EXXON COMPANY, U.S.A.
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Noted - Dunaway

SANTA YNEZ UNIT PRODUCTION ORGANIZATION

ROBERT L. LAGE
OPERATIONS DEVELOPMENT MANAGER

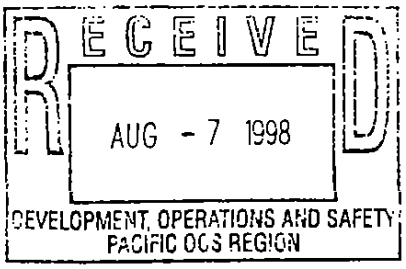
August 7, 1998

Santa Ynez Unit
Heritage Extended Reach Drilling
Development of Heather Platform Area
(Revised)
File No. 52.026

Noted - Wolfson

Noted - Grant

Mr. Thomas W. Dunaway
Regional Supervisor
Minerals Management Service
Pacific OCS Region
770 Paseo Camarillo
Camarillo, California 93010-6064



Dear Tom:

Exxon Company, U.S.A. requests approval for the development of Santa Ynez Unit Sacate Field which is referred to in the Development and Production Plan (DPP) as the Heather Platform Area (Participating Area II) by drilling extended reach wells from the Heritage platform. Consistent with our previous discussions, this development is a minor revision to the latest update of the approved DPP and is the result of an updated reservoir development evaluation together with recent technology advances in the drilling of extended reach wells. We believe this development approach will enable the Heather Platform Area reserves to be exploited in an efficient and timely manner.

A summary of the proposed development is provided in Attachment I, including information requested by your staff and other agencies following reviews of our evaluation and our initial letter request which was · on March 25, 1998. In addition, revised pages to the most recent version of the DPP are included in Attachment II and incorporate the minor changes in the development plan for the Heather Platform Area.

The scope of the development includes minor Heritage platform topside modifications to accommodate Heather Platform Area production and the drilling of ten wells, including one, as yet to be defined, outpost well. The final number of development wells will depend upon reservoir performance, resolution of geologic uncertainties, and

economic conditions. It is our intention to fully develop the Heather Platform Area by extended reach wells from Heritage, however, before requesting that Platform Heather be deleted from the DPP, we believe it is prudent to confirm that these long-reach wells can be cost-effectively drilled and produced, and that the reservoir is not significantly different than currently assessed. The cost and technical feasibility of drilling such wells can be determined in the initial phases of our development. The geologic and the reservoir performance data required to assess the resource will need to be acquired over a longer period and will require drilling of many, if not all, the planned wells.

We appreciate the attention you and your staff continue to devote to this important development. If you have any questions regarding this request, please contact me at (805) 494-2670 or Bill Grady at (805) 494-2678.

Sincerely,

BJG/jfd
98-315
Attachments

c: (without Appendix A revisions)
Mr. D. A. Hammond - Nuevo Energy Company
Ms. M. Gasperini - SBC P&D

bc: E. L. Cheney
R. D. Lattanzi
R. A. Masonheimer
J. M. Penny
K. T. Radtke
R. R. Rounsaville

(without attachments)
P. E. Conner
G. S. Goss
E. E. Lesikar
R. D. Schilhab

Attachment I

HERITAGE EXTENDED REACH DRILLING DEVELOPMENT OF HEATHER PLATFORM AREA FIELD

Geology

- The Monterey structural interpretation has been revised as a result of a detailed stratigraphic study and the 1995 3-D seismic data. Analysis of a true stratigraphic representation of the steeply dipping Monterey Formation reveals a relatively uniform formation thickness across the field except where impacted by a significant disconformity in the Massive Chert. As a result, the Monterey can be mapped without the numerous large scale north by northeast striking faults (greater than 400' of throw) previously mapped. The 1995 3-D seismic, which has a resolution down to about 300', supports this interpretation. Extensive minor faulting (on the order of 200' or less) is expected across the crest due to the severe structural folding, but these faults are not of sufficient offset to restrict flow in the 400'-plus thick Upper Siliceous.

Reservoir

- Based on pressure and production performance in the Hondo and Pescado fields and regional mapping which indicates a large contiguous aquifer, the depletion mechanism for Heather Platform Area is expected to be water drive with reservoir pressure maintained above bubble point. This is a change from previous predictions of dissolved gas drive with gas injection required for pressure maintenance. Recovery is now expected to be only from the fracture system with no contribution by gas expansion in the matrix.

Wells

- Due to the above changes in the Monterey structural faulting and depletion mechanism, it is expected that six production wells completed near the top of the Upper Siliceous will be adequate to drain the Monterey reserves. This compares to the previous estimate of 16 producers and two gas injectors. Three of the six wells are located along the crest of the central area of the field. An additional well in the central area and a well to the east, upstructure from P-0194 no. 2, are dependent upon post-drill structure and performance results from the initial three wells. The sixth well is to the west near P-0195 no. 2 and is considered high risk due to the complex geology. Additional geologic evaluation will be required before a decision can be made on this location.

- The development well requirements for the Heather Platform Area Sandstone formations have been revised based on updated structure maps and re-evaluation of recoverable reserves.

The number of Vaqueros/Alegria producers required to deplete the oil reserves north of the Sacate fault has been revised from four wells to one structurally high well based on updated structural interpretation and fluid contact analysis.

One of the two Gaviota oil producers north of the Sacate fault has been risked out of the development in the current proposal. The well that was eliminated was an offset to the exploration test in P-0193 no. 7 which has a marginal reserve size.

South of the Sacate fault, the approved Development and Production Plan (DPP) includes six non-associated gas producers, consisting of two Gaviota, one Matilija (previously called the Camino Cielo), and three dual Vaqueros/Matilija producers. Due to the relatively small reserve distributed vertically throughout the sandstone section, the revised proposal is for one crestal well to produce the Gaviota and Vaqueros reserves by completing initially in the Gaviota and reworking to the Vaqueros as the reserves are depleted. Development of the Matilija reserves has been risked out of the current proposal due to poor reservoir quality assessed from the drill stem test (DST) results, however, favorable Matilija production experience in future Pescado wells could provide a basis for a future well to the Matilija at Sacate.

- The approved DPP specifies an Outpost well to test deep sandstone potential on Lease OCS-P 0192. This is unchanged in the current proposal.

- Heather Platform Area wells will be drilled from spare well slots on the Heritage platform. If more than ten wells are required to ultimately develop Sacate reserves, it is feasible to reuse slots when either Pescado or Sacate wells deplete. The total number of wells drilled from the Heritage Platform as a result of this development will be below the 60 permitted for the platform.

  The casing program (Monterey and Sandstone wells) will be the same as specified in the DPP for "deep Monterey wells" except the protective casing will be tapered. The Monterey wells are to be completed with 4-1/2" production tubing with gas lift valves, dual downhole electric submersible pumps (ESP), and a downhole diluent injection system to ensure continuous flow during periods of increasing watercut and high emulsion viscosities. The placement of the ESP is limited by the curvature of the pipe, but can operate in hole angles up to 90°. Typically, the ESP will be located mid-depth (approximately 5,000' subsea) where the hole angle is above 75° and, therefore, in an essentially straight pipe section. The Sandstone wells will be completed with 3-1/2" tubing and gas lift valves.

- The Heritage rig equipment will be upgraded for the use and containment of mineral oil-based muds (MOBM) and to accommodate the extra lengths of 5-1/2" drill pipe. A non-volatile mineral oil-based drilling mud (i.e., Escaid 110) will be used to assist in drilling selected portions of the wells. Approximately 5300 barrels of mineral oil

and MOBM will be transported to the platform during drilling of the first well using routine supply boat trips (total trips about five to nine). Each subsequent well will require approximately 2800 barrels of mineral oil to be transported to the platform (total trips about three to five). These muds have properties similar to ordinary lubricating oils (i.e., high initial boiling point, high flash point, and very low vapor pressure). The Escaid product will be combined with water (10-20%) and normal mineral oil-base drilling additives and solids. The muds are exempt from monitoring under SBC APCD Rule 331 due to their designation as heavy liquids. In addition, the muds have a reactive organic compound (ROC) content of less than 10% as required by the Platform Heritage Permit to Operate. Finally, since the muds have a vapor pressure of less than 0.5 psia, the provisions of Rule 326 do not apply.

The MOBM will be stored on the platform between wells to minimize transportation requirements. The solids control equipment on the rig will be upgraded specifically to minimize degradation of the mud. Mud will be added as necessary from storage tanks to replace losses to cuttings and the formation. Disposal of this mud is not expected, but if necessary, any waste mud will be injected into a designated approved disposal well on Heritage (HE-21). If a spill of MOBM occurs during drilling or transport, Exxon will immediately implement our oil spill response procedures. At the completion of the drilling program, the MOBM will be returned to the owner company using routine supply boat trips and ultimately reused.

The cuttings collected when drilling with MOBM will be sent to a slurrification unit on the platform where they will be ground into small particles and injected into the designated approved disposal well. Occasionally, cuttings may need to be transported and ultimately be disposed onshore. When this occurs, the same procedures will be used as are currently in place for handling water-based cuttings that do not pass the sheen test requirements of our current National Pollutant Discharge Elimination System (NPDES) permit. During drilling operations with MOBM, there will be no discharge to the ocean and, therefore, there will be no requirement to modify the NPDES permit.

Production Facilities

- Heather Platform Area production will utilize existing Heritage topsides facilities as well as the Las Flores Canyon (LFC) onshore treating facilities. Heather Platform Area wells will be tied directly into the existing production and well test separators and associated systems. Production will be allocated between Heritage Platform Area wells and Heather Platform Area wells on the basis of monthly well test results. In order to obtain acceptable metering accuracy, we are currently evaluating modifications to upgrade the test separator measurement systems that could include new or upgraded meters or other procedural approaches. Other minor modifications to the Heritage facilities include an upgrade of the electrical systems to supply power for electric submersible pumps and installation of an electric drive

pump and associated piping to enable downhole injection of diluent. To accommodate this equipment, one or two small deck extensions may be required.

Several of the proposed topsides modifications (e.g., separator meters, diluent system, and miscellaneous piping) will include components that will need to be added to the fugitive monitoring and inspection program. The estimated ROC emissions from these sources total a maximum of 0.05 lbs./hr. using the SBC APCD's current fugitive leak factors. This total, in and of itself, is within the de minimus limit specified in Rule 202.D.6 which would exempt these emissions from the permit requirements of Rule 202. In addition, after each well is drilled, the wellhead will add an estimated 0.03 lbs./hr. of ROC fugitive emissions, which likewise will be exempt from permitting.

- Production from the Heather Platform Area will produce into spare Heritage and LFC capacity that is available due to declining Heritage Platform Area production. Thus, the approved production levels for SYU will not be exceeded. Heather Platform Area oil production will peak at about 8 to 10 thousand barrels per day and gas production will peak at 6 to 8 million standard cubic feet per day. The addition of this production is not expected to extend the life of Platform Heritage and the associated facilities beyond that currently foreseen for the existing developed production.

Timing

- Project timing is currently envisioned as follows:

  - 3Q98 Project regulatory approval and funding
  - 4Q98 - 1Q99 Permit and spud first well.
  - 2Q99 - 3Q99 Initial production from first well.
  - 2Q99 - 3Q99 Install topsides modifications.

locations of all the proposed platforms and the marine terminal are given in Table 1.1 and shown in Figure 1.3.

The projected schedule is shown in Figure 1.4. The Harmony and Heritage jackets were installed in December, 1989, and March 1990, respectively, with production start-up scheduled for the third quarter of 1993.

it is proposed to develop the reserves in the Heather Platform Area by drilling from Heritage platform. Present plans continue to include Platform Heather until it can be confirmed that these long-reach wells can be cost-effectively drilled and produced, and that the reservoir is not significantly different than currently assessed. Installation of Platform Heather will be deferred at least until after **2002**.

This Development and Production Plan is submitted per Minerals Management Service request for a summary of all updates since the approval of the original on December 27, 1982. Exxon has two development options, Option A for offshore oil treating and Option B for onshore oil treating. Option A will be updated if required, while Option B is fully updated as current plans are to treat oil onshore.

This plan includes the following project areas: geology, reservoir evaluation, platform sites and structures, drilling plans and facilities, subsea production systems, offshore platform facilities, pipelines, oil and gas treating facilities, crude transportation and field operations. The Attachments highlight the Critical Operations and Curtailment Plan, the H_2S Contingency Plan, and the Oil Spill Contingency Plan for California Operations.

Attachment II
SUMMARY OF DPP REVISION 8/98

- Section I
  - Page I-5 — Subsection I.1: Revise wording
- Section II
  - Page II-iii — Geology Plates: add 2.1A and 2.2A; revise 2.8 and 2.9
  - Page II-13 to 14 — Subsection 2.4.4: revise wording
  - Plate 2.1A, 2.2A, 2.8 and 2.9 — Add 2.1A and 2.2A; revise 2.8 and 2.9 (Appendix A)
- Section III
  - Page III-ii — Table of Contents: revise page numbers
  - Page III-iv — Figures: add 3.4A
  - Page III-7 to 8 — Subsection 3.4.2.1: revise wording
  - Page III-10 to 16 — Subsection 3.4 to 3.6: revise wording
  - Page III-37 to 41 — Tables 3.12 to 3.16: revise wording (Appendix A)
  - Figure 3.4A — Add 3.4A (Appendix A)
- Section V
  - Page V-i — Table of Contents: revise page numbers
  - Page V-iii — Figures: add 5.7A and 5.7B
  - Page V-2 to 3 — Subsection 5.3: revise wording
  - Page V-5 to 6 — Subsection 5.4.1 and 5.4.2: revise wording
  - Page V-8 — Subsection 5.4.4: revise wording
  - Page V-13 to 15 — Subsection 5.4.5 and 5.4.6: revise wording
  - Page V-16 — Table 5.1: revise wording
  - Figures 5.7A and 5.7B — Add 5.7A and 5.7B
- Section VII
  - Page VII-7 to 8 — Subsection 7.4.2.1: revise wording
  - Page VII-10 — Subsection 7.4.2.5: revise wording

locations of all the proposed platforms and the marine terminal are given in Table 1.1 and shown in Figure 1.3.

The projected schedule is shown in Figure 1.4. The Harmony and Heritage jackets were installed in December, 1989, and March 1990, respectively, with production start-up scheduled for the third quarter of 1993. **Due to recent advances in extended reach drilling technology, it is proposed to develop the reserves in the Heather Platform Area by drilling from Heritage platform. Present plans continue to include Platform Heather until it can be confirmed that these long-reach wells can be cost-effectively drilled and produced, and that the reservoir is not significantly different than currently assessed.** Installation of Platform Heather will be deferred at least until after **2002**.

This Development and Production Plan is submitted per Minerals Management Service request for a summary of all updates since the approval of the original on December 27, 1982. Exxon has two development options, Option A for offshore oil treating and Option B for onshore oil treating. Option A will be updated if required, while Option B is fully updated as current plans are to treat oil onshore.

This plan includes the following project areas: geology, reservoir evaluation, platform sites and structures, drilling plans and facilities, subsea production systems, offshore platform facilities, pipelines, oil and gas treating facilities, crude transportation and field operations. The Attachments highlight the Critical Operations and Curtailment Plan, the H_2S Contingency Plan, and the Oil Spill Contingency Plan for California Operations.

SECTION II

GEOLOGY

Note: Plates 2.1 to 2.11 contain detailed geologic and reservoir information which is considered EXXON PROPRIETARY and are located in a separate "Appendix A." NO DISCLOSURE OF THESE PLATES BEYOND THE MINERALS MANAGEMENT SERVICE IS ALLOWED WITHOUT PRIOR WRITTEN AUTHORIZATION FROM EXXON.

The structure maps show contours drawn on top of the horizon, major faults, well locations, and lease block outlines. The structure cross-sections are profile views. Type logs are representative electric well logs.

PLATES

2.1 Monterey Formation Siliceous Zone: Development Well Plan (Siliceous Zone Structure Top), Santa Ynez Unit.

2.1A Monterey Formation: 1997 Revised Development Well Plan (Upper Siliceous Structure Top), Heather Platform Area.

2.2 Structure Cross-Sections, Santa Ynez Unit.

2.2A Structure Cross-Sections: 1997 Revised, Heather Platform Area.

2.3 Type Log, Hondo/Harmony Platform Area.

2.4 Vaqueros/Alegria Formation: (Vaqueros/Alegria Structure Top), Heritage Platform Area.

2.5 Gaviota Formation: Development Well Plan (Gaviota Formation Upper Sand Structure Top), Heritage Platform Area.

2.6 Camino Cielo Formation: Development Well Plan (Camino Cielo Formation Structure Top), Heritage Platform Area.

2.7 Type Log, Heritage Platform Area.

2.8 Vaqueros Formation: 1997 Revised Development Well Plan (Vaqueros Structure Top), Heather Platform Area.

2.9 Gaviota Formation: 1997 Revised Development Well Plan (Gaviota Structure Top), Heather Platform Area.

2.10 Camino Cielo Formation: Development Well Plan (Camino Cielo Formation Structure Top), Heather Platform Area.

2.11 Type Log, Heather Platform Area.

Geology Section

Pursuant to the Freedom of Information Act (5 U.S.C. 552) and its implementing regulations (43 CFR Part 2) and as provided in 30 CFR 550.199(b), the information contained in this section is deleted from the public information copy of this submission.

Proprietary

Not for Public Release

SECTION III

RESERVOIR EVALUATION

TABLE OF CONTENTS (Cont.)

SECTION III

RESERVOIR EVALUATION

Note: Tables 3.1 to **3.4A** contain detailed reservoir information which is considered EXXON PROPRIETARY and are located in a separate "Appendix A." NO DISCLOSURE OF THESE TABLES BEYOND THE MINERALS MANAGEMENT SERVICE IS ALLOWED WITHOUT PRIOR WRITTEN AUTHORIZATION FROM EXXON.

FIGURES

Reservoir Evaluation Section

Pursuant to the Freedom of Information Act (5 U.S.C. 552) and its implementing regulations (43 CFR Part 2) and as provided in 30 CFR 550.199(b), the information contained in this section is deleted from the public information copy of this submission.

Proprietary

Not for Public Release

SECTION V

DRILLING PLANS AND FACILITIES

TABLE OF CONTENTS

SECTION V

DRILLING PLANS AND FACILITIES

FIGURES

Preliminary drilling equipment deck layouts are included on the deck plans shown in Section VII: Platform Harmony (Figure 7.5), Platform Heritage (Figure 7.17), and Platform Heather (Figure 7.29). Preliminary well bay layouts are shown in Figures 5.1 to 5.3. The drilling rigs will be especially designed and/or adapted for use on offshore platforms. The drilling contractor will have some flexibility in final equipment layouts, but the equipment will require compatibility with the platform deck designs.

5.3 Platform Drilling Equipment

5.3.1 Rig Components

Each drilling rig will have a ±150-foot derrick with a 1,000,000-pound hook load capacity and a drilling depth capability beyond 15,000 feet. The drawworks will be powered by two 1000-horsepower DC motors. The unit will include a sand line reel. The rotary table will be independently driven by a 1000-horsepower DC motor. The hook, traveling block, and crown will be of 500-ton capacity to match the derrick. The rig will use up to **5-1/2"** drill pipe of various grades.

5.3.2 Substructure

The substructure of each rig will be capable of supporting the derrick and setback loads. It is designed to provide unobstructed clearance for the blowout prevention equipment.

The substructure base will rest on skid beams elevated above the drilling deck. A hydraulic jacking system will be used to move the rig over the desired well slot. Mechanical restraints will be used to prevent movement once the rig is positioned.

5.3.3 Drilling Mud System

Each rig will have a separate mud system equipped with all of the components listed below.

Each mud system will contain two 1,600-horsepower mud pumps and approximately 1,200 barrels of active and reserve mud tank capacity. The system would include a mud mixing tank, a trip tank, and a sand trap tank below the shale shakers.

Up to three 1,000-cubic foot storage tanks will be provided for bulk barite and bentonite. Sacked mud additives will be stored on pallets. Storage for approximately 1,800 barrels of water will be provided.

Mud treating equipment will consist of dual screen shale shakers, a desilter, a desander, and a degasser. Oil contaminated cuttings will be caught and hauled to shore for disposal at an approved dump site. Centrifugal pumps will be installed for mixing mud, circulating mud through the desander, desilter, and degasser, and transferring mud, water, and diesel fuel. **The Heritage rig will be equipped with 2,400 barrels of additional oil mud storage tanks to enable the drilling of wells to the Heather Platform Area.**

5.4 Drilling Operations

5.4.1 Casing Program

The planned casing program consists of 26-inch conductor, 20-inch or 18-5/8-inch surface, 13-3/8-inch intermediate, and 9-5/8-inch production casing, as shown in Figure 5.4 (Monterey and Gaviota [Sandstone] Producer) and Figure 5.5 (Monterey gas injection well). On wells with a slotted casing completion, a 7-inch liner would be hung below the 9-5/8-inch casing, set at the top of the productive interval as in Figure 5.6 (deep Monterey producer and Monterey water disposal well) and Figure 5.7 (non-associated {Camino Cielo] gas well). Depending on individual well conditions, a 7-inch liner might also be used on wells with a measured depth greater than 12,000 feet. **Figures 5.7-A and 5.7-B show planned casing programs for Heather Platform Area Monterey and Sandstone wells drilled by Heritage Platform rig.**

The casing setting depths and cementing will be in accordance with **MMS requirements**. Exxon plans to install the 26-inch conductor by driving.

Exxon will design all casing to exceed anticipated burst and collapse pressures and tensile loads. Casing designs will include appropriate safety factors. Production casing and tubing subjected to sour oil and gas service will be made of controlled yield strength quenched and tempered steel.

5.4.2 Well Completions

Cemented and perforated casing (Figure 5.8) will be used when it is necessary to selectively produce the interval due to gas or water intrusion. When gas or water intrusion is not present, slotted **or perforated** casing (Figure 5.9) may be used. The completion tubing string will be designed for natural flow **and/or** gas lift, **and electrical submersible pumps**. The proposed well programs are shown in Table 5.1.

All 50 Harmony **Platform Area** wells (45 producers, 3 gas injectors, and 2 produced water disposal wells) will be completed in the Monterey Formation using tubing inside of either perforated or slotted production casing.

Three types of Heritage **Platform Area** wells are tentatively planned: 52 Monterey Formation producers, 4 Sandstone (Gaviota) dual producers, 3 gas injection wells, and 1 Camino Cielo Formation producer. The dual sandstone completion wells and the Camino Cielo well would be produced through tubing inside of perforated production casing. Monterey wells would be produced through tubing inside of either perforated or slotted production casing.

Two types of Heather **Platform Area** wells are tentatively planned: **6** Monterey formation, **1** Vaqueros/Alegria Formation producer, and **2** Gaviota producers. The Monterey wells would be produced using tubing inside of either perforated or slotted production casing. The **Sandstone** wells would be completed using tubing inside of perforated casing. All depletion wells could be available for recompletion to other producing formations.

1. A hydraulic actuating system with sufficient accumulator capacity to operate all functions without the aid of the hydraulic pumps and without reducing the chamber charge pressure below 1,200 psig. Air and electricity will drive independent hydraulic pumps.
2. A drilling spool with side outlets to provide for kill and choke lines.
3. Choke and kill lines, a choke manifold, and a fill-up line.
4. A top kelly cock installed below the swivel, and another at the bottom of the kelly that can be run through the blowout preventers.
5. An inside blowout preventer and a full opening drill string safety valve in the open position which would be maintained on the rig floor at all times while drilling.
6. A pit volume totalizer system, an incremental flow rate indicator, a pit level indicator, and a fill-up measurement system to continuously monitor mud volume. These devices will transmit visual and audible warnings to indicate abnormal conditions.

Control for operating the blowout prevention system will be located on the rig floor, at the accumulator unit, and in a remote platform location. Operation and testing of the BOP equipment will be in accordance with **MMS requirements**.

5.4.5 Typical Drilling Procedures

Typical drilling programs for the different development well types are given here. Each well will be drilled using these general procedures supplemented and modified as necessary for the particular well program and anticipated drilling conditions.

5. Run and cement 13-3/8-inch casing at 3,500 feet BML.
6. Directionally drill 12-1/4-inch hole to the proper depth for setting 9-5/8-inch casing (see Table 5.1). Run logs.
7. Run and cement 9-5/8-inch casing.
8. Directionally drill 8-1/2-inch hole to the proper depth for setting 7-inch liner (see Table 5.1). Log.
9. Run and cement 7-inch liner.
10. Run correlation log.
11. Perforate the Camino Cielo-Vaqueros/Alegria intervals.
12. Install completion equipment on dual 2-7/8-inch tubing.
13. Remove BOP stack and install christmas tree.

A typical Heather Platform Area Monterey well drilled from Heritage will be directionally drilled with the following general procedure:

1. **Move and rig up. Install diverter.**
2. **Directionally drill 17-1/2" hole to 1750' MD and underream to 22".**
3. **Run and cement 18-5/8" casing.**
4. **Directionally drill 17-1/2" hole to 6500' MD.**
5. **Run and cement 13-3/8" casing.**
6. **Install and test BOP stack.**
7. **Directionally drill 12-1/4" protective hole. Run logs as necessary.**
8. **Run and cement 9-5/8" production/protective liner.**
9. **Run and cement 11-3/4" production/protective tie back string to surface.**
10. **Directionally drill 8-1/2" production hole to TD. Run logs.**
11. **Run and cement 5-1/2" production liner.**
12. **Install completion equipment on 4-1/2" tubing.**
13. **Remove BOP stack and install christmas tree. Perforate the production interval.**

A typical Heather Platform Sandstone well drilled from Heritage will be directionally drilled with the following general procedure.

1. Move and rig up. Install diverter.
2. Directionally drill 17-1/2" hole to 1750' MD and underream to 22".
3. Run and cement 18-5/8" casing.
4. Directionally drill 17-1/2" hole to 6500' MD.
5. Run and cement 13-3/8" casing.
6. Install and test BOP stack.
7. Directionally drill 12-1/4" protective hole. Run logs as necessary.
8. Run and cement 9-5/8" production/protective casing.
9. Directionally drill 12-1/4" protective hole to TD. Run logs.
10. Run and cement 5-1/2" or 7" production liner.
11. Install completion equipment on 3-1/2" tubing.
12. Remove BOP stack and install christmas tree. Perforate the production interval.

5.4.6 Pollution Prevention

Most wells will be drilled with water-base mud. When water-base mud is in use, drill cuttings and mud will be checked for oil contamination prior to their disposal into the ocean in accordance with an NPDES permit. Any oil-contaminated cuttings that fail to meet discharge requirements will either be transport to shore for disposal or ground into a slurry and injected down an approved disposal well at the platform. Any water-base drilling mud that fails to meet discharge requirements will be injected down an approved disposal well at the platform.

For extended reach wells, protective and production hole intervals may be drilled with mineral oil-base mud (MOBM). When MOBM is in use, drilling operations will be conducted on a "zero discharge" basis. Typically, cuttings will be ground into a slurry and injected down an approved disposal well at the platform. If necessary, cuttings can also be transported to shore for disposal. MOBM will typically be salvaged, stored on the platform, and re-used. Excess MOBM will be hauled to shore for storage or returned for credit to the supplier. Any oil mud or oily waste that is not fit for salvage will be injected down an approved disposal well at the platform.

A deck drainage system will collect deck and equipment runoff. Before disposal into the ocean, the oil contained in the deck drainage will be skimmed off. The skimmed oil will be transported to shore**, typically by injection into the export pipeline**.

Trash and garbage will be transported to shore for disposal. Containers will be constructed to prevent accidental loss onboard or en route to the disposal site.

Drilling rigs will be powered by onshore-generated electrical power, thereby eliminating a significant amount of air pollutant emissions.

test headers will be provided in the wellhead manifold for future tie-in of high GOR wells to handle gas coning of some wells without having to expand the sales gas compression and gas conditioning system. High pressure production facilities, if required, will be a future addition on the drilling deck following completion of drilling. Well manifold piping connections will be provided to divert flow to either Production Separator.

Heritage also will have 60 well slots arranged in three rows of 18 each and one row of six. Of the 60 well slots, approximately 52 will be initially allocated as Monterey producers, four as Sandstone producers (dual completions), and one as a non-associated sweet gas well. The remaining three well slots will be utilized for gas reinjection. **Unused well slots can be used to develop the Heather Platform Area reserves.** The production system is divided into two parallel separation trains for Monterey wells and one for the Sandstone wells. Well manifolds will be provided to flow each well to a Production Separator. A gas lift manifold with metering will connect to the production casing of each Monterey producing well. The Sandstone wells will not require gas lift. An injection manifold with metering will connect to each of the reinjection wellheads. As for Harmony, high pressure production and test headers will be provided in the wellhead manifold for future tie-in of high GOR wells. Well manifolds for the Monterey wells will include piping to divert flow to either Production Separator.

Current plans are to develop the Heather Platform Area by drilling up to ten (10) extended reach wells from Platform Heritage. Platform Heather, **if required, is designed for** 28

well slots. It is anticipated that the production system for Platform Heather **could** be very similar to that for Platform Heritage.

7.4.2.2 Well Cleanup

The Well Cleanup system will be a single-train, one-stage system for bringing individual wells on stream after servicing, shutdowns, or completOion operations. The Well Cleanup Separator will remove undesirable workover fluids and solids. It can also be operated as a continuous flowing Test Separator. Gas from the Well Cleanup Separator can flow either to flare or to the first stage of compression.

7.4.2.3 Well Testing

Each of the two Monterey production trains will have a two-phase Test Separator. Both the gas and liquid streams exiting the separator will be metered. Connections will be provided for calibration of the meter by means of a portable test meter. Well testing will be controlled automatically. An additional Test Separator will be provided on Heritage and Heather for testing Sandstone and non-associated gas wells.

An additional production train will be provided on Heritage and Heather for production from the non-associated gas wells and the Sandstone wells. Produced fluids from the Sandstone and non-associated gas wells will be combined and flashed at 330 psig and 80 psig pressure levels. The separated liquid at 80 psig will be commingled with the Monterey Production Separator liquid upstream of the Emulsion Surge Tank. **Part of the Sandstone liquid may be metered and utilized as diluent for downhole injection for wells with high viscosity produced emulsion.** Part of the gas separated at 330 psig will be used as platform fuel gas, and the remaining gas will be routed to the gas compression/conditioning system.

7.4.2.6 Emulsion Shipping

The degassed emulsion will be pumped from the Emulsion Surge Tank to pipeline pressure, mixed with the Natural Gas Liquids (NGLs) from the gas conditioning system, and metered in the Automatic Custody Transfer (ACT) Unit before entering the submarine pipeline. The ACT Unit will be equipped with a meter prover and sampling system. Metering of the emulsion is discussed in Section 7.4.3.17.

7.4.2.7 Surge Tank Vapor (STV) Compressor System

The vapors from the Emulsion Surge Tank and the Vent Recovery Compressor will be routed to the STV Compressor Suction Cooler. The vapor will be cooled and sent to the STV Compressor Suction Scrubber along with the acid gas from the Amine Reflux Accumulator (Harmony only). The water and hydrocarbon liquids from the STV Compressor

TABLE 5.1

PROPOSED TYPICAL WELL PROGRAMS

Platform	Completion Type	Number of Wells	Formation	9-5/8" Casing Set (Feet Subsea)	**5-1/2" or** 7" Liner Set (Feet Subsea)	Reference Figure
Harmony	Single	45	Monterey	8,500	-	5.6/5.4
Harmony	Single	3	Monterey (Gas Injection)	7,400	-	5.5
Harmony	Single	2	Monterey (Water Disposal)	11,000	10,700 - 12,500	5.6
Heritage	Single	52	Monterey	7,200	-	5.6/5.4
Heritage	Single	3	Monterey (Gas Injection)	6,000	-	5.5
Heritage	Dual	4	Gaviota (Sandstone)	9,900	-	5.4
Heritage	Single	1	Camino Cielo (Non-Associated Gas)	10,600	10,300 - 12,500	5.7
Heritage	**Single**	**6**	**Heather Platform Area Monterey**	**5,700**	**5,500 - 6,600**	**5.7A**
Heritage	**Single**	**2**	**Heather Platform Area Vaqueros/Alegria/Gaviota**	**8,000**	**7,800 - 11,000**	**5.7B**
Heritage	**Single**	**1**	**Heather Platform Area Gaviota (Non-Associated Gas)**	**8,000**	**7,800 - 10,500**	**5.7B**

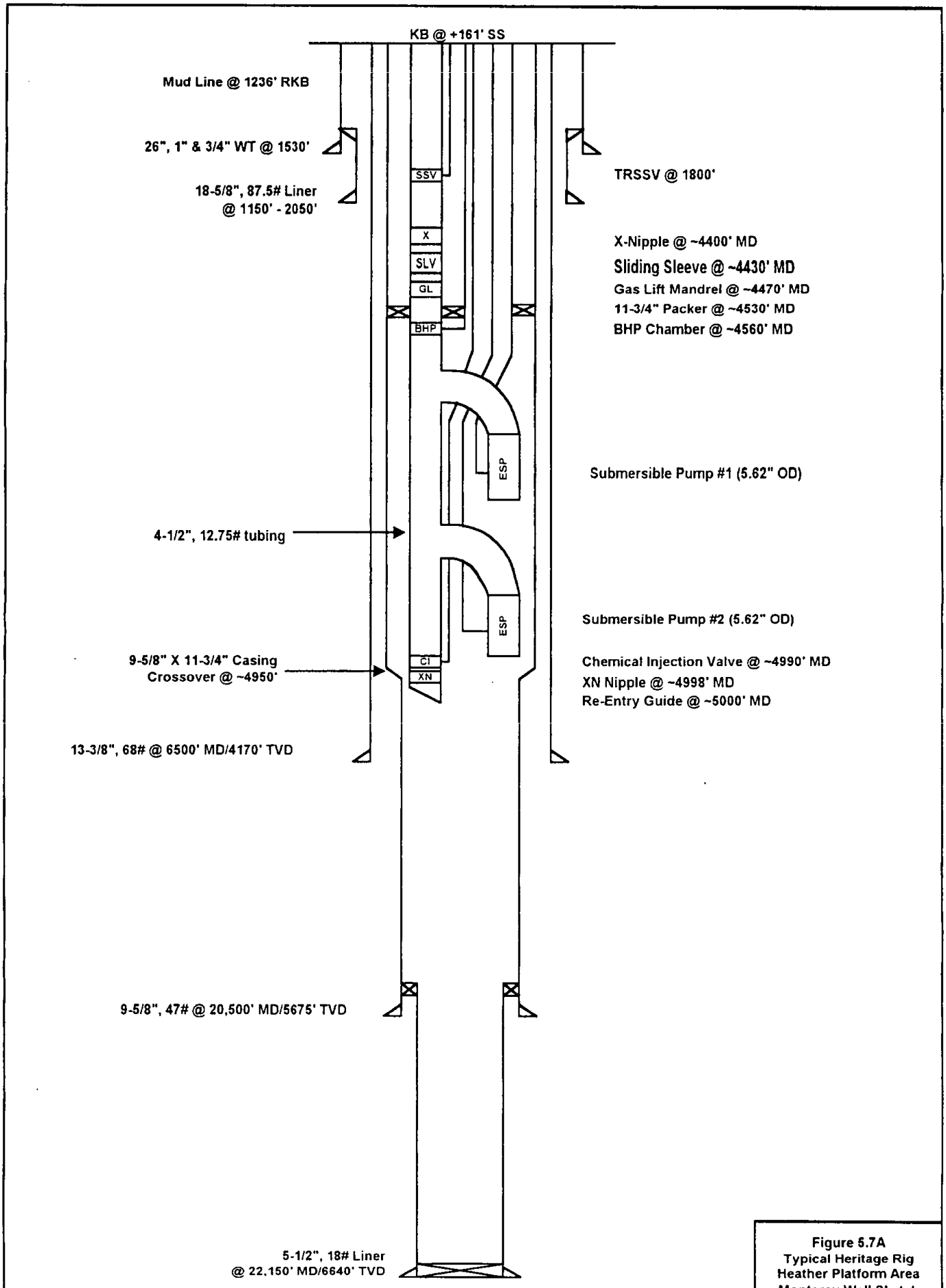


Figure 5.7A
Typical Heritage Rig
Heather Platform Area
Monterey Well Sketch

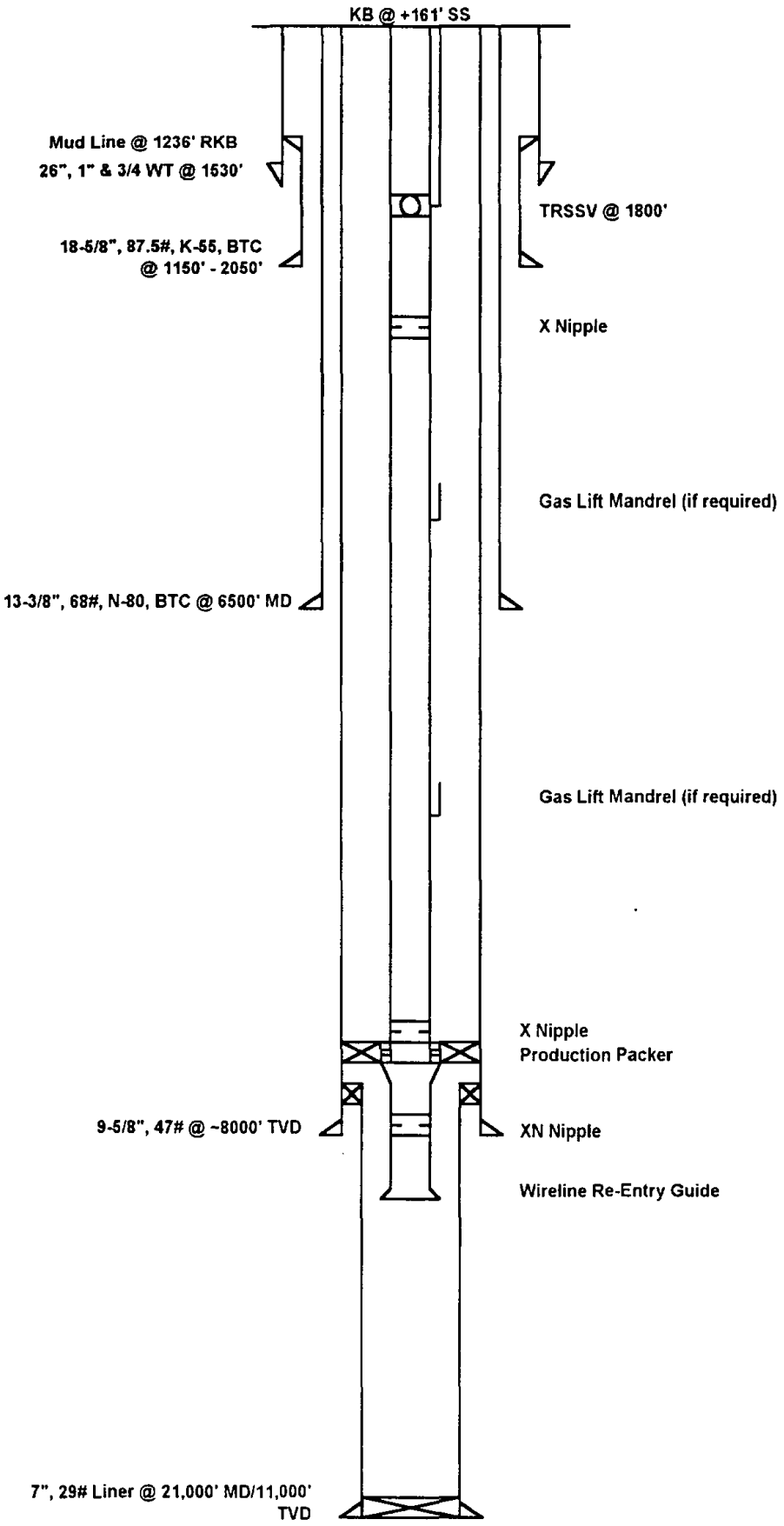


Figure 5.7B
Typical Heritage Rig
Heather Platform Area
Sandstone Well Sketch

TABLE 3.15

RESERVOIR AND FLUID PROPERTIES

HEATHER PLATFORM AREA (CAMINO CIELO)

General Description	
Producing Depth Interval, ft. subsea	11,600 to 12,050
Average Gross Thickness, ft.	190
Productive Area, ac.	1,350
Reservoir Properties	
Porosity, %(1)	1 to 13
Permeability, md(1)	0.01 to 0.5
Reservoir Temperature, °F (12,000' ss datum)	287
Original Reservoir Pressure, psig (12,000' ss datum)	5,780
Initial Condensate yield, B/MSCF	80
Fluid Properties	
Average Oil Gravity °API or Gas Gravity	0.7
Average Condensate Gravity °API	50
Initial Gas Formation Volume Factor	3.6

(1) Matrix Properties.

TABLE 3.12

RESERVOIR AND FLUID PROPERTIES
HEATHER PLATFORM AREA (MONTEREY)

General Description	
Producing Depth Interval, ft. subsea	5,400 to 7,100
Average Gross Thickness, ft.	1,200
Productive Area, ac.	4,182
Gas Cap to Oil Zone Ratio	--
Reservoir Properties	
Porosity, % **(matrix)**	5 to 25 (est.)
Porosity, % (fracture)	**0.5 to 2.5**
Permeability, md **(matrix)**	<1 to 5
Permeability, md (fracture)	**<10 to 10,000**
Reservoir Temperature °F (6,200' ss datum)	180
Original Reservoir Pressure, psig (6,200' ss datum)	2,840
Fluid Properties	
Average Oil Gravity, °API	15
Saturation Pressure, psig (6,200' ss datum)	1,920
Viscosity - Reservoir, cp (6,200' ss datum)	15 - 20
Initial Producing GOR, SCF/STB	240
Initial Oil Formation Volume Factor, RB/STB	1.2

TABLE 3.13

RESERVOIR AND FLUID PROPERTIES

HEATHER PLATFORM AREA (VAQUEROS/ALEGRIA)

General Description	Oil Reservoirs	Gas Reservoirs
Producing Depth Interval, ft. subsea	8,400 to 10,200	8,600 to 8,900
Average Gross Thickness, ft.	310	80
Productive Area, ac.	312	530
Reservoir Properties		
Porosity, %[1]	5 to 20	5 to 27
Permeability, md[1]	**1 to 500**	**100 to 500**
Reservoir Temperature, °F	245 (9,000' ss datum)	237 (8,700' ss datum)
Original Reservoir Pressure, psig	4,050 (9,000' ss datum)	4,100 (8,700' ss datum)
Initial Condensate yield, B/MSCF	NA[2]	46
Fluid Properties		
Average Oil Gravity °API or Gas Gravity	33	0.8
Average Condensate Gravity °API	NA	59
Saturation Pressure, psig (9,000' ss datum)	4,050	NA
Viscosity - Reservoir, cp (9,000' ss datum)	0.3	NA
Initial Producing GOR, SCF/STB	700	NA
Initial Formation Volume Factor	1.5 RB/STB	4.5 CUFT/KSCF

[1] Matrix Properties.

[2] Not Applicable.

TABLE 3.14

RESERVOIR AND FLUID PROPERTIES

HEATHER PLATFORM AREA (GAVIOTA)

General Description	Oil Reservoirs	Gas Reservoirs
Producing Depth Interval, ft. subsea	9,800 to 10,400	9,800 to 10,300
Average Gross Thickness, ft.	260	210
Productive Area, ac.	150	1,180
Reservoir Properties		
Porosity, %(1)	15 to 21	14 to 23
Permeability, md(1)	**1 to 300**	**1 to 300**
Reservoir Temperature, °F (9,800' ss datum)	250	250
Original Reservoir Pressure, psig (9,800' ss datum)	4,680	4,680
Initial Condensate yield, B/MSCF	NA(2)	80
Fluid Properties		
Average Oil Gravity °API or Gas Gravity	35	1.0
Average Condensate Gravity °API	NA	50
Saturation Pressure, psig (9,800' ss datum)	4,680	NA
Viscosity - Reservoir, cp (9,000' ss datum)	0.3	NA
Initial Producing GOR, SCF/STB	1,060	NA
Initial Formation Volume Factor	1.7 RB/STB	4.2 CUFT/KSCF

(1) Matrix Properties.

(2) Not Applicable.

TABLE 3.16

DEVELOPMENT WELL LOCATION

HEATHER PLATFORM AREA

Well	Formation	Lambert Coordinate Location X	Lambert Coordinate Location Y	Comments
1	Monterey	772346	831280	Planned oil
2	Vaqueros/Alegria	777250	832000	Planned oil
3	Monterey	775210	831230	Planned oil
4	Monterey	769300	831900	Planned oil
5	Monterey	781800	829300	Potential oil
6*	Gaviota	772250	832400	Planned gas
7	Gaviota	775680	833450	Potential oil
8	Monterey	765800	832780	Potential oil
9	Monterey	754490	834000	Potential oil
10**	Sandstone	781200	832100	Outpost

* Recomplete to Vaqueros upon depletion of Gaviota.

** Possible Outpost location to test for potential hydrocarbon accumulations in the deeper sandstone reservoirs (Vaqueros, Gaviota, and Camino Cielo) to the north of major east-west fault.

Appendix A
(Exxon Proprietary)

Information Redaction Statement

Pursuant to the Freedom of Information Act (5 U.S.C. 552) and its implementing regulations (43 CFR Part 2) and as provided in 30 CFR 550.199(b), some information has been redacted from this document and was deleted from the public information copy of this submission.

Proprietary Information Redacted

Not for Public Release