advisor, and government liaison. In the event of a small spill the plan provides that personnel safety should be assured, the flow of pollutant stopped, and equipment for containment and clean-up deployed. A very small spill (up to 10 gallons (38 l)) would result in loading sorbents and sorbent boom on the crew supply boat, containing the slick with the boom, and using sorbent pads on the surface of the slick until the visible spill is cleaned up. For larger spills (up to 400 gallons (1514 l)), the boom would be lowered from the reel on the platform and attached to the crew supply boat for deployment. A Walosep (W-3) oil skimming device would be brought to the spill by a fast response boat and utilized in the boomed area. Sorbents would be used to capture small amounts of oil that may escape the boom. Sorbents would also be utilized to clean up remaining oil when the oil skimming device is no longer effective. Oil and oil soaked sorbents will be disposed of onshore in a designated disposal site.

Equipment for oil spill prevention, containment, and retrieval aboard Beta platforms includes:

a. All blowout prevention equipment listed in Final OCS Order No. 2, Drilling Procedure, effective May 1, 1976, U.S. Geological Survey.

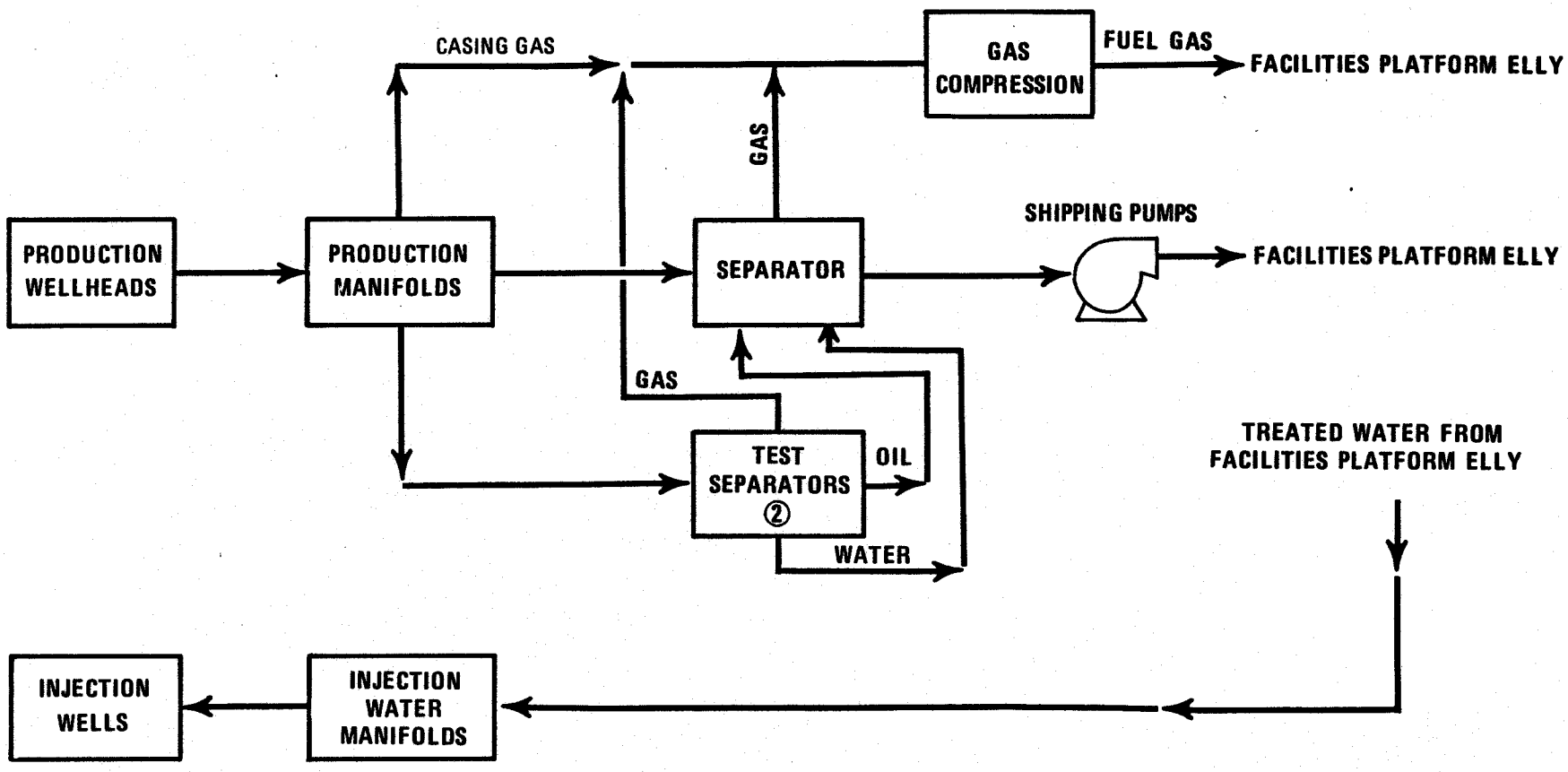
b. Curbs, gutters, drains, and drip plans placed to collect contaminants from the deck areas and prevent them from discharging into ocean waters.

c. Miscellaneous quantities of sorbent pads, sorbent booms, and dispersants.

d. Communications equipment.

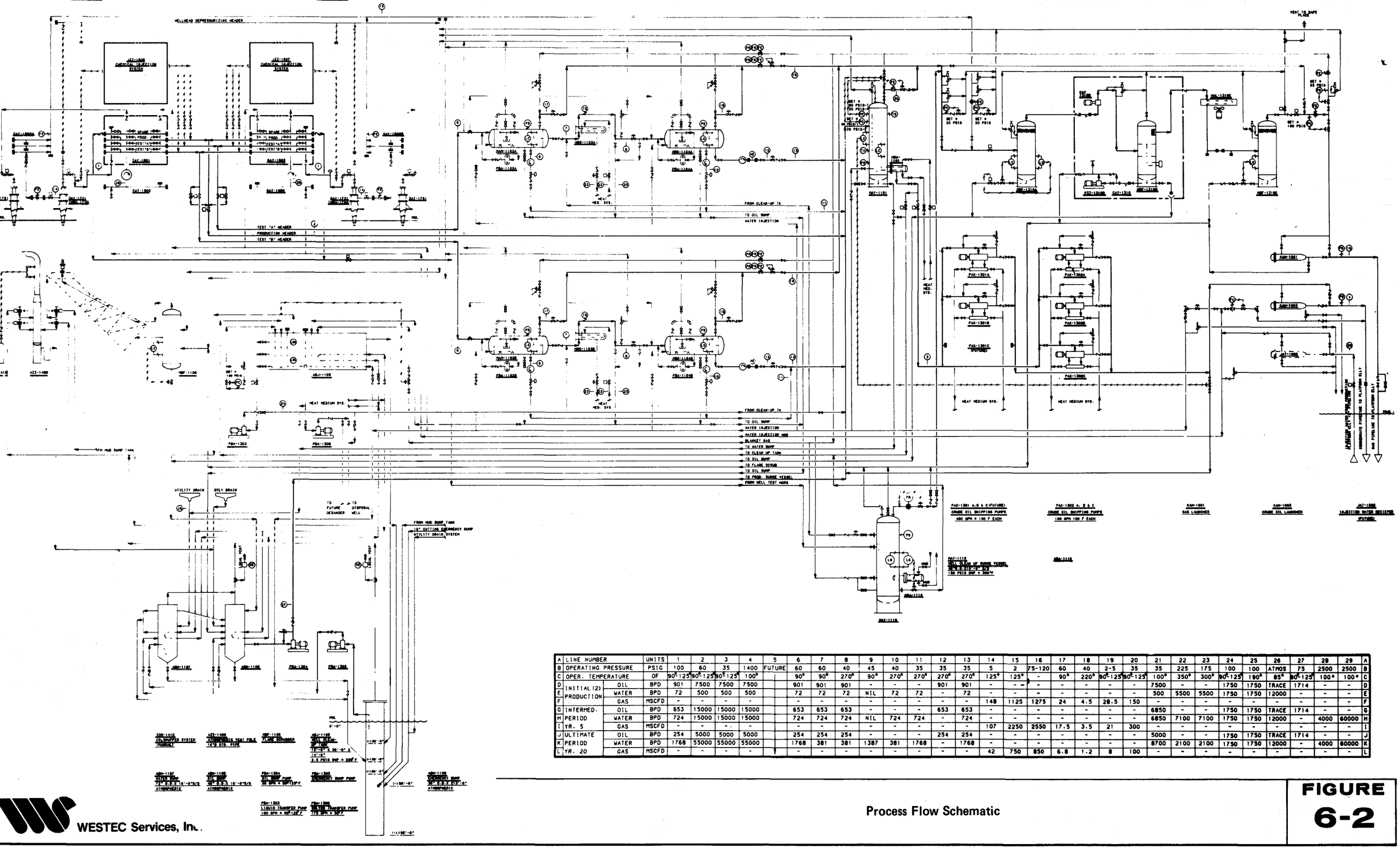
e. A fast deployment containment boom with 1600 feet (488 m) of boom on an electric-hydraulic reel. (This boom is stored on Platform Elly and is available for rapid deployment to other Beta Platforms.)

In addition, a dedicated vessel and three fast response boats are berthed in Long Beach. The response craft can be on the scene within 1 hour; the larger vessel can arrive within 2-1/2 hours. As noted above, one of the fast response boats carries a Walosep oil skimming device.



Simplified Process Flow—Eureka Platform Production Facilities.

FIGURE 6-1

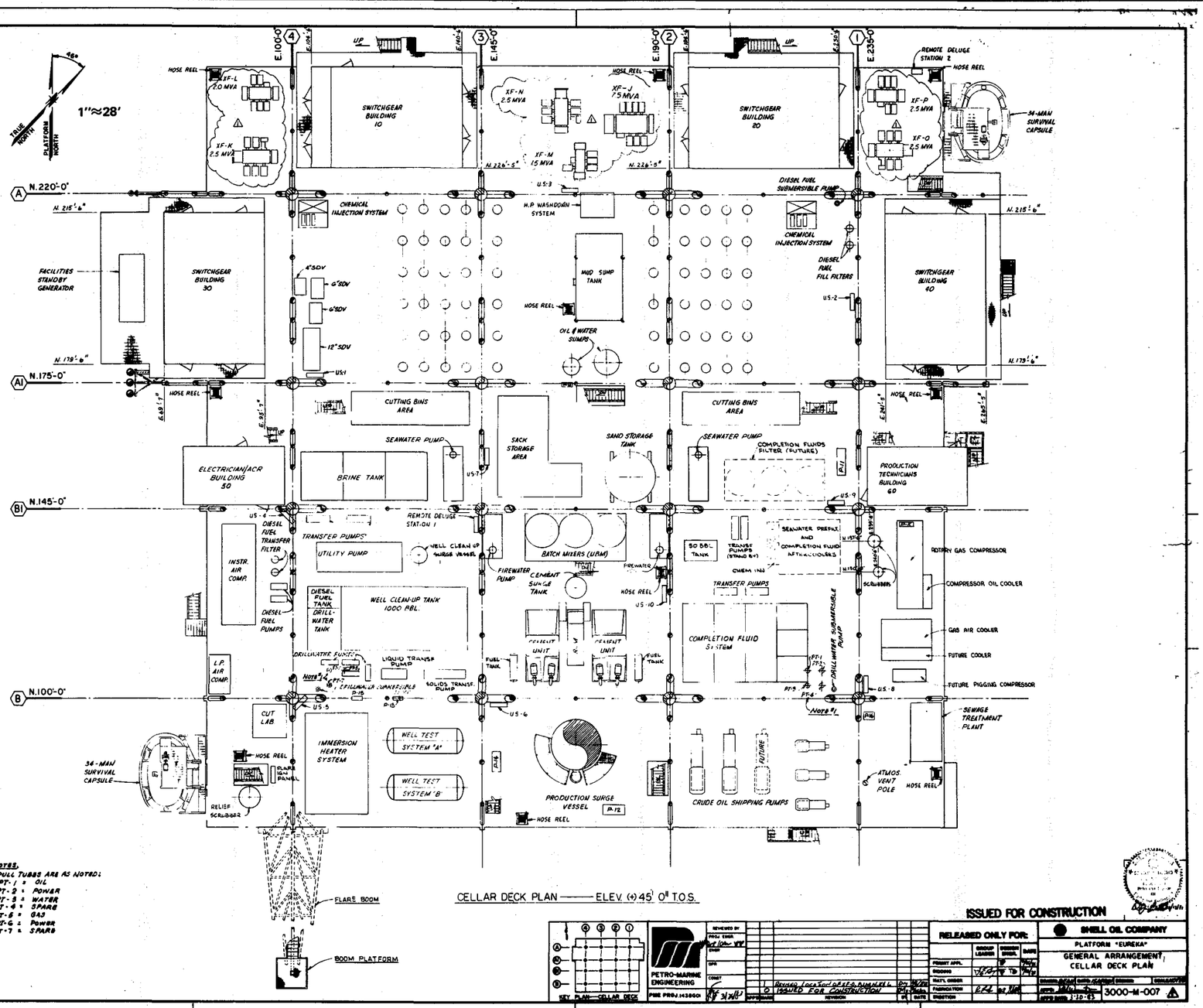


A	LINE NUMBER		UNITS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	A
B	OPERATING PRESSURE		PSIG	100	60	35	1400	FUTURE	60	60	40	45	40	35	35	35	5	2	75-120	60	40	2-5	35	35	225	175	100	100	ATMOS	75	2500	2500	B
C	OPER. TEMPERATURE		OF	90°-125°	90°-125°	90°-125°	100°		90°	90°	270°	90°	270°	270°	270°	270°	125°	125°	-	90°	220°	90°-125°	90°-125°	100°	350°	300°	90°-125°	180°	85°	90°-125°	100°	100°	C
D	INITIAL (2) PRODUCTION	OIL	BPD	901	7500	7500	7500		901	901	901	-	-	-	901	901	-	-	-	-	-	-	-	7500	-	-	1750	1750	TRACE	1714	-	-	D
E		WATER	BPD	72	500	500	500		72	72	72	NIL	72	72	-	72	-	-	-	-	-	-	-	500	5500	5500	1750	1750	12000	-	-	-	E
F		GAS	MSCFD	-	-	-	-		-	-	-	-	-	-	-	-	148	1125	1275	24	4.5	28.5	150	-	-	-	-	-	-	-	-	-	F
G	INTERMED.	OIL	BPD	653	15000	15000	15000		653	653	653	-	-	-	653	653	-	-	-	-	-	-	-	6850	-	-	1750	1750	TRACE	1714	-	-	G
H	PERIOD	WATER	BPD	724	15000	15000	15000		724	724	724	NIL	724	724	-	724	-	-	-	-	-	-	-	6850	7100	7100	1750	1750	12000	-	4000	60000	H
I	YR. 5	GAS	MSCFD	-	-	-	-		-	-	-	-	-	-	-	-	107	2250	2550	17.5	3.5	21	300	-	-	-	-	-	-	-	-	-	I
J	ULTIMATE	OIL	BPD	254	5000	5000	5000		254	254	254	-	-	-	254	254	-	-	-	-	-	-	-	5000	-	-	1750	1750	TRACE	1714	-	-	J
K	PERIOD	WATER	BPD	1768	55000	55000	55000		1768	381	381	1387	381	1768	-	1768	-	-	-	-	-	-	-	8700	2100	2100	1750	1750	12000	-	4000	60000	K
L	YR. 20	GAS	MSCFD	-	-	-	-		-	-	-	-	-	-	-	-	42	750	850	6.8	1.2	8	100	-	-	-	-	-	-	-	-	-	L

WESTEC Services, Inc.

Process Flow Schematic

FIGURE 6-2



NOTES,
1. PULL TUBBS ARE AS NOTED:
PT-1 = OIL
PT-2 = POWER
PT-3 = WATER
PT-4 = SPARE
PT-5 = GAS
PT-6 = POWER
PT-7 = SPARE

CELLAR DECK PLAN ——— ELEV. (+) 45' 0" T.O.S.

ISSUED FOR CONSTRUCTION

RELEASED ONLY FOR:

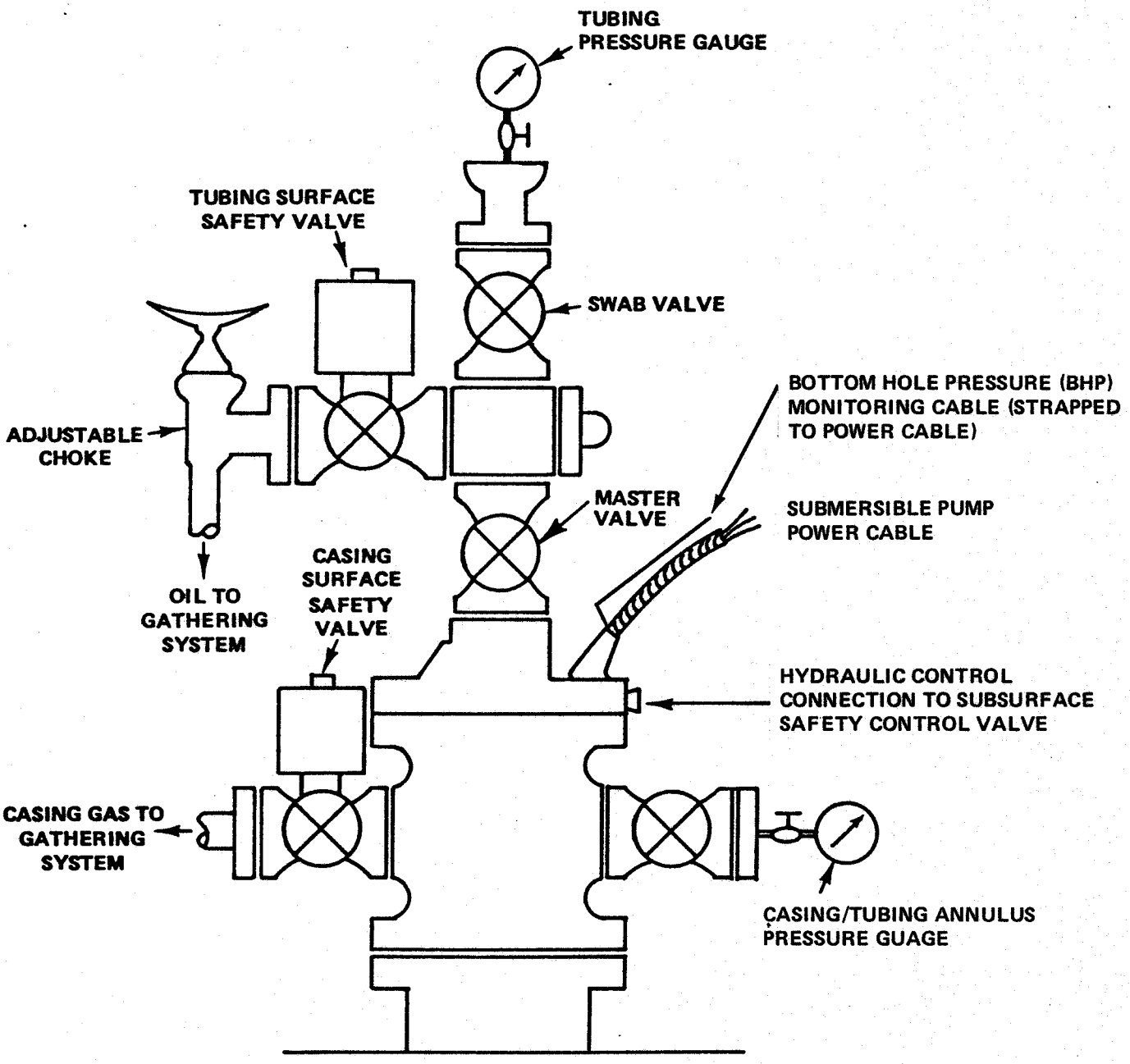
SHELL OIL COMPANY
PLATFORM "EUREKA"
GENERAL ARRANGEMENT CELLAR DECK PLAN

PETRO-MARINE ENGINEERING
PME PROJ. #3800

3000-M-007

General Arrangement Cellar Deck Plan

FIGURE 6-3



Wellhead Arrangement

FIGURE 6-4

SECTION 7

SUBSEA PIPELINES AND ELECTRICAL POWER CABLES

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SECTION 7
SUBSEA PIPELINES AND ELECTRICAL POWER CABLES

7.1 INTRODUCTION

Two subsea pipelines to transport wet crude and wet gas from Eureka to production facilities on Elly are needed. Also, one subsea pipeline to transport injection water from Elly to injection wells on Eureka is planned. In addition, two subsea electrical power cables for providing electrical power to Eureka from Elly are necessary. Geophysical and geotechnical studies of the pipeline route area have been completed (MESA[2], 1980, 1984b). These studies conclude that the pipeline/cable alignment selected is, from a geotechnical perspective, in the most favorable part of the study area. Given proper design and installation based on the geologic design considerations given in MESA[2] (1984b), the proposed pipelines and power circuits should not be adversely affected by geologic hazards.

7.2 PIPELINE AND CABLE ROUTES

Figure 7-1 shows the proposed pipeline and cable routes. Separation of the power cables is planned in order to provide security. Figure 7-1 shows the proposed pipeline and cable routes.

7.3 PIPELINE AND CABLE INSTALLATION

7.3.1 Beta Intrafield Pipeline Installation

The Beta intrafield pipelines will be installed by the lay barge method after completion of the Platform Eureka installation phase by the crane ship. A 400-foot x 100-foot x 30-foot (120-m x 30-m x 9-m) pipelay barge equipped with tensioners, stringer, weld stations, and anchor winches will be mobilized for the pipeline installation. All three lines (6-inch (15-cm), 10-inch (25-cm) and 12-inch (30-cm) diameter) will be laid starting at Platform Eureka and proceeding towards Platform Elly. Each riser pipe at Eureka will be pulled through a J-tube conduit and terminated prior to moving towards Elly. Upon arrival at Elly, the pipe will be laid on bottom with one-half of a misaligning ball connector attached to it.

The 6-inch (15-cm) and 10-inch (25-cm) pipelines at Platform Elly will be installed in J-tubes, whereas the 12-inch (30-cm) pipeline will be attached to a preinstalled clamped riser. Because of the orientation of Platform Elly with respect to the 6-inch (15-cm) and 10-inch (25-cm) pipelines, short sections of riser pipe will be pulled through their appropriate J-tube and left on bottom. A spoolpiece connection will be made between each riser section and the appropriate pipeline utilizing the remaining

half of the ball connector. A spoolpiece will also be used to connect the 12-inch (30-cm) pipeline to the clamped riser at Platform Elly. A saturation diving spread aboard the lay barge will be utilized during the spoolpiece hookup phase of the work.

After all three lines have been installed, a sizing plate will be run through each line to confirm that the lines have been laid without damage. Hydrotesting the lines to at least 1.25 times the maximum design working pressure for 8 hours will complete the work.

7.3.2 Beta Intrafield Submarine Cable Installation

The Beta intrafield 35 kV submarine power cables will be installed using a cable laying barge after the pipeline work is completed. Two circuits will be installed, one on each side of the pipeline corridor, between Platforms Elly and Eureka. A bare 200-foot x 50-foot x 10-foot (61-m x 15-m x 3-m) barge will be outfitted with thrusters, anchor winches, linear cable gripping machine, cable handling frame and tub, cable ramp, and all other necessary pieces of equipment prior to loading out the cable. A four point moving system consisting of 18,000# anchors, buoys and adequate cable will be positioned near each platform prior to cable loadout. After preparations are complete, the cable will be loaded onto the barge and spooled in the cable tub located in the middle of the cable laying barge.

The barge will be towed to location and set in a four point moor at Platform Eureka. The first cable circuit will be pulled through a J-tube, with adequate length pulled onto the platform to reach the cable termination location. A tug will then pull the barge along the cable route after releasing it from the mooring system. Thrusters aboard the barge will keep the cable on the predetermined route. Upon reaching Platform Elly, the barge will be set in a moored configuration. The end of the cable will be held at the stern of the barge in a gripping device. A predetermined length of cable will be fed through the linear gripping machine and laid on the deck of the barge where a pull head will be attached. A winch on Platform Elly will then begin to pull the cable off the end of the barge and through a J-tube on Elly. When the cable on the deck has been fed over the stern, the gripping device at the barge stern will be released and the cable slack gradually lowered to the seafloor as the J-tube pull continues. Adequate cable will be pulled onto the platform to reach the termination location.

The barge will then return to Platform Eureka and install the second circuit in a similar manner. Terminations at each end of the circuits will be made after cable laying operations are complete.

7.4 DESIGN CRITERIA AND OBJECTIVES

7.4.1 Basis for Design

The 12-inch (30-cm) diameter crude oil line to production Platform Elly will be designed to handle the maximum expected liquid volumes of oil/water emulsion. The 6-inch (15-cm) diameter gas line to Platform Elly will be designed to handle the maximum expected throughput of gas. The 10-inch (25-cm) diameter water injection line from Platform Elly will be designed to handle the maximum expected injection water requirements. The two subsea electrical cables from Platform Elly to Eureka will transmit power at 35 kV. Each cable will be approximately 4-1/2 inches (11.5 cm) in diameter.

7.4.2 Applicable Regulations and Codes

The pipelines will be designed in compliance with MMS, Conservation Division, Branch of Oil and Gas Operations, Pacific OCS Region, OSC Order No. 9, dated June 1, 1971; ANSI B31.4-1979, "Liquid Petroleum Transportation Piping Systems," ANSI B31.8-1975, "Gas Transmission and Distribution Piping Systems;" Department of Transportation Regulation 49, Parts 192 and 195 as amended August 18, 1976, "Transportation of Liquids by Pipeline" and "Transportation of Natural and Other Gas by Pipeline," as applicable. In addition to the above, the pipeline designs and operating procedures will follow API Recommended Practice RP 1111, "Design, Construction, Operation and Maintenance of Offshore Hydrocarbon Pipelines," March 1976, and the Department of Interior/Department of Transportation memorandum of understanding of June 11, 1976.

7.4.3 Stability

The pipelines will be designed to resist movement under the action of on-bottom currents predicted to occur during the design 100-year storm and seabed slopes. On-bottom stability will be achieved by proper design of submerged pipeline weight when the pipelines are placed on the ocean bottom.

7.4.4 Pipeline and Cable Specifications

The pipeline and cable specifications are as follows:

7.4.4.1 Pipeline Specifications

a. Products to be transported:

- 12.75-inch (32.3-cm) OD line - produced water and crude oil
- 10.75-inch (27.3-cm) OD line - injection water
- 6.625-inch (16.8-cm) OD line - wet natural gas

b. Size, weight and grade of the pipes:

- 12.75-inch (32.3-cm) OD x 0.625-inch (1.58-cm) WT, 80.93 lb/feet, AP15LX-Grade X-42 SMLS Pipe
- 10.75-inch (27.3-cm) OD x 0.594-inch (1.5-cm) WT, 64.43 lb/feet, AP15LX-Grade X-42 SMLS Pipe
- 6.625-inch (16.8-cm) OD x 0.375-inch (0.95 cm) WT, 25.03 lb/feet, AP15LX-Grade X-42 SMLS Pipe

c. Length of lines (J-tube to J-tube):

- 12.75-inch (32.3-cm) OD line - 8220 feet (2506 m)
- 10.75-inch (27.3-cm) OD line - 8156 feet (2487 m)
- 6.625-inch OD (16.8-cm) line - 8439 feet (2573 m)

d. Description of Protective Coating - 14 mils of thin film thermo-setting epoxy.

e. Type of corrosion protection:

- 12.75-inch (32.3-cm) OD line - 150# aluminum anodes spaced 550 feet (167 m) apart
- 10.75-inch (27.3-cm) OD line - 125# aluminum anodes spaced 550 feet (167 m) apart
- 6.625-inch (16.8-cm) OD line - 75# aluminum anodes spaced 550 feet (167 m) apart

f. Design working pressure and capacity:

- 12.75-inch (32.3-cm) OD line - 700 psi at 19,600 bpd
- 10.75-inch (27.3-cm) OD line - 1500 psi at 110,000 bpd
- 6.625-inch (16.8-cm) OD line - 60 psi at 3 MMSCFD

g. Maximum design working pressure and capacity:

- 12.75-inch (32.3-cm) OD line - 1440 psi at 24,500 bpd
- 10.75-inch (27.3-cm) OD line - 2200 psi at 180,000 bpd
- 6.625-inch (16.8-cm) OD line - 200 psi at 12.3 MMSCFD (based on velocity)

7.4.4.2 Cable Specifications

a. Cable description - 35 kV, 3 conductor No. 1/OAWG, EPR insulated, armored submarine power cable with 3 instrumentation quads

b. Size and weight of cables - 4.500-inch (11.43-cm) OD, 9 lb/foot in seawater, 15 lb/foot in air

c. Length of circuits (J-tube to J-tube):

- Easterly circuit - 8515 feet (2596 m)
- Westerly circuit - 8485 feet (2587 m)

7.4.5 External Pressure

The pipelines will be designed to withstand external loads, including hydrostatic pressures with the pipeline void and with its absolute internal pressure equal to one atmosphere.

7.4.6 Other Stresses

The pipelines will be designed under applicable codes and regulations to withstand stresses which result from installation, thermal and fluid expansion effects, earthquake and other dynamic effects, dead loads, and surges.

7.4.7 External Corrosion Protection

The pipelines will be protected against external corrosion by means of external coatings and zinc sacrificial anodes. The coating material will be a thin-film epoxy system.

7.4.8 Internal Corrosion Protection

Provision will be made for adding inhibitors if required. Testing and monitoring for internal corrosion will dictate the extent of the program.

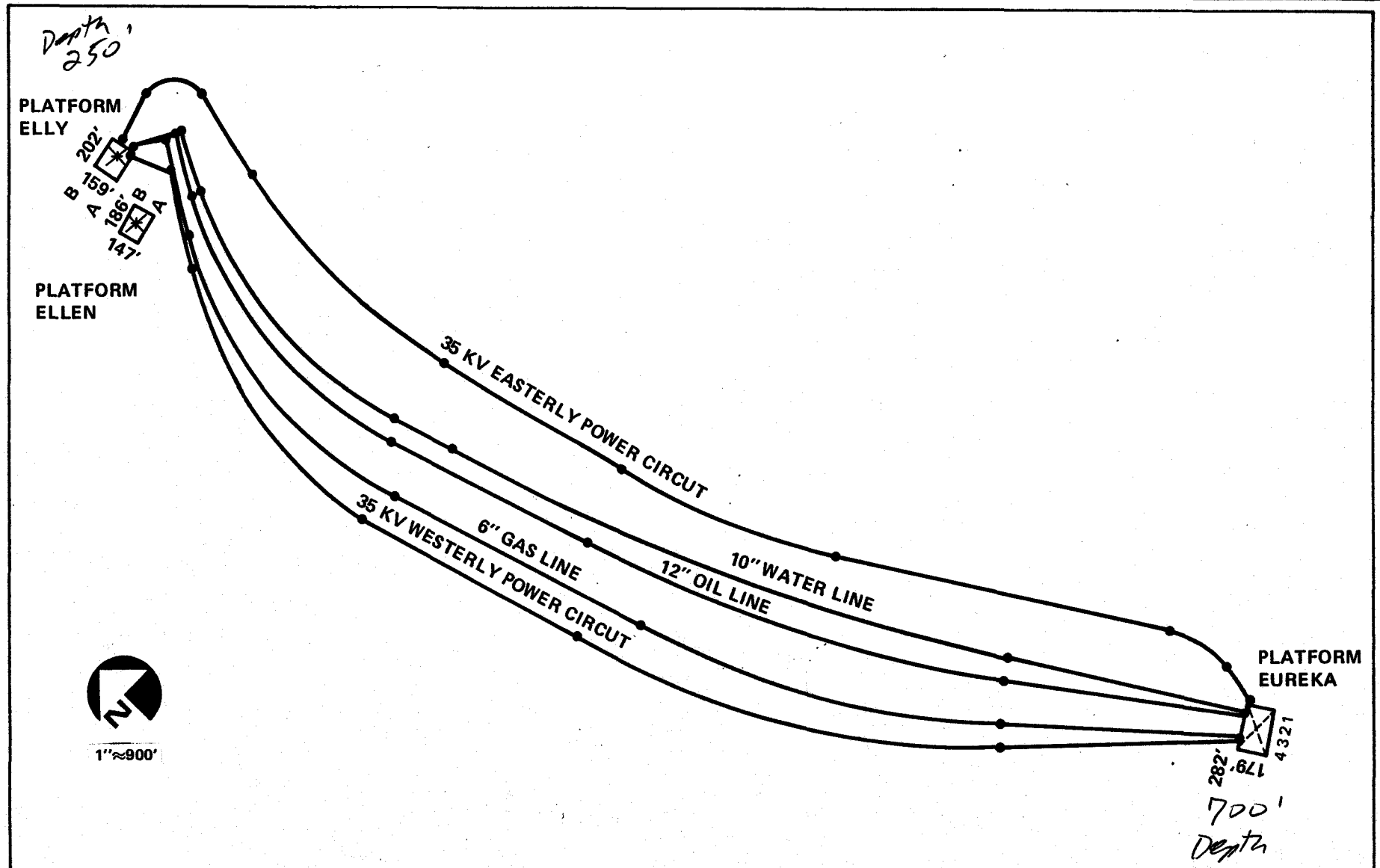
7.4.9 Compatibility With Commercial Fishing

Pipelines will be installed to be compatible with trawling operations in the area. The pipelines are expected to settle into the seafloor so that approximately half will be below the mudline. Trawling operations in that area are usually mid-depth so the pipelines are not anticipated to pose any threat to their operations. Nonetheless, pipeline sections are welded except for flanged connections near the base of each platform. The power cables are single cables (i.e., no connections). Sacrificial anodes are round in cross-section and the ends are tapered down to pipeline diameter. Thus, no projections are present on either the pipelines or the power cables, and snagging of trawls or other fishing gear on the pipeline is completely avoided.

The subsea connections between the riser sections and their respective pipelines near Elly are within 328 feet (100 m) of the platform. Because of their proximity to the platform and the existence of a 1640-foot (500-m) safety zone around Platform Elly, SCPI does not anticipate these connections to interfere with trawling operations.

7.5 PIPELINE OPERATION

The pipelines will be operated and regularly inspected in compliance with MMS regulations. Safety and monitoring devices will be provided in accordance with OCS Order No. 9. Recordkeeping and reporting will be in accordance with all federal regulations.



Beta Intrafield Pipelines and Cable Routes

FIGURE 7-1

SECTION 8

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MESA^2, Inc., 1979, Deep Water Beta Platform Site Evaluation, previously provided as Appendix 8.15.

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APPENDIX A

INVENTORY OF EQUIPMENT
CLEAN COASTAL WATERS

INVENTORY OF EQUIPMENT
CLEAN COASTAL WATERS

CCW Office/Storage Yard
1185 West Seaside Boulevard
Long Beach, California 90802
Phone 213/432-1415 24 Hr.

EQUIPMENT	LOCATION

BOATS/VESSELS

Oil Spill Response Vessel (OSRV)

CLEAN WATERS I — Berth 59, Port of Long Beach

Dimensions 145' x 35'
Clear deck space 97' x 27.5' = 2,668 sq.ft.
Elevated stern deck 26' x 35' = 910 sq.ft.
Fuel capacity - 34,000 gal.
Potable water 1,200 gal.
Ballast and storage 4,031 barrels
Main engines - 4 12 V-71 GMC
Speed 10.5 kts.
Accommodations - complete for 10 persons
Electronic - Radar, 2-VHF Marine, UHF and VHF - CCW frequency

Major Onboard Equipment

Hydraulic Boom Reel w/1,500 ft. Expandi model 4300 - 20" x 23"
Vikoma Seapack w/1,600 ft. boom 17" x 27"
Goodyear Boom 1,500 ft 12" x 24"
Walosep Skimmer model W3
Destroil Advancing skimmer Model DS 210
Oil/water separating tank - 70 barrels
Hydraulic crane 12 ton cap. 50 ft. boom
Surface dispersant spray system
Dispersant 220 gal. Corexit 9527
14' skiff w/25 H.P. engine

Fast Response Boats (FRB)

RESPONSE I — Berth 59, Port of Long Beach

Dimensions 34' x 10'
Clear deck space 10' x 22' = 220 sq.ft.
2 - 200 HP engines
Fuel capacity - 200 gal.
speed 25 kts +
Electronics - Radar, VHF Marine, UHF and VHF - CCW frequency

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INVENTORY OF EQUIPMENT
CLEAN COASTAL WATERS

CCW Office/Storage Yard
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EQUIPMENT	LOCATION

FAST RESPONSE BOATS (FRB) (Continued)

Onboard equipment

16 bales sorbent pads
200 ft. sorbent boom
2 boxes plastic bags
4 - 40 gal storage barrels
6 sorbent pad recovery pkgs.

RESPONSE II — Berth 59, Port of Long Beach

Dimensions 34' x 10'
Clear deck space 10' x 22' = 220 sq.ft.
2 - 200 HP engines
Fuel capacity - 200 gals.
Speed 25 kts +
Electronics - Radar. VHF Marine, UHF - CCW frequency
Tracker buoy locator with antenna.

Onboard equipment

1,000' 14" x 17" Expandi boom Model 3000

RESPONSE III — Berth 59, Port of Long Beach

Dimensions 34' x 12"
Clear deck space 12' x 22' = 264 sq.ft.
2 - 175 HP engines
Fuel capacity - 200 gals.
Speed 25 kts+
Electronics - Radar, VHF Marine, UHF - CCW frequency

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EQUIPMENT	LOCATION

FAST RESPONSE BOATS (FRB) (Continued)

Onboard equipment

Walosep Skimmer Model W1
Hydraulic power and pump pack
Oil/water separating tank
Kepner storage bag - 1,200 gal.
1 ton hydraulic crane w/15' boom

MV RECOVERER — Berth 48, Port of Long Beach

196' Oil Tanker
10,000 barrels oil storage
8 ton hydraulic crane w/50' boom
Accommodations - complete for 20 persons
Electronic - 2 Radar VHF Marine, UHF - CCW frequency

14' ALUMINIUM SKIFF w/25 HP engine — Clean Waters I, Berth 59, Port of Long Beach

12' ALUMINIUM SKIFF w/15 HP engine trailer mounted — CCW storage yard

16' Boat with 40 HP motor
Trailer mounted
Onboard equipment
400' 6" x 12" Acme boom

16' Boat with 40/HP Motor
Trailer mounted
Onboard equipment
100' 6" x 12" Acme boom

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EQUIPMENT	LOCATION

SKIMMERS

CLEAN WATERS II

Berth 36
Port of Long Beach

Marco Class II skimmer
40' x 12' self propelled catamaran
Main engines 2 - 180 HP diesel
speed 9 Kts.
Fuel capacity 300 gals.
Propulsion - Hamilton jet
Bow thrusters (2) 15 HP
Onboard storage 32 barrels
Oil transfer pumps 2,400 G.P.M.
Induction pump 1 - 16 HP
Filter Belt 1 - 3' x 29'

Highly manueverable catamaran with endless oleophilic pick up module mounted between the hulls. Can be used as an independent unit or any length of boom can be connected to each bow of the skimmer and positioned by boats to form a "V" with skimmer at the apex. Excess of oil storage can be pumped into storage bags or another vessel.

WALOSEP SKIMMER

Clean Waters I
Berth 59
Port of Long Beach

Model W3

Pump capacity 420 BPH
Hydraulic power and pump pack

WALOSEP SKIMMER

Model W1

Response III
Berth 59 - Long Beach

Pump capacity 300 BPH
Hydraulic power and pump pack

DESTROIL SKIMMER - (Advancing)

Clean Waters I
Berth 59 - Long Beach

Model DS 210
Pump capacity - 200 G.P.M.
Springsweep outrigging system

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EQUIPMENT	LOCATION
SKIMMERS - (Continued)	
050 CYCLONET Oil recovery system mounted on self-propelled 24' Zodiac boat with twin 50 hp engines. Oil and water is separated by centrifical force as boat is moved forward through oil to be recovered. Oil is pumped to storage bags or into another vessel.	CCW Storage Yard
MARK II SKIMMERS - 2 30' x 14' twin hulled catamarans equipped with weir type skimming system. To be towed with oil boom extensions or tied along side of any motor vessel. Oil is pumped from weir to storage bags or to another vessel. Recovery rates from 50 to 200 gpm.	CCW Storage Yard
ACME SKIMMERS - 4 1 - Model DS 150 3 - Model DS 400 Weir type skimmer. Air or gasoline drive. To be used inside boom or to remove oil confined around docks and ships.	Beach Cleanup trailer #1 CCW Storage Yard
KOMARA SKIMMERS - 1 Rotating disc type skimmer operated and controlled by hydraulic power. Can be used on open ocean inside boom for oil recovery.	Two Harbors, Catalina
SEAVAC SYSTEM - 2 Slurp skimmer with 2" homelite diaphram pump Oil water separator, floats, hoses, etc.	1 - CCW Storage Yard 1 - Two Harbors, Catalina

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EQUIPMENT	LOCATION
CONTAINMENT BOOM:	
VIKOMA SEAPACKS - 2 1600' ocean boom carried in a 23' planing hull for fast response. Can be towed and deployed with any vessel of opportunity.	1 - Clean Waters I, Berth 59, Long Beach Harbor 1 - Two Harbors, Catalina (on trailer)
VIKOMA SEAPACKS - 2 Owned by others	2 - CCW Storage Yard 1 owned by Shell 1 owned by Sohio (on trailers)
3100' GOODYEAR BOOM - (12" x 24")	1,500' Clean Waters I, Berth 59, Long Beach Harbor 1,600' CCW Storage Yard
5000' KEPNER BOOM - (20" x 30")	Berth 36, Long Beach Pactow facility
3000' KEPNER BOOM - (20" x 30")	Berth 213 Terminal Island Crowley Facility
4100' KEPNER COMPACTI BOOM - (16" x 23") Stowed in covered van for transfer and deployment.	3100' in Van #2 - CCW Storage Yard 1000' - Two Harbors, Catalina
5000' KEPNER BOOM - (14" x 16")	Berth 170, LA Harbor, Shell Dock
12,000' EXPANDI BOOM - (14" x 17") Stowed on four trailers to be towed to any spill site for deployment	4 - Trailers (1 Huntington Beach, Aminoil) (2 El Segundo, Chevron Refinery) (1 CCW Storage Yard)
1500' EXPANDI BOOM - (20" x 23")	CCW Storage Yard

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EQUIPMENT	LOCATION
CONTAINMENT BOOM - (Continued)	
1000' EXPANDI BOOM - (20" x 23")	Two Harbors, Catalina
1500' EXPANDI BOOM _ (20" x 23")	CLEAN WATERS I
3000' EXPANDI BOOM - (14" x 17") Hydraulic Boom Reel - trailer mounted for towing.	CCW Storage Yard
500' EXPANDI BOOM - (14" x 17")	CCW Storage Yard Beach Cleanup Van #1
1000' EXPANDI BOOM - (14" x 17")	Response II, Berth 59, Long Beach Harbor
500' ACME BOOM - (6" x 12")	CCW Storage Yard
200' CONWED SORBENT BOOM	Two Harbors, Catalina

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INVENTORY OF EQUIPMENT
CLEAN COASTAL WATERS

CCW Office/Storage Yard
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EQUIPMENT	LOCATION
OIL CONTAINMENT BAGS	
DUNLOP DRACONES - 3 Heavy duty sea bag used with any skimmer. Holds 1,440 gal. Equipped with towing hose assemblies and fittings.	1 - Clean Waters I, Berth 59 Long Beach 1 - CCW Storage Yard 1 - Two Harbors, Catalina
KEPNER SEA BAGS - 2 1200 gallons oil container. These to be used with recovery systems until barge or other containment vessel is on-site.	1 - Response III - Berth 59 Long Beach 1 - Two Harbors, Catalina
DISPERSANT EQUIPMENT	
100 drums Corexit 9527	79 - bbls CCW Storage Yard 1 - bbl Two Harbors, Catalina 20 - bbl Signal Hill (Shell)
1 - DC 4 Aircraft fully equipped for spraying Dispersant. Is under contract to CCW 3000 gal. capacity pumping and loading equipment onboard aircraft.	Mesa, Arizona 4 hr. response to California
2 English Type Vessel Spray booms, pumps, breaker boards, etc.	1 - CCW Storage Yard 1 - Clean Waters I - Berth 59 Long Beach
1 - 300 gallon helicopter spraying unit, fitted to any helicopter with cargo hook.	CCW Storage Yard

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INVENTORY OF EQUIPMENT
CLEAN COASTAL WATERS

CCW Office/Storage Yard
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EQUIPMENT	LOCATION
MISCELLANEOUS EQUIPMENT	
2 - Double Diaphram Pumps Used with Mark II Skimmer	CCW Storage Yard
1 - 100 PSIG Joy Air Compressor To be used with double diaphram pumps	CCW Storage Yard
1 - 1 hp Air Compressor w/tank	CCW Storage Yard
1 - Hydraulic Power Block Used for recovery of Vikoma Sea Boom	Clean Waters I, Berth 59 Long Beach
1 - Hydraulic Power Pack	CCW Storage Yard
2 - Zon Guns	CCW Storage Yard
1 - Av-Alarm Used for frightening birds	CCW Storage Yard
8 - Drogues	CCW Storage Yard
2 - Electronic Tracker Buoys Used for tracking oil slicks	CCW Storage Yard

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1185 West Seaside Boulevard
Long Beach, California 90802
Phone (213)432-1415 24 Hr.

EQUIPMENT	LOCATION

STORAGE FACILITIES:

1. VAN #1 - Enclosed van trailer at CCW storage yard. Beach clean-up gear including beach matting, shovels, pitch forks, absorbents, etc.

2. VAN # 2 - Enclosed van trailer stores 3100' Kepner Boom at CCW storage yard.

3. VAN #3 - Available for transport of miscellaneous clean-up equipment. CCW Storage Yard.

4. One - 40' x 20' prefab building. Two Harbors, Catalina. Storage and field headquarters.

Revision #1
August/1983

INVENTORY OF EQUIPMENT
CLEAN COASTAL WATERS

CCW Office/Storage Yard
1185 West Seaside Boulevard
Long Beach, California 90802
Phone 213/432-1415 24 Hr.

EQUIPMENT	LOCATION

COMMUNICATIONS EQUIPMENT

A 26' Motor Home converted for use as a Mobile Command Center. Completely self contained including built-in generator, cooking, sleeping and sanitary facilities.

The MCC has all ocean charts, shoreline sensitivity map (NOAA) and other information to assist in planning special response measures for sensitive areas within CCW's area of interest.

Communications Equipment - In MCC:

UHF Base station - F1 repeater - 459.000 MHz F2 direct 454.000 MHz

Call sign KDG 703

VHF Base station - F1 repeater - 158.445 MHz F2 direct 159.480 MHz

Call sign KCD 769

VHF Marine 55 Channel including weather and marine operator channel

Call sign WQA 870

Telephone w/two jacks - 300' connector wire

Six UHF Portable radios - 454.000/459.000 MHz

One VHF Portable radio - 158.445/159.400 MHz

Two battery chargers - (6 batteries each)

Twelve spare batteries (portable radios)

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INVENTORY OF EQUIPMENT
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EQUIPMENT	LOCATION
COMMUNICATIONS EQUIPMENT - (Continued)	
Base Units	
4 UHF - 454.00 MHz 459.00 MHz	1 - CCW office 2 - CCW Storage Yard 1 - Two Harbors, Catalina
4 VHF - 158.445 MHz 159.480 MHz	1 - CCW office 2 - CCW Storage Yard 1 - Two Harbors, Catalina
Mobile Base	
4 UHF - 454.000 MHz - 459.000 MHz	1 - Clean Waters I 1 - Mobile Command Center 2 - CCW Storage Yard
2 VHF - 158.445 MHz - 159.480 MHz	1 - Clean Waters I 1 - Mobile Command Center
Marine VHF	
8 Units	2 - Clean Waters I 1 - Response I 1 - Response II 1 - Response III 1 - M/V Recoverer 1 - CCW Office 1 - Mobile Command Center
Portable Units	
29 UHF - 454.000 MHz 459.000 MHz	12 - CCW Storage Yard 6 - Mobile Command Center 2 - Crowley Office 5 - Manager's Auto 2 - Two Harbors, Catalina 2 - Clean Waters I
5 VHF - 158.445 MHz 159.480 MHz	4 - CCW Storage Yard 1 - Manager's Auto

Revision #1
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INVENTORY OF EQUIPMENT
CLEAN COASTAL WATERS

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EQUIPMENT	LOCATION
COMMUNICATIONS EQUIPMENT - (Continued)	
1 Mobile Telephone	Manager's Auto
Converta-com	
6 Units - Converts portable radio to base unit with external antenna and speaker	1 - Response I 1 - Response II 1 - Response III 1 - Mobile Command Center - driver 1 - Manager's Auto 1 - CCW Storage Yard
2 - Portable Repeaters VHF - 454.000 MHz UHF - 459.000 MHz	CCW Storage Yard

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