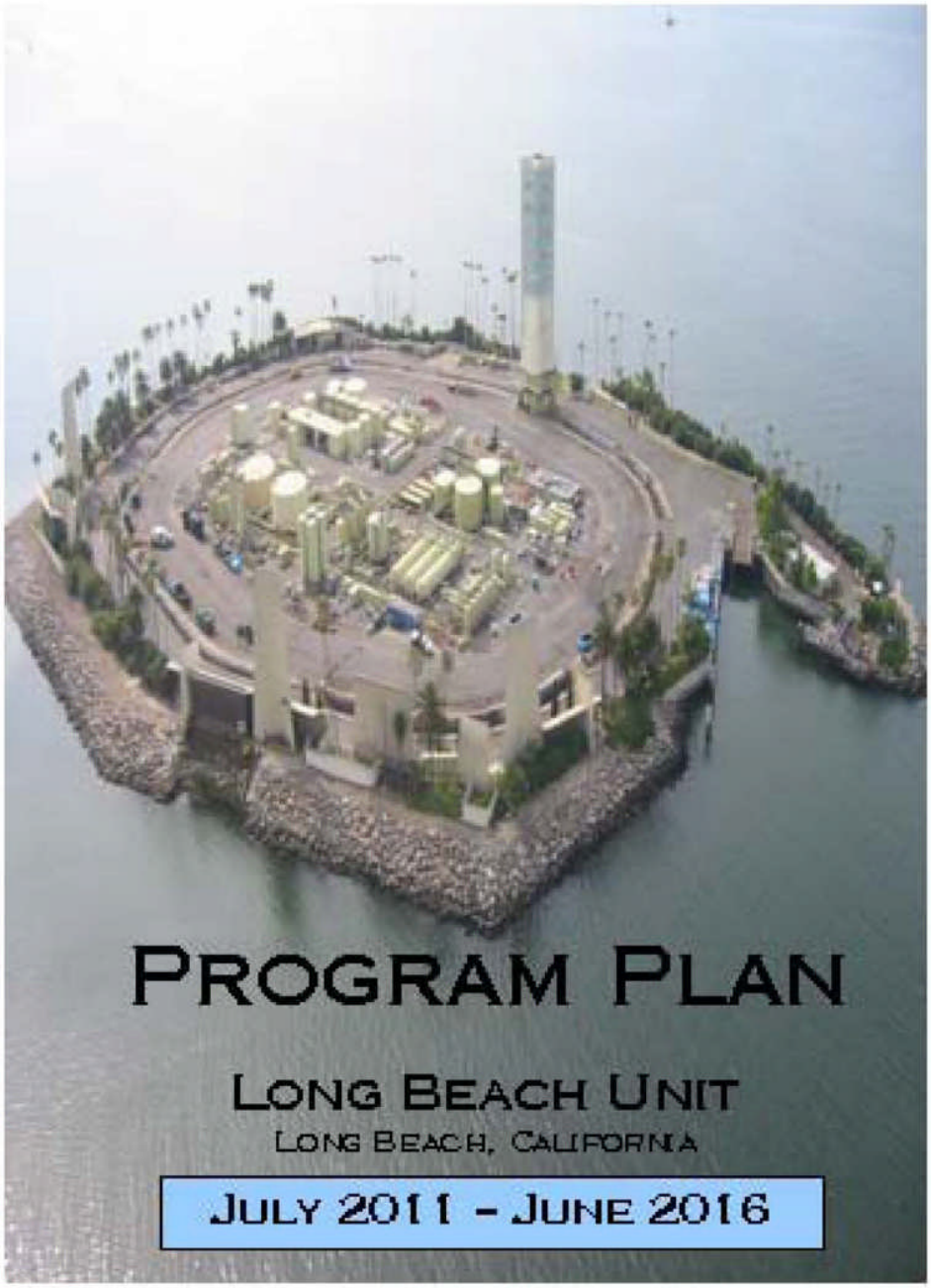
Exhibit B

W 17165



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Executive Summary

This Program Plan covers the period from July 1, 2011 through June 30, 2016. The purpose of the Plan is to describe key issues facing the Unit and to outline strategies for maximizing profitability while maintaining excellence in safety and environmental protection. This Plan is the culmination of a cooperative effort by the Long Beach Gas & Oil Department, City of Long Beach (Unit Operator), OXY Long Beach, Inc. (Field Contractor), and THUMS Long Beach Company (agent for the Field Contractor). The Program Plan meets requirements of Section 2.03 of the Optimized Waterflood Program Agreement ("OWPA").

The Program Plan describes the Unit reservoir management strategies to be implemented under the OWPA, including drilling plans and projected rates of production and injection. The Plan also includes a discussion of key issues facing the Unit, plans for major facility projects and initiatives to be implemented during the Plan period, and anticipated revenues and profits. The format is similar to the previous Program Plan.

The Plan includes expenses associated with drilling 231 development and replacement wells over the life of the Program Plan. This schedule will result in a steady decline in oil production rate through the end of FY15/16. Unit production and injection rates are expected to average 24.9 Mbopd, 1,023.7 Mbwpd and 1,118.9 Mbwipd in FY11/12 and 24.6 Mbopd, 1,053.2 Mbwpd and 1,139.2 Mbwipd in FY12/13, respectively.

The anticipated development drilling activity is detailed in Exhibit B and the predicted rate curves are shown in Exhibits E and F. This drilling activity encompasses all locations: Pier J, and Islands Chaffee, Freeman, Grissom and White with the use of Unit rigs T-3, T-5 and T-9, if needed, augmented with the use of other Unit rig assets, workover rigs, and coiled tubing units. The purchase or rental of additional peripheral equipment to maintain safe and efficient operations may be required. It is possible that development results, continuous reservoir review, improved Unit seismic data, and production history will yield additional new drilling candidates throughout the Plan period. Decisions regarding future drilling activity will be influenced by the quality of the projects identified and prevailing economic conditions.

Facility improvement projects envisioned during the Plan include completion of Pier J infrastructure and piping projects that will upgrade and ensure continued, efficient, production processing. Other work will focus on electrical infrastructure improvements to provide additional well capacity required to support the planned development program. These improvements are focused on right-sizing facility capacity limits to accommodate the forecast drilling program throughout all 5 years of the Program Plan period. These investments result in enhancement of revenue streams, lower maintenance and operational costs, and improved safety and environmental performance. The first year of the Program Plan also includes funds to design and install replacement pipe from Pier 3 through J4 and J5 to reduce facility risk. These lines were identified as high priority in the Pier J Piping Risk Assessment.

Based on production from 46 development and replacement well projects planned for FY11/12 of the Program Plan and an average oil price of $45.00/bbl, total revenue, expenditures, and net profits are projected to be $429.3 million, $377.6 million, and $51.7 million, respectively. Over the five-year Program Plan period, cumulative total

revenue, expenditures, and net profit are expected to reach $2,103.7 million, $1,915.2 million, and $188.5 million, respectively. A schedule of projected revenue, expenditures, and net profits by year is given in Exhibit A. Expenditure levels and project mix will be adjusted as needed to respond to fluctuations in oil price and other economic conditions.

Overview

This Program Plan covers the period from July 1, 2011 through June 30, 2016. The purpose of this Plan is to describe key issues facing the Unit, and to outline strategies for maximizing profitability while maintaining excellence in safety and environmental protection.

This Plan is divided into four major sections:

- The *Introduction* provides a brief summary of the Unit history.

- The *Unit Reservoir Management Plan* section outlines strategies to be employed in reservoir development and management. An overview of the field-wide goals and strategies is provided. Appendix 1 contains a more detailed Reservoir Management Plan for the six reservoir areas: Ranger West/Tar, Ranger East, Terminal, UP Ford, Shallow gas zone and 237 Zone.

- The *Unit Forecasts* section summarizes planned Unit drilling activity as well as projected production and injection rates during the Program Plan period.

- The *Major Issues and Projects* section describes the key issues facing the Unit. Key goals in the areas of people, safety, environmental protection, profitability, and subsidence control are described, as are plans for meeting those goals. Initiatives to manage costs through improved business and operating practices are described. Plans for maintaining and improving the field infrastructure, abandoning unusable wells, and managing external influences on the Unit are also described.

- The *Economic Summary* section provides a forecast of Unit revenues, expenditures, and profits anticipated during the Plan period, assuming an oil price of $45.00/bbl during the Program Plan period and gas price of $4.50/mcf. This section also includes the schedules that will be incorporated into the FY11/12 and FY12/13 Annual Plans.

Introduction

History

The Long Beach Unit ("Unit") commenced operation April 1, 1965. Since its inception, a major requirement of Unit operations has been to minimize the impact on the environment and to comply with all applicable environmental laws and regulations. No oil-related subsidence has occurred since the inception of the Unit, although minor positive and negative elevation fluctuations have been observed. An active subsidence monitoring system is in place and remedial measures would start immediately if significant subsidence was detected.

Development drilling began in July 1965. Initial development activity peaked with 20 rigs operating in 1968. This high level of drilling activity continued into early 1970. Drilling activity decreased to four rigs in 1973 and dropped to one rig in mid-1976. Full zone production and injection locations were emphasized. The pace of development accelerated in 1977, reaching a peak of nine rigs in 1982, when sub-zone development was initiated to improve oil recovery by completion of wells in sands with high remaining oil saturation. This level of activity was held until early 1986 when drilling activity again began to decline due to low oil price. Activity dropped to one rig in the summer of 1986. No drilling rig activity occurred from mid-March 1987 until August 1987, at which time one rig was re-activated. A second rig was started in January 1988, and a third in January 1990. Rig activity dropped to one rig again in 1994, fluctuated between a one and two rig pace until 2003 where it remained at two rigs until 2005. In September 2005 a third rig was contracted to capitalize on the high oil price environment. A review was made in 2007 to determine optimal drilling pace and Unit Stakeholders made the decision to move from a three to a two rig drilling program effective November, 2007. For the remainder of the FY07/08 fiscal year the drilling program was executed using two Unit rigs. In November 2008 a third rig was contracted to execute accelerated drilling pace due to 237 zone exploration wells and to support the activities from the Injection Balance and Optimization Team (IBOT) efforts. The Unit continued drilling operations with three rigs until January 2009 when the contract rig was demobilized. Drilling is expected to be at an approximately two-rig pace through the FY15/16

On January 1, 1992, ARCO Long Beach, Inc. ("ALBI") became the sole Field Contractor, having acquired interests from all previous Field Contractor companies. On the same date, the OWPA also took effect. On January 1, 1995, the term of the Contractors' Agreement was extended through the end of the Unit's economic life, in accordance with the OWPA. Consequently, THUMS Long Beach Company ("THUMS") will continue in its capacity as agent for the Field Contractor beyond the original contract term of April 1, 2000.

In April 2000, Occidental Petroleum Corporation bought all of Atlantic Richfield Company's stock in ALBI. As a result, the Field Contractor name was legally changed from ALBI to OXY Long Beach, Inc. (OLBI).

Unit Reservoir Management Plan

Goal

The goal of the Unit Reservoir Management Plan is to maximize the economic recovery of oil and gas from the Unit, while ensuring stable surface elevations, through the application of sound engineering practices. This will be achieved by utilizing existing Unit assets to maximize short and long term economic benefit, optimizing the Unit's waterflood depletion strategies, identifying investment opportunities, and delivering the expected results.

Reservoir Management Strategy

The Unit's Reservoir Management strategy consists of three elements:

1. Maximize economic production from existing assets by the use of sound waterflood practices. This effort is focused on waterflood surveillance activities including well monitoring, flood performance analysis, and voidage management for subsidence control. In third quarter of FY 07/08, an "Injection Balance and Optimization Team" (IBOT) was formed to execute such strategy through a structured and detailed process.
2. Assess and deliver additional development investment opportunities via the drilling and investment wellwork programs. Development activities are currently focused on capturing bypassed, unswept oil and increasing waterflood throughput in immature areas.
3. Implement new technologies to decrease costs, improve efficiencies, and develop unproven reserves. The Unit's Technology Plan identifies technology needs, impacts, and implementation issues. Enhanced oil recovery applications will be considered for implementation if economically and technically viable.

Each of these strategies is discussed in more detail below. Specific strategies and goals for each reservoir are included in the Appendix.

Production and Surveillance

A major goal of the Unit's reservoir management plan is to ensure the value from production is maximized. The reservoir management strategies for accomplishing this goal include well monitoring, flood performance analysis, and voidage management for subsidence control.

- Well monitoring activities include monthly testing of production wells, daily monitoring of injection well pressures and volumes, acquiring injection well profiles at least once every two years, and obtaining well pressure surveys as required to assess formation pressures. This data forms the cornerstone for reservoir analysis of production trends. THUMS Development and Operations Divisions work jointly to ensure the needed data is obtained in the most cost-effective manner.
- Waterflood performance will be analyzed using standard industry techniques to differentiate between good and poor pattern performance and identify well enhancement opportunities. Techniques used will include decline curve analysis, material balance, volumetrics, bubble maps, waterflood sweep, hydrocarbon

throughput analysis and streamline and other reservoir simulation methodologies. Based on the analysis results, development opportunities will be identified and evaluated including re-completions, profile modifications, new drill wells, and stimulations. In addition, as wells fail, the analysis results will be used to justify well maintenance work such as liner replacements, wellbore repairs, and pump changes. The maintenance work program is managed and executed by the Wellwork group.

- The Unit was formerly required to inject a total of 41.2 MBWPD in excess of gross production in designated voidage pools to ensure pressure maintenance and reduce the potential for subsidence. Since July 2006, the LBGO Subsidence and Geology Division, along with the Thums RMT and Well Surveillance Leaders have been periodically modifying the voidage accounting rules to ensure stable ground elevations (subsidence and dilation), while providing prudent operational flexibility to improve waterflood management. A collaborative effort is used on the methodology for the voidage account, and to identify key wells to survey for bottomhole pressures to support semi-annual ground elevation measurements.

Development Opportunities

The Unit has a strategy to invest and minimize the decline of the LBU's oil production rate. To support this strategy, development activities have focused on:

- Drilling injection wells targeting increased throughput in the less mature sand layers and improving zonal injection control. Drilling results to date have shown good success from injection wells drilled to re-establish injection patterns in the relatively underdeveloped areas of the field.
- Adding production wells: (1) in areas of unswept oil (2) in lower productivity sands that cannot produce well in combination with higher productivity zones in long completions, (3) in areas of high oil saturations banked along sealing faults, and (4) in areas where improved injection warrants additional production capacity.
- Investing in wellwork projects that will increase the ultimate recovery of the field or require special planning and attention. Investment wellwork includes well conversions, recompletions, permanent profile modifications and hydraulic fracture stimulations. Although most work is considered routine, fracture stimulations which are more complex, require special planning. The investment wellwork program is still one of the Unit's most successful programs, adding reserves at comparatively low cost. The investment wellwork program will continue at a healthy pace throughout the upcoming Plan period.

The Long Beach Unit has embarked on an effort to improve reservoir characterization across the Unit. With the assistance of Oxy's Worldwide Reservoir Characterization Group, other outside consultants and local staff, the Long Beach Unit continues to assess, understand and refine its knowledge of the reservoir and develop new production opportunities.

Technology

Advances in drilling and completion technology continue to be a significant factor in realizing development drilling opportunities. Key technologies being developed and applied include horizontal well placement, water shut-off techniques, special design and extended reach wells, cased hole completions including hydraulic fracturing and frac-n-pack completions, and low cost replacement wells. The Unit maintains a Technology

Plan that identifies technology needs, impacts, and implementation issues. Operational and technological areas addressed by the Plan include wellwork and drilling (artificial lift, stimulation, corrosion, and scale prevention), facilities (automation, corrosion control, water quality), reservoir (profile control, fracture, behind-pipe-oil detection, conformance evaluation software tools, reservoir modeling software tools, 3D reservoir characterization), and Health, Environmental and Safety training. Enhanced oil recovery applications will be considered for implementation if economically and technically viable.

Unit Forecasts

Drilling Schedule

The Program Plan projects development and replacement drilling to average approximately 46 wells per year in both FY11/12 and FY12/13. This schedule can be met with approximately 2 Unit drilling rigs running continuously. Workover rigs will continue to be used for new well completions to capitalize on improved completion quality control and to provide better drilling rig efficiency.

Exhibit B shows the drilling plan by Unitized Formation for the Program Plan period, and the required Schedules 1B and 2B show the anticipated range of development and replacement wells to be drilled into each cut-recovery block during FY11/12 and FY12/13. This drilling plan reflects the current understanding of new development well economics. The drilling candidate list is updated annually by the reservoir development teams. Drilling projects are submitted to Voting Parties for approval at least 2-4 months ahead of the planned spud date. Individual well AFEs are submitted subsequently. The economics of each well are fully investigated at that time, and changes in key factors such as oil price, drilling cost, or candidate quantity and quality may result in changes to the overall plan.

Rate Forecasts

Exhibit C shows the Unit production forecasts for the Plan period, and the required Schedules 1A and 2A show the anticipated rates for FY11/12 and FY12/13. These forecasts were developed by combining a forecast of existing well performance with the expected results of the previously outlined development plan. The expected case injection forecast shown in Exhibit D was generated based on the gross fluid rates from the production forecast. Graphs comparing historical and predicted field rate performance data are presented in Exhibits E and F. The plots clearly show the variability of historical rate data, necessitating the use of rate ranges to account for uncertainty in the rate projections.

The oil and water production forecast for the existing wells is based on a process that uses an extrapolation of wells within each Unitized Formation summed together to yield a forecast of the existing wells' production for the entire Unit. For each well, the expected future oil and water rates are extrapolated from historical trends of oil and gross fluid rates vs. time and the trend of water-oil ratio vs. cumulative oil production using conventional decline curve techniques. The resulting prediction shows a near term exponential decline of about 11% per year for the existing wells.

The incremental production contribution for new development wells is calculated by adding together type wells. The type wells are determined by reservoir area and completion type (conventional producer, frac producer, horizontal producer and injector). The engineers managing individual reservoir pools determine type wells for their areas based on historical performance. Depending on available data, type wells are built by reservoir, by pool, or by cut-recovery block. The producer type wells are based on recent development wells determining an average initial production rate and decline rate. The injector type wells are based on average injection rates, peak offset oil and gross response measured in effected wells and reserves. The type well rates are combined with the development drilling schedule to generate the expected rate contribution for new development wells. The total Unit production forecast is the sum of

the existing well and development well forecasts. The Unit water production forecast was derived as the difference between the gross fluid and oil production rates.

Major Issues and Projects

Several major issues must be considered when planning Unit strategies. These issues include consideration for people, health and safety, environmental protection, subsidence control, well abandonment, cost management, expansion of production infrastructure, shallow and deep gas development, electrical generation, taxes and make-up water sources. All can dramatically influence the success of the Unit, and as such, will be addressed with considerable effort and resources.

The most critical potential issues anticipated during the Program Plan period are discussed below. Actual operating practice will be adjusted in accordance with future economic circumstances, practical considerations, regulatory requirements, and any unforeseen situations that may arise.

People

The most important asset of the Unit is its employee resource and the ability of these employees to work together toward organizational goals. The Unit will strive to maintain a diverse workforce of employees who are positioned in the right job and who are well qualified to perform that job in a superior manner. Effective teamwork is expected of all Unit employees, as well as open communication, mutual respect, and individual accountability. Developing and enhancing job skills through training, education, and job experience will be emphasized through the Plan period.

Health and Safety

The Unit is committed to conducting all aspects of its business in a manner that provides for the safety and health of employees, contractors, and the public, and safeguards the environment in which it operates. Ensuring the safety of all personnel is crucial to the success of any enterprise and is a specific goal of the Unit. Operations are conducted in a manner to ensure compliance with applicable laws and regulations. The Health, Environment, and Safety (HES) Department is responsible for providing day to day health, environment, and safety support and service to the employees and contractors of the Unit.

Personnel awareness is essential for an effective safety program. Training will continue to be conducted routinely to meet regulatory requirements. Other safety awareness training will be conducted as areas of need are identified in health, environment, and safety practices

Contractor Safety has been and will continue to be a primary focus at Thums. Contractors participate in many of the on-site safety meetings and also serve on many of the safety related teams and committees. Contractor performance is reviewed frequently to ensure that expectations are understood and are being met. Aggressive safety performance goals are set each year and are tracked to measure bottom line improvement.

The Unit is proud of the safety record attained by its employees and contractors. To ensure continued compliance, safety assessments are conducted periodically by Unit personnel and outside organizations.

Environmental Protection

The Unit is committed to the protection of the environment, and as such has identified this as a key goal. All operations are conducted to minimize environmental impacts and comply with all applicable laws, regulations, and policies.

Precautions to prevent uncontrolled discharges are a high priority. Each island has oil spill response booms and deployment equipment for rapid containment. Response drills are conducted regularly to continually improve the effectiveness of personnel and equipment, and to test coordination with other agencies. Refinements to the response process and equipment will be made when necessary.

Personnel awareness is also essential for an effective Environmental Program. Training will be conducted routinely to meet all regulatory requirements and other environmental awareness training will be conducted as areas of need are identified.

The Unit continues to strive to improve the environmental record attained by its employees and is proud of it's accomplishments, including the Wildlife Habitat Council Certification of all four Thums Islands. To ensure continued compliance, environmental assessments are undertaken by Unit personnel and outside organizations.

Regulatory Environment

The regulatory and permitting outlook is an area of growing concern and could lead to unknown and potentially significant development, cost and production impacts in future years. In 2010, significant delays in well permitting became an issue that impacted drilling schedules. It also resulted in increased voidage management challenges resulting in production losses to maintain voidage conformance. As of this time, there is no resolution to the delays in well permitting. Other issues that could impact operations include severance tax proposals and similar tax/fee proposals related to the California budget situation.

Subsidence Control

A major goal during the operation and development of the Unit is the continued prevention of subsidence related to oil and gas production. Since the oil zones of the Wilmington Oil Field are susceptible to compaction, injection rates must be managed and reservoir pressures must be maintained to prevent subsidence.

Currently, injection-voidage targets are maintained in eleven reservoir pools in the Tar, Ranger and Terminal Zones to ensure pressure maintenance and reduce the potential for subsidence. Current injection rules require net injection to exceed gross production by an average of 41.8 MBWPD in the eleven voidage pools with each pool having specific injection requirements. Since July 2006, the LBGO Subsidence and Geology Division, along with the Thums RMT and Well Surveillance Leaders, have been periodically modifying the voidage accounting rules to ensure stable ground elevations, while providing prudent operational flexibility to improve waterflood management. A collaborative effort is used on the methodology for the voidage account, and to identify key wells to survey for bottomhole pressures to support semi-annual ground elevation measurements.

Well Abandonment Plan

The Unit attempts to minimize the inventory of idle wells that have no further economic benefit. Each plugback of an idle well reduces the ultimate liability for that well to the cost of completing the surface abandonment. This prudently reduces overall future abandonment liability as well as the potential for detrimental in-zone cross flow.

Wells with no further economic use are fully abandoned to reduce the Unit's future abandonment liability. Abandonment also eliminates the costs of performing periodic pressure tests of long-term idle well casings mandated by the State Division of Oil, Gas and Geothermal Resources. Unit engineers regularly review idle wells and evaluate their potential value to the Unit. Those found to have little or no value are added to the queue of wells to be plugged or abandoned. The Unit plans provide funding for both in-zone and mud-line abandonments that will allow the Unit to reduce its abandonment liability.

Cost Management

The Unit continuously strives to be efficient in spending its operational funds. Emphasis is given to spending funds wisely, investing in opportunities with the best economic return, and continuing to look for ways to become more efficient in business operations. Employing effective cost management strategies will aid in achieving the Unit's goal of performing in the lowest cost per net barrel quartile for comparable operations. Cost management gains will be aggressively pursued during the term of this Plan. Some of the areas where the Unit plans to make substantial gains include the following:

Operations: The Facility Operations group is accountable for electricity usage, operation of oil, gas and water treating facilities, chemical usage and acquisition of make-up water. Amine Plant operations, used to reduce produced-gas CO2 levels, will be optimized in conjunction with Power Plant operations. Process optimization, best operating practices, and operating cost reductions will be focus areas. Improvements in electrical efficiency, optimization of make-up water sources, maintaining water quality, enhanced well surveillance, and improved coordination between operations, wellwork, and facility maintenance are expected outcomes over the Program Plan period.

Waste Management: Operations at the slurrification well continue to save waste disposal costs associated with drill cuttings and other waste and reduce potential future liabilities for waste disposal. This Plan includes operating and maintenance costs for this beneficial project.

Maintenance Wellwork and Drilling Operations: In order to reduce overall Unit development costs, several challenges will be addressed during the Program Plan period. These include rig resource allocation, rig equipment, wellbore maintenance, high demand for quality labor and equipment, increased labor rates, improving safety performance, reducing well failures, and complex formation injection and pressure profile optimization projects. Several teams have been formed to focus on these areas of the business. Some of these include a well failure analysis team, a rig utilization team and a contracts/alliances team.

Drilling/Wellwork Equipment: Future drilling activity can be accomplished on Pier J, and Islands Chaffee and Freeman with the use of Unit Rig T-9. Activity on Grissom can be accomplished with Unit Rig T-5. Activity on Island White can be accomplished with Unit Rig T-3. Additional drilling methods or equipment will be considered for lowering drilling

costs on all locations. These additional equipment could include contract drilling rigs, workover rigs and coiled tubing units and the use of top drive components.

Expansion of Pier J Electrical Infrastructure

Expansion of current electrical facility will be needed to provide electrical capacity for the field development during the Program Plan period at the Pier J facilities. The existing electrical service capacity is sufficient to handle our current load but will not be able to handle future development. Activities to help achieve capacity expansion include new SCE 66KV service substation, transformers, electrical switchgears, motor control centers, and conduits. The planned expansion will also optimize system reliability by providing back-up service to minimize production downtime in the event of a primary electrical service failure. This Plan includes funding to complete the upgrades needed to meet the anticipated drilling activity.

Shallow and Deep Gas Development

Currently the Shallow Gas accumulation under Grissom and White has been produced. However, Shallow Gas production was shut down from the middle of July to mid December 2010 for repairs and maintenance on subsea lines. White Shallow Gas production has been added through well B403, while four producers (A271, A301, A310 and A313) on Grissom make up for the majority of production. As the wells water out, shallower gas sands will be added to continue the production of Shallow Gas.

Electricity Generation

Electricity is the single largest cost element for the Unit. Currently the Unit consumes approximately 700 million kWh per year, and is one of the largest single-site users of electricity in Southern California Edison's territory. Any change in the electrical rates or availability of electricity supply significantly affects the profitability of Unit operations.

The Unit constructed a 47MW power generation plant in an effort to increase the California in-state generation supply, as well as insulate the Unit from the risks of electricity supply disruptions and escalating wholesale electric costs. The plant commenced operations in FY02/03.

The power plant was converted into a cogeneration facility in FY04/05 to provide heat to a neighboring wallboard manufacturing facility, reducing their reliance on natural gas. As a result, and depending on demand from the wallboard facility, the Unit receives revenue from heat sales and favorable treatment regarding departing load charges that may be assessed for leaving Southern California Edison's electricity grid.

Efforts will also focus on electrical production equipment efficiency. Injection pumps will utilize power monitoring devices to identify opportunities for improving their electrical efficiency. Work will also continue with the Unit's submersible pump supplier to identify opportunities for reducing power usage on submersible pumps.

Taxes

The County of Los Angeles has significantly increased the assessed value of the Unit. Estimation of taxes for the Plan period assume an annual 3% increase, although determination of actual tax levies will be based on assessor valuation, again driven by oil price.

Make-up Water Sources

A reliable source of water to be used for injection is vital to the success of the Unit. Water injected into the formations serves two purposes: 1) controlling subsidence and 2) enhancing oil recovery. In order to meet voidage targets, make-up water is purchased from sources outside the Unit. The Unit's primary make-up water sources include Tidelands Oil Production Company produced water and Long Beach Water Department (LBWD) reclaimed water. Due to cost and environmental considerations, the Unit will use fresh potable water from LBWD only when necessary as a back-up supply.

The Unit evaluated the usage of reclaimed water because of quality issues related to Tidelands water and the high cost and potential for interruptions in supply of the LBWD fresh water. This evaluation resulted in the Unit installing facilities to utilize reclaimed water supplied by the LBWD. Reclaimed water provides a long-term source of make-up water at a lower cost than fresh potable water.

THUMS is working closely with Tidelands to anticipate water needs and sources to satisfy the injection needs in the Unit.

Economic Summary

Revenue Forecast

Unit Revenue will be generated from the sale of oil and gas from six producing formations: Lower Pliocene shallow gas sands, Tar, Ranger West, Ranger East, Terminal, and UP Ford/237. The projected revenue during the Program Plan period is $2,103.7 million, based on a $45.00/bbl oil price and $4.50/mcf gas price, and average daily oil and gas production as projected in Exhibit C. Projected revenue for FY11/12 is expected to be $429.3 million.

Cost Forecast

Total estimated expenditures for the first year of this Program Plan are consistent with the FY11/12 Annual Plan. Costs in subsequent years are projected by establishing a relationship between current costs and the variables believed to be principally responsible for driving future costs by Category. The most leveraging cost drivers overall are the levels of gross fluid production and injection, discretionary activity levels (e.g., drilling, abandonment, and major projects), and the number of wells and facilities that are active at a given time.

Based on the projected production rates, injection rates and activity levels, total expenditures during the Program Plan period are expected to be $1,915.2 million. The projected expenditures for FY11/12 are $377.6 million. Costs in future years will be refined upon completion of ongoing studies and projects and also be affected by changes and adjustments that may result from the economic conditions.

Profit Forecast

Based on the above revenue and cost forecasts, Unit profit during the Program Plan period is projected to be $188.5 million. Unit profit for FY11/12 is expected to be $51.7 million. A schedule of annual projected revenue, expenditures, and net profit is given in Exhibit A.

Budget commitments for FY12/13 will be established based on actual results and additional insights gained during FY11/12.

Table 1
SUMMARY OF PRODUCTION AND INJECTION
AS OF OCTOBER 2010
JULY 2011 – JUNE 2016 PROGRAM PLAN, LONG BEACH UNIT

		Active Well Count		Average Rates for October 2010				Average Well Rates	
Reservoir	CRB	Producers	Injectors	BOPD	BWPD	BIPD	Wtr Cut	BOPD/ Well	BIPD/ Well
SG	65	0	0	0	0	0	0.00%	-	-
	66	0	0	0	0	0		-	-
Tar	35	5	1	72	817	1,962	92%	14	1,962
Ranger	1	41	28	1,349	65,818	75,620	98%	33	2,701
West	2	28	16	1,034	39,991	44,851	97%	38	2,894
	3	39	28	1,510	77,799	90,199	98%	39	3,221
	4	58	28	2,210	107,413	102,594	98%	38	3,664
	5	32	25	1,368	71,999	81,719	98%	43	3,269
	7	18	8	498	19,899	21,351	98%	28	2,847
	8	12	8	329	18,049	18,099	98%	27	2,413
	9	7	6	330	6,389	9,074	95%	47	1,512
	10	23	18	939	30,325	37,799	97%	42	2,100
	11	11	5	838	10,418	10,169	93%	80	2,034
	12	6	4	254	6,656	6,944	96%	42	1,736
	13	6	5	247	11,341	9,445	98%	41	1,889
	36	21	17	688	35,537	45,436	98%	33	2,754
	37	7	9	282	13,858	21,909	98%	40	2,434
	Total	**311**	**204**	**11,950**	**516,311**	**577,171**	**97.74%**	**38**	**2,829**
Ranger	14	16	17	589	21,705	33,707	97.36%	37	2,043
East	15	38	22	1,194	50,674	51,669	97.70%	31	2,403
	16	18	9	587	17,628	15,621	96.78%	33	1,736
	17	24	12	741	17,115	18,628	95.85%	32	1,552
	18	16	13	382	19,524	30,752	98.08%	24	2,366
	20	11	5	290	9,387	9,518	97.00%	26	1,904
	32	2	2	34	1,356	2,141	98%	17	1,070
	33	30	18	960	42,864	43,624	98%	32	2,424
	21	33	23	1,274	44,259	48,604	97%	39	2,113
	22	18	6	498	15,307	12,834	97%	28	2,139
	Total	**206**	**126**	**6,549**	**239,818**	**267,098**	**97.34%**	**32**	**2,120**
Terminal	24	29	18	817	19,413	25,092	96%	28	1,394
	38	37	20	1,100	54,657	61,245	98%	30	3,062
	39	30	13	908	28,021	29,548	97%	30	2,273
	40	7	6	100	3,335	6,223	97%	14	1,037
	41	4	2	189	3,480	3,253	95%	47	1,626
	42	10	5	290	12,752	9,875	98%	29	1,975
	43	35	18	1,026	29,565	30,393	97%	29	1,688
	47	4	1	15	580	-	98%	4	-
	Total	**156**	**83**	**4,446**	**151,802**	**165,628**	**97.15%**	**29**	**1,996**
UP/Ford	26	0	2	-	-	2,001	0%	-	1,000
	27	17	16	625	14,002	17,341	96%	37	1,084
	31	10	5	143	4,892	4,902	97%	14	980
	44	4	6	66	2,594	7,099	98%	16	1,183
	45	23	14	677	18,343	14,168	96%	29	1,049
	46	27	18	959	21,846	23,294	96%	36	1,331
	Total	**81**	**60**	**2,470**	**61,678**	**68,804**	**96.15%**	**30**	**1,147**
237	30	2	0	389	2957	0	0.00%	-	-
	LBU Total	761	474	25,875	973,383	1,080,662	97.41%	34	2,280

Exhibit A

ECONOMIC PROJECTIONS
July 1, 2011 through June 30, 2016 Program Plan
(Million Dollars)

	Fiscal 2011/12	Fiscal 2012/13	Fiscal 2013/14	Fiscal 2014/15	Fiscal 2015/16	Program Plan Period
Estimated Revenue						
Oil Revenue	$410.8	$403.2	$400.8	$399.5	$399.8	$2,014.0
Gas Revenue	$18.5	$17.6	$17.6	$17.8	$17.9	$89.6
Total Estimated Revenue	$429.3	$420.9	$418.5	$417.3	$417.7	$2,103.7
Estimated Expenditures	$377.6	$387.2	$385.6	$382.8	$382.0	$1,915.2
Net Income	$51.7	$33.7	$32.9	$34.5	$35.7	$188.5

Exhibit B

Anticipated Drilling Schedule

July 1, 2011 through June 30, 2016

FISCAL YEAR	RANGER WEST	RANGER EAST	TERMINAL	U.P. FORD/ 237	TOTAL WELLS
2011/12	25	10	7	4	46
2012/13	25	10	6	5	46
2013/14	25	5	11	6	47
2014/15	17	11	8	9	45
2015/16	17	11	6	13	47

* See text for a description of the process that will be used to identify and approve all new locations
** Development drilling of proven, risked probable and possible replacement wells

Exhibit C

Range of Production Rates

July 2011-June 2016 Program Plan

Long Beach Unit

FISCAL YEAR	EXPECTED RANGE			EXPECTED RATE		
	OIL MBOPD	WATER MBWPD	GAS MMCFPD	OIL MBOPD	WATER MBWPD	GAS MMCFPD
2011/12	23.7 - 26.2	973 - 1,075	10.7 - 11.8	24.9	1,024	11.2
2012/13	23.3 - 25.8	1,001 - 1,106	10.2 - 11.3	24.5	1,053	10.7
2013/14	23.2 - 25.6	1,041 - 1,150	10.3 - 11.4	24.4	1,095	10.8
2014/15	23.1 - 25.5	1,077 - 1,191	10.3 - 11.4	24.3	1,134	10.8
2015/16	23.1 - 25.5	1,111 - 1,228	10.4 - 11.4	24.3	1,170	10.9

Exhibit D

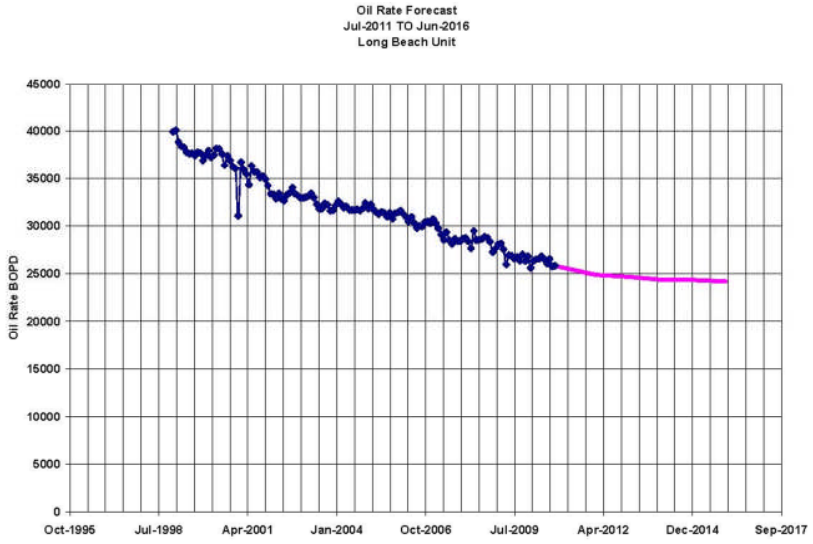
Range of Injection Rates

July 2011-June 2016 Program Plan

Long Beach Unit

FISCAL YEAR	WATER INJECTION RATE		RANGE OF INJECTION PRESSURES			
	RANGE MBWPD	EXPECTED MBWPD	TAR PSI	RANGER PSI	TERMINAL PSI	U. P./FORD PSI
2011/12	1,056 - 1,167	1,119	UP TO 1500	UP TO 2500	UP TO 2500	UP TO 3000
2012/13	1,085 - 1,200	1,139	UP TO 1500	UP TO 2500	UP TO 2500	UP TO 3000
2013/14	1,128 - 1,246	1,184	UP TO 1500	UP TO 2500	UP TO 2500	UP TO 3000
2014/15	1,167 - 1,289	1,224	UP TO 1500	UP TO 2500	UP TO 2500	UP TO 3000
2015/16	1,202 - 1,329	1,262	UP TO 1500	UP TO 2500	UP TO 2500	UP TO 3000

Exhibit E


Oil Rate Forecast
Jul-2011 TO Jun-2016
Long Beach Unit
Oil Rate BOPD
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
Oct-1995
Jul-1998
Apr-2001
Jan-2004
Oct-2006
Jul-2009
Apr-2012
Dec-2014
Sep-2017

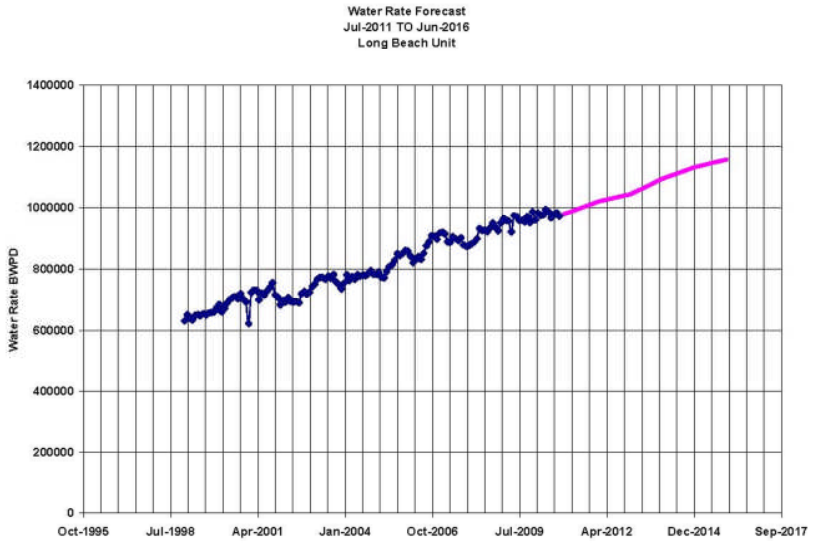

Water Rate Forecast
Jul-2011 TO Jun-2016
Long Beach Unit
Water Rate BWPD
1400000
1200000
1000000
800000
600000
400000
200000
0
Oct-1995
Jul-1998
Apr-2001
Jan-2004
Oct-2006
Jul-2009
Apr-2012
Dec-2014
Sep-2017

Exhibit F

Gas Rate Forecast
Jul-2011 TO Jun-2016
Long Beach Unit
Gas Rate MCFD
16000
14000
12000
10000
8000
6000
4000
2000
0
Oct-1995
Jul-1998
Apr-2001
Jan-2004
Oct-2006
Jul-2009
Apr-2012
Dec-2014
Sep-2017

Schedule 1 A

Range of Production and Injection

FY 2011/12

Long Beach Unit Program Plan, July 2011-June 2016

FISCAL YEAR	RANGE OF PRODUCTION AND INJECTION RATES			
	OIL MBOPD	WATER MBWPD	GAS MMCFPD	INJECTION MBWPD
2011/12	23.7 - 26.2	973 - 1,075	10.7 - 11.8	1,056 - 1,167

FISCAL YEAR	RANGE OF INJECTION PRESSURES			
	TAR PSI	RANGER PSI	TERMINAL PSI	U. P./FORD PSI
2011/12	UP TO 1500	UP TO 2500	UP TO 2500	UP TO 3000

Schedule 1 B

Anticipated Development and Replacement Locations

Fiscal Year 11/12

Long Beach Unit Program Plan, July 2011-June 2016

Reservoir	CRB	Producers					Injectors				
		Grissom Min - Max	White Min - Max	Chaffee Min - Max	Freeman Min - Max	Pier J Min - Max	Grissom Min - Max	White Min - Max	Chaffee Min - Max	Freeman Min - Max	Pier J Min - Max
Tar		0 - 2	0 - 2				0 - 1	0 - 1			
SG		0 - 1	0 - 1								
Ranger West	1	0 - 3					0 - 2				
	2	1 - 3	0 - 1				1 - 1	0 - 1			
	3	0 - 3	0 - 1				0 - 1	0 - 1			0 - 1
	4	1 - 3	0 - 1		0 - 1	0 - 1	1 - 2	0 - 1		0 - 1	0 - 1
	5	0 - 1			0 - 1	0 - 1	0 - 1			0 - 1	0 - 1
	7				0 - 1					0 - 1	
	8							0 - 1			
	9		0 - 1					0 - 1			
	10		0 - 1					0 - 2			
	11		0 - 1					0 - 1			
	12		0 - 1					0 - 1			
	13		0 - 1					0 - 1		0 - 1	
	36				0 - 1	0 - 1				0 - 1	0 - 1
	37				0 - 1					0 - 1	
Ranger East	14		0 - 1					0 - 1			
	15		0 - 1		0 - 1			0 - 1		0 - 1	
	16								0 - 1		
	17			1 - 2					0 - 1		
	18			1 - 1					0 - 1		
	20			0 - 1					0 - 3		
	21			1 - 2					1 - 2		
	22			0 - 1					0 - 1		
	33			0 - 1					0 - 1		
Terminal	24		0 - 1					0 - 1			
	38	0 - 1				0 - 1	0 - 1				0 - 1
	39	0 - 1	0 - 1				0 - 1			0 - 1	
	40		0 - 1								
	41	0 - 1				0 - 1	0 - 1				0 - 1
	42			0 - 1					0 - 1		
	43			0 - 1	0 - 1				0 - 1	0 - 1	
	47										
UP Ford	26				0 - 1					0 - 1	
	27		0 - 2		0 - 1			0 - 1		0 - 1	
	30			0 - 2	0 - 1						
	31	0 - 1	0 - 1		0 - 1	0 - 1	0 - 1	0 - 1		0 - 1	0 - 1
	44			0 - 2					0 - 1		
	45			0 - 1				0 - 1	0 - 1		
	46			0 - 1	0 - 1				0 - 1	0 - 1	
237	30	0 - 1		0 - 2	0 - 2						
		Total					Total				
		5 - 78					3 - 64				

Schedule 2 A

Range of Production and Injection

FY 2012/13

Long Beach Unit Program Plan, July 2011-June 2016

FISCAL YEAR	RANGE OF PRODUCTION AND INJECTION RATES			
	OIL MBOPD	WATER MBWPD	GAS MMCFPD	INJECTION MBWPD
2012/13	23.3 - 25.8	1,001 - 1,106	10.2 - 11.3	1,085 - 1,200

FISCAL YEAR	RANGE OF INJECTION PRESSURES			
	TAR PSI	RANGER PSI	TERMINAL PSI	U. P./FORD PSI
2012/13	UP TO 1500	UP TO 2500	UP TO 2500	UP TO 3000

Schedule 2 B

Anticipated Development and Replacement Locations

Fiscal Year 12/13

Long Beach Unit Program Plan, July 2011-June 2016

Reservoir	CRB	Producers					Injectors				
		Grissom Min - Max	White Min - Max	Chaffee Min - Max	Freeman Min - Max	Pier J Min - Max	Grissom Min - Max	White Min - Max	Chaffee Min - Max	Freeman Min - Max	Pier J Min - Max
Tar		0 - 2	0 - 2				0 - 1	0 - 2			
SG		0 - 1	0 - 2	0 - 1			0 - 1				
Ranger West	1	0 - 1					0 - 9				
	2	1 - 4	0 - 1				0 - 2	0 - 1			
	3	1 - 5	0 - 1				0 - 1	0 - 1			0 - 1
	4	1 - 3	0 - 1		0 - 1	0 - 2	0 -	0 - 1		0 - 1	0 - 1
	5	0 - 1			0 - 1	0 - 2	0 -			0 - 1	0 - 1
	7				0 - 1					0 - 1	
	8										
	9		0 - 1					0 - 1			
	10		0 - 1					0 - 1			
	11		0 - 1					0 - 1			
	12		0 - 1					0 - 1			
	13		0 - 1					0 - 1		0 - 1	
	36				0 - 1	0 - 2				0 - 1	0 - 1
	37				0 - 1					0 - 1	
Ranger East	14		0 - 1					0 - 1			
	15		0 - 1		0 - 1			0 - 1		0 - 1	
	16		0 - 1					0 - 1	0 - 1		
	17			0 - 1					0 - 1		
	18			0 - 1					0 - 1		
	20			0 - 1					1 - 1		
	21			1 - 2					1 - 1		
	22			0 - 1					0 - 1		
	33			0 - 1					0 - 1		
Terminal	24		0 - 1				0 -	0 - 1			
	38	0 - 1				0 - 2	0 - 1				0 - 1
	39	0 - 1	0 - 1				0			0 - 1	
	40		0 - 1								
	41	0 - 1				0 - 2	0				0 - 1
	42			0 - 1					0 - 1		
	43			0 - 1	0 - 1				0 - 1	0 - 1	
	47										
UP Ford	26				0 - 1					0 - 1	
	27		0 - 1		0 - 1			0 - 1		0 - 1	
	30			0 - 1	0 - 1		0 -				
	31	0 - 1	0 - 1		0 - 1	0 - 2		0 - 1		0 - 1	0 - 1
	44			0 - 1					0 - 1		
	45			0 - 2				0 - 1	0 - 1		
	46		0 - 1	0 - 1	0 - 1				0 - 1	0 - 1	
237	30	0 - 1		0 - 2	0 - 2						
		Total					Total				
		4 - 86					2 - 64				

Appendix 1

Ranger West / Tar
Reservoir Management Plan

History

The Ranger West reservoirs are comprised of the Ranger 6 and Ranger 7 fault blocks. Ranger West is the largest pool in the Unit with 1.5 billion barrels of original oil in place (OOIP). The first pool developed at field startup in late 1965, Ranger West contains a contrasting mix of mature and under-developed blocks. The crestal and southern blocks are generally more mature than the northern blocks in the Ranger West area. In the more mature crestal and southern blocks, waterflood recovery is generally high (30-40% OOIP) with water-oil ratios (WOR's) approaching 40. In the less mature northern blocks, oil recoveries range from 26-30% and WOR's range from 27-31.

The Ranger West waterflood was originally implemented using a 3-1 staggered line drive (SLD) pattern containing three rows of producers for each row of injectors. There are twelve cut-recovery blocks (CRB's) still using this pattern framework. The only exceptions are CRB-8, which lies between 2 faults on the crest, and CRB's 1 and 10, which were re-configured through development drilling as injector-centered patterns (1992-1994). In 1986, 70 offset row producers were shut-in because of high water cuts and high operating costs. This left only the center row producers in some blocks, converting these patterns to a classic line drive with exaggerated spacing between producers and injectors. This skewed pattern provides a slow rate of recovery at a reduced, but still relatively high, theoretical areal sweep efficiency. The SLD pattern makes pattern balancing difficult with less than optimal areal sweep due to reservoir heterogeneity.

The Ranger West pool is also peripherally flooded from the north and south aquifers. The southern aquifer appears to be bounded allowing peripheral injection to be effective in supporting up-dip producers. The northern aquifer appears to be unbounded providing less effective support from aquifer injection (based on production performance, pressure histories, and full-field reservoir simulation studies).

There are three main completion intervals in Ranger West: the F0, the F-X, and X-HX1 (Lower Ranger). Over the majority of the Ranger West pool, the F0 is the thickest and most dominant sand package. Original wells used full-zone, open-hole gravel packs across all three intervals. The more permeable F0 sand received the majority of the injected water through point exits resulting in bypassed oil within the F0 and throughout the lower zones. The Subzone Redevelopment Program, from 1980-1984, was successful in diverting injection and production to the F-X and Lower Ranger intervals by selectively completing only those subzones. Ranger West production increased 4,000 BOPD during 1980-1984 from this effort. Pockets of bypassed oil throughout the Ranger West area continue to be the target of horizontal wells, injection realignment/conversions, and selective, cased-hole recompletions.

Since 1992, a successful development drilling program in CRB-1 has resulted in increased water throughput and oil production. CRB-1 oil production increased from a low of 2690 BOPD in April 1992 to a high of 6350 BOPD in September 1994. Additional development is needed to further optimize the waterflood patterns in CRB-1.

Status

The Ranger West/Tar production rates in October 2010 were 11.9 MBOPD and 515.5 MBWPD (97.75% water cut) from 299 producers. October 2010 injection averaged 575.3 MBWPD from 281 injectors. Average active well rates were 40 BOPD and 2047 BWPD for producers and 2697 BWPD for injectors.

Ranger West currently has 55 inactive wells that have not been plugged in zone. 40 of these wells are being evaluated for repair and/or conversion. Additionally there are 40 wells that have previously been plugged in zone and are currently inactive.

Recovery through October 2010 was 492.5 MMBO (31.8% OOIP). While the base production in Ranger West reservoir has been declining at around 13% per year, the active development program in 2009-2010 resulted in a 0% decline in total rate for the January to mid-November 2010 period. Additional information concerning the development drilling and wellwork activities can be found in the Calendar Year 2009-2010 Activities and Results section.

Calendar Years 2009 and 2010 Activities and Results

Since publication of the last Program Plan, 27 producers (9 horizontal, 16 conventional, and 2 cased-hole completions) and 2 injectors (2 dual string vertical cased injectors) have been drilled and completed in the Ranger West pool.

The average initial stabilized rate (3 month average) for the producers drilled in the Ranger West Pool is 103 BOPD with initial rates ranging from 17 BOPD to 271 BOPD. This rate is better than the anticipated average rate of 93 BOPD. The average initial stabilized production rate is 110 BOPD for the horizontal completions, 95 BOPD for the conventional completions and 39 BOPD for the cased-hole completions. The injection wells drilled during the 2009-20010 period were selectively perforated in specific intervals with historically low waterflood throughput and relatively high remaining oil saturation. All the injection wells met injectivity expectations with an average injection rate of 2423 BWPD.

During the 2009-2010 Plan period, a total of 12 development (investment) wellwork jobs were also completed (5 producers and 6 injectors). Three of the producer development projects were selective recompletions/add pay projects and two were recompletions to the Ranger zone targeting bypassed oil sands. Overall, the producer development wellwork has been successful, averaging about 27 BOPD/job at a cost of $357,303 per job. The injector development wellwork projects included three convert to injectors and 3 profile modifications and add pay projects. The injection work targeted increasing water throughput in selective sands and pattern areas. Injection development wellwork projects contributed an average of 2975 bpd of injection per well at an average cost of about $202,802 per job.

Maintenance wellwork continues to play a major role in maximizing Ranger West base production. During 2009-2010, approximately 171 producer maintenance wellwork projects at a cost of about $89,196/job were performed. 535 injector maintenance projects were also completed at an average cost of about $18,824/job.

Reservoir Management Objectives

The primary reservoir management objective is to maximize the profitability of the Ranger West pool. Maximum profitability will be achieved by increasing recovery in underdeveloped blocks through identifying optimal locations for development drilling/investment wellwork combined with the right placement of injection water. Throughput objectives are to reach an HPVI target of at least 6.0 for each sand in all CRB's. As of November 2010, HPVIs range from 1 to more than 10 on an individual sand basis. As a result, oil recoveries range from values as low as 26% in some CRB's up to 40% in other CRB's. By ensuring that each sand reaches an HPVI target of at least 6.0, oil recoveries for individual sands should reach a minimum of 30-33% for an overall recovery in excess of 37% for the Ranger West sand. In the more mature blocks, maximum profitability will be achieved through minimizing the volume of low value water cycling, directing water to the remaining economic reservoir targets and targeting by-passed oil pockets with development drilling and investment wellwork projects. In the absence of economic options, idle wells will be abandoned to reduce future abandonment liabilities and reservoir crossflow. Risk of subsidence will be minimized in all reservoir management actions.

Strategies

The Ranger West development plan includes drilling an additional 21 development wells and performing 5 investment wellwork projects in FY11/12. The development plan will be implemented under the guidance of the reservoir management objectives discussed above. The best new drilling and investment wellwork locations will be evaluated and selected for inclusion in the drilling and wellwork programs based on a combination of economic and strategic criteria. Projects will be reviewed carefully to ensure that only projects that will be profitable even in low price environments are executed. Pool reviews/reservoir studies, conducted on an ongoing basis, will be used as the foundation for identifying the best drilling and wellwork opportunities and to monitor progress towards achieving reservoir management goals.

Key reservoir management strategies have been developed for each of the CRB's in Ranger West. In summary, waterflood optimization of the more mature crestal and south flanking blocks will be achieved through injector and producer profile control, pattern realignment, and capturing bypassed pockets of oil through horizontal drilling and cased-hole recompletions. In the less mature northern blocks, waterflood optimization will be achieved through (1) infill drilling and recompletions to improve pattern throughput, and (2) injector profile modifications to better balance injection between high permeability and low permeability sands.

Critical Issues

Key areas of focus for the Program Plan period include the following:

- Continue throughput optimization in under-injected sands; generally the lower sands (Mn thru G6).
- Optimize the Ranger West waterflood through subzoning into upper and lower floods where it economically effective.
- Continue application of horizontal well technology including additional infill Fo horizontals in blocks 3, 4, and 5, the crestal area of Ranger 7, and look for horizontal

well opportunities in lower Fo lobes (F01 & F02) in all areas. In addition utilize slant wells as another way to optimize depletion from these sands.

- Evaluate the completion methods to deliver optimum productivity including continued improvement of open hole gravel packed slotted liners and cased hole selective completions including fracture stimulations.
- Implement low cost replacement drilling options for failed wells, particularly for injectors with poor conformance and limited repair options.
- Update the geologic and reservoir description in Tar V and develop a depletion plan.
- Continue to update and optimize streamline reservoir models to evaluate depletion optimization in Ranger West. Update the geologic model in Petrel.

Ranger East
Reservoir Management Plan

History

The Ranger East area is comprised of the three major fault blocks east of the Long Beach Unit fault: Ranger 8A/8B, Ranger 90N, and Ranger 90S. To facilitate reservoir analysis, the fault blocks are further broken down into cut-recovery blocks (CRB's) along injection rows or significant faults, as appropriate.

Production from Ranger East began in April 1967. However, several initial wells encountered relatively low reservoir pressures, and full production was delayed until enough pressure support was established to reduce the high producing gas-oil ratios. The waterflood program was initiated immediately, based primarily on peripheral injection. Line drive injectors were subsequently added in some areas, primarily along the crest of the structure. Early efforts to inject into and produce from full-zone completions were not fully effective, as flow was dominated by well-developed and high permeability F0, F, or M1 sand units high in the vertical section. A subzoning program in the early 1980's significantly improved the flood by decreasing the amount of interval open in each well, and substantially enhanced the response in the Lower Ranger sands.

This development strategy has been effective along the southern flank and the structural crest of the reservoir. The aquifer along the southern flank is effectively bounded, and the adjacent CRB-21 area has seen good pressure support and sweep from the peripheral injectors. Similarly, the crestal areas have benefited from a combination of downdip support from the aquifer injectors along the southern flank and direct support from line drive injectors. Pressure support and recovery efficiencies in crestal CRB's 15, 22, 32, and 33 are expected to be high, though somewhat lower than in CRB-21 due to complex faulting and reduced sweep efficiency.

Although peripheral injection along the northern flank provides a row of back-up injection, this injection has been less effective because the aquifer is not well bounded and communicates with the Seal Beach field downstructure. A significant portion of the peripheral injection in CRB's 14, 16, 17, and 18 has been lost to the aquifer, particularly during the early field life when withdrawal from the Seal Beach field was higher. Pressure support has thus been limited in these areas, and both the current and projected recoveries are relatively low. The remaining reserves in these areas constitute the major redevelopment target in Ranger East.

Status

As of October 2010, Ranger East production is 6548 BOPD and 239,819 BWPD from 204 active producers. Total water injection was 267,097 BWPD into 124 active injectors. Average active well rates were 33 BOPD and 1211 BWPD for producers and 1950 BWPD for injectors.

Ranger East currently has 18 wells that are mechanically idle but are capable of reactivation with further investment. The team is currently evaluating the repair and/or conversion options for these wells. Additionally, there are 7 wells that have been identified as "uneconomic to repair" that have yet to be plugged in zone.

Cumulative oil production as of October 2010 is 243.9 MMBO (29.2% OOIP).Since the last reporting period in December 2008, oil production, the base production has declined at 8.1% per year. With development in the past year, total production is approximately flat for the period of January – mid-November 2010.

Calendar Years 2009 and 2010 Activities and Results

Since publication of the last Program Plan, 11 producers (1 horizontal, 9 conventional, and 1 cased-hole completion) and 8 injectors (1 single string vertical cased injector and 7 dual string vertical cased injectors) have been drilled and completed in the Ranger East pool.

The average initial stabilized rate (3 month average) for the producers drilled in the Ranger East Pool is 63 BOPD with initial rates ranging from 14 BOPD to 136 BOPD. This expected rate is as an average rate of 63 BOPD. The average initial stabilized production rate is 52 BOPD for the horizontal completion and 65 BOPD for the conventional completions. The injection wells drilled during the 2009-20010 period were selectively perforated in specific intervals with historically low waterflood throughput and relatively high remaining oil saturation. All the injection wells met injectivity expectations with an average injection rate of 2285 BWPD.

During the 2009-2010 Plan period, a total of 7 development (investment) wellwork jobs were also completed (5 producers and 2 injectors). All of the producer development projects were selective recompletions/add pay projects targeting bypassed oil sands. Overall, the producer development wellwork has been successful, averaging about 33 BOPD/job at a cost of $250,577 per job. The injector development wellwork projects included one convert to injectors and one profile modifications and add pay projects. The injection work targeted increasing water throughput in selective sands and pattern areas. Injection development wellwork projects contributed an average of 2336 bpd of injection per well at an average cost of about $195,758 per job.

Maintenance wellwork continues to play a major role in maximizing Ranger East base production. During 2009-2010, approximately 94 producer maintenance wellwork projects at a cost of about $74,241/job were performed. 247 injector maintenance projects were also completed at an average cost of about $14,082/job.

Reservoir Management Objectives

The primary goal of the reservoir management plan is to maximize the profitability and economic oil recovery from the Ranger East pool. This can be accomplished by developing proper waterflood pattern closure, providing adequate injection throughput into all the individual sand intervals in each pattern, reducing water cycling in swept zones where possible, and maximizing well productivity. Current WOR in the three major fault blocks averages 36.6. The injection target volume is greater than 6.0 hydrocarbon pore volumes into each sand before reaching a producing WOR of 70. Injection throughput has been challenged by the difficulty of maintaining good vertical profile control. Another challenge is the optimal placement of injectors in the highly

faulted Ranger East pool. Producer to injector conversions and injector recompletions have been done to improve sweep efficiency.

Production rates are maximized by selective acidization of active wells, or in conjunction with other wellwork. In addition, increasing pump size and using variable speed drives to increase well drawdown assure that maximum productivity is achieved from the wells. Finally, producers are recompleted when economic quantities of unswept oil are identified.

Strategies

The Ranger East development plan includes drilling an additional thirteen development wells and performing several investment wellwork projects in FY11/12. These projects will target insufficiently swept pay.

An update of the Ranger East geologic description and streamline reservoir model was completed in 2007. The geologic study was undertaken to improve the reservoir characterization of Ranger East, to improve the estimate of net pay and OOIP and to provide the framework for the simulation model. The goals of the simulation model are to understand flux into or out of the Unit, identify hydrocarbon hot spots, manage waterflooding, optimize the Ranger East depletion plan and assist with well planning. The low ultimate recovery indicates a greater amount of study is needed to maximize recovery in Ranger East. Updating and fine-tuning of the streamline reservoir model is continuing on a regular basis.

The profitability of the development plan will be maximized by reducing costs where possible and prudent. The focus will be on using existing wellbores, correcting injection profiles with workovers or remedial wellwork where possible, returning idle producers to production, shutting in high WOR producers and potentially adding or stimulating non-productive intervals. Existing wells will continue to be redrilled when warranted. A successful wellwork program will continue to be critical to Ranger East success. Strong communications between individuals in operations and engineering will be maintained through joint involvement in block reviews and joint review of wellwork opportunities and priorities.

Critical Issues

Redevelopment of the Ranger East area is continuing. The primary development goals for the Plan period include:

- Continue to refine and update the existing Ranger East streamline model.
- Complete depletion studies by CRB for Ranger 90N/90S and R8A/B.
- Develop proper waterflood pattern closure and improve the injection throughput into under-injected sands by prudent application of acid stimulation, wellwork, and drilling.
- Select the optimal injector drilling locations by utilizing the results of the improved streamline simulation model.
- Continue selective fracturing of mid and lower Ranger zones to improve productivity and ultimately reserves.

- Evaluate the feasibility of high-angle slant wells in the M1 in the eastern part of the pool similar to the Belmont Upper completions.
- Redevelop bypassed areas down-dip

Terminal Zone
Reservoir Management Plan

History

The Terminal zone is about 1000 feet thick and its productive limits cover an area about four miles long and two miles wide within the Unit. The LBU fault divides the Terminal into the Upper and Lower Terminal zones on the west side of the field from the Terminal East zone on the east side.

The Terminal Zone was first developed in 1965 on the west side of the LBU fault in Upper Terminal VI (UT6). Water injection commenced with initial production utilizing a peripheral injection flood configuration. Early injectors were drilled in the aquifer, down structure from the productive limits of the oil column. Development of Terminal East began in 1967, and the last block to be flooded was Upper Terminal VII (UT7) starting in 1985.

Wells on the west side of the field have generally been completed in Upper Terminal sands, in either the HX1-Y4 or Y4-AA intervals; however, a few wells include the less prolific Lower Terminal AA-AD sands.

Terminal East wells are completed in either the upper Y-AA or AA-AE intervals. In the middle 1980's, some Terminal East wells were completed as dedicated sub-zone producers and injectors in the AC-AD interval. The sub-zone development program targeted reserves in these deeper interbedded sands. AC-AD zone reserves were not fully recovered in the original full-zone completions due to competition from the upper, more prolific intervals.

Early wells were completed with gravel packed slotted liners and water zones were excluded with cemented blank liner sections. Water exclusion and selective injection became more important as the waterflood matured and the more permeable reservoir sands watered out. In the early 1980's cased hole completions were utilized to improve water exclusion and sand control. The current cased hole completion program typically includes conventional perforating and wire-wrapped screens or the use of frac technology.

Status

As of October 2010, the total production from the Terminal zone is 4,446 BOPD and 151,802 MBWPD resulting in an average WOR of 34.1. There are currently 156 active producers. Terminal zone injection for October 2010 is 165,627 BWPD from 79 wells. Average active well rates were 29 BOPD and 992 BWPD for producers and 2,208 BWPD for injectors.

Sixteen Terminal wells are currently mechanically idle and capable of being reactivated with further investment. Evaluation of repair and/or conversion options is underway for these wells. There are currently no idle wells slated to be plugged in zone. Additionally there are five wells that have previously been plugged in zone and are currently inactive.

Cumulative production through October 2010 totaled 145.4 MMBO (33.2% OOIP). Successful infill drilling and well work activities have partially offset the underlying Terminal zone oil production decline rate of 15.5%/year. Additional information concerning the development drilling and wellwork activities can be found in the Calendar Year 2009-2010 Activities and Results section.

Calendar Years 2009 and 2010 Activities and Results

Since publication of the last Program Plan, 2 producers (2 cased-hole completions) and 1 injector (1 single string vertical cased injector) have been drilled and completed in the Terminal pool.

The average initial stabilized rate (3 month average) for the producers drilled in the Ranger East Pool is 71 BOPD with initial rates ranging from 53 BOPD to 90 BOPD. This expected rate is as an average rate of 83 BOPD. The injection well drilled during the 2009-20010 period was selectively perforated in specific intervals with historically low waterflood throughput and relatively high remaining oil saturation. The average initial injection rate is 2065 BWPD.

During the 2009-2010 Plan period, a total of 5 development (investment) wellwork jobs were also completed (4 producers and 1 injectors). Two of the producer development projects were selective recompletions/add pay projects and two were completions to new zone targeting bypassed oil sands. Overall, the producer development wellwork has returned average of about 32 BOPD/job at a cost of $325,898 per job. The injector development wellwork projects included one convert to injectors and one profile modifications and add pay projects. The injection work targeted increasing water throughput in selective sands and pattern areas. Injection development wellwork projects contributed an average of 4,756 bpd of injection per well at an average cost of about $267,202 per job.

Maintenance wellwork continues to play a major role in maximizing Terminal base production. During 2009-2010, approximately 82 producer maintenance wellwork projects at a cost of about $74,750/job were performed. 199 injector maintenance projects were also completed at an average cost of about $8,123/job.

Reservoir Management Objectives

Future plans for development and management of the reservoir are guided by the objective of maximizing profitability while ensuring stable surface elevations. Development will be driven by identifying the best new well locations and by optimizing the placement of injected water within voidage constraints while minimizing uneconomic water cycling.

In 2004 and 2005, a reservoir study was conducted to improve the geological and reservoir description of the Terminal Zones and better define the estimation of OOIP. This project resulted in the creation of a streamline reservoir simulation model for the Terminal East area and a second model for Terminal West. These models are and will continue to be used as a directional tool to identify opportunities to maximize recovery from the reservoir.

Production and injection infill well locations will be identified and drilled to recover oil banked near faults, to improve areal sweep efficiency and to increase reservoir

throughput. Profile modification will be attempted to reduce thief intervals and improve vertical conformance. Recovery from existing wells will be optimized to ensure maximum economic value. Completion techniques will be modified to increase injectivity, minimize reservoir damage, and reduce high decline rates.

Strategies

The Terminal Zone development plan for FY 11/12 assumes six drilling projects and several investment workover projects. These objectives will be met by utilizing the various Unit programs currently in-place. The best new production and injection infill well candidates will be evaluated and selected for inclusion in the drilling schedule based on economic and strategic development criteria. Pool reviews will be conducted regularly to identify well work, conversion, and infill opportunities. Reservoir studies are being performed to develop long term depletion plans and to reliably forecast future reservoir performance.

Key reservoir management strategies have been formulated for each Terminal reservoir pool. The focus strategy for UT6 CRB-38 is to improve vertical conformance due to the block's waterflood maturity and highly layered system. In addition, a highly selective drilling program will be conducted to target bypassed oil. The reservoir management goal for UT6 CRB-39 is to increase the overall level of development through infill drilling in this less mature block. Increased throughput and optimization of vertical and areal conformance will also be focus areas for the block. The development strategy for UT7 includes crestal injection to augment the current peripheral injection configuration due to the area's highly faulted nature. Terminal 8A development will include additional injection projects to achieve throughput targets. Finally, injection in Fault Block 90 will continue to be tailored to the improved understanding of fault compartmentalization.

Reservoir studies incorporating updated volumetric analyses, based on additional geologic interpretation, will help fine tune future drilling requirements. Throughput analyses will be performed in those areas with the greatest development potential to quantify injection requirements. The streamline models will be used to optimize the waterflood and generate development projects for depletion planning. Detailed review of existing well histories and performance during pool reviews will help identify candidates for well work to improve management of the reservoir. Special logs including Formation Mirco Image, Density-Neutron and 3-Resistivity will be run to better understand the thin bed potential.

In order to optimize well performance, completion techniques will continue to include larger perforating guns, gravel pack and frac and pack technology. Fracture stimulation technology in the lower sands of the Terminal zone will continue to be applied on a case by case basis to provide sand control and improve well deliverability in sensitive, low permeability formations. The team will actively seek out and advocate cost reduction strategies while meeting reservoir objectives.

Critical Issues

The following key points summarize the development goals for the Program Plan period:

- Update the Terminal East and West streamline models with the latest production, completion and log data. In addition, update the Terminal East fault model.
- Improve vertical conformance in UT6 CRB-38 through selective drilling of a limited number of new cased hole producers, profile modification workovers of existing wells, and drilling of a limited number of injectors.
- Identify areas of bypassed oil and drill high angle producers to exploit in Terminal Blocks 38 and 39.
- Strategically develop thinly bedded Lower Terminal East sands independently of more permeable zones characterized by higher water saturations.
- Optimize crestal injection in UT7 to augment the current peripheral injection configuration.
- Increase reservoir throughput in Terminal 8A through injection well drilling and conversions.
- Identify up-hole add-pay potential in Terminal 8A and increase development of upper Terminal zones
- Optimize waterflood pattern development in Terminal 90N by incorporating detailed reservoir fault analysis stream tube model development.

UP-Ford
Reservoir Management Plan

History

The UP-Ford Zone has produced 103.4 MMSTB oil to date and current active well counts are 80 producers and 59 injectors. Much of the historical production is attributable to natural water drive from the AX sand, which watered-out over almost the entire field by the early 1980's. Sands above the AX have been historically less prolific owing to several factors, including: lower formation permeability, thin-bedded discontinuous shaly sands which are prone to formation damage owing to a high clay content, a lack of adequate injection support and damaging completion and workover techniques.

The UP-Ford reservoir is complex from both reservoir and operational perspectives. Since it underlies the Ranger and Terminal zones, new wells are more expensive to drill because of the depth and the pressure difference in Ranger and Terminal sands. In addition, higher reservoir temperatures and lower total fluid production rates shorten pump run times relative to the other reservoirs of the Unit. Non-damaging fluids are required during drilling and workover operations owing to the sensitive nature of the formation, and fracture stimulation is often required to yield economically successful wells.

From the late 1990's, success in pattern waterflood development in the Tract II area was achieved through adoption of non-damaging drilling and completion techniques, and the fracture stimulation program. As a result, UP-Ford oil production rate reached a 20-year high (6978 STB/D oil) during early 1998. During the early 2000's, attempts to further exploit these strategies in the upper UP-Ford sands were not successful because of the lack of adequate injection support. During a two year development break, the reservoir description was completely redone and completion techniques were reviewed. New Petrel geological model and Frontsim reservoir simulation model were built and history-matched in 2005. The drilling and workover program is continuing with many benefits being realized from hydraulic fracturing completion techniques.

Status

The UP Ford production rates in October 2010 were 2,469 BOPD and 61,678 BWPD (96.1% water cut) from 80 producers. October 2010 injection averaged 68,804 BWPD from 59 injectors. Average active well rates were 32 BOPD and 801 BWPD for producers and 1,186 BWPD for injectors.

UP Ford currently has 14 wells that are currently mechanically idle and capable of being reactivated with further investment. These wells are being evaluated for repair and/or conversion. Additionally there are 43 wells that have previously been plugged in zone and are currently inactive.

Recovery through October 2010 was 103.4 MMBO (18.7% OOIP). The base production in UP Ford reservoir has been declining at around 11% per year for the January to mid-November 2010 period. Additional information concerning the development drilling and

wellwork activities can be found in the Calendar Year 2009-2010 Activities and Results section.

Calendar Years 2009 and 2010 Activities and Results

Since publication of the last Program Plan, 3 producers (3 cased-hole completions) have been drilled and completed in the UP Ford pool.

The average initial stabilized rate (3 month average) for the producers drilled in the UP Ford Pool is 48 BOPD with initial rates ranging from 13 BOPD to 98 BOPD. This rate is less than the anticipated average initial rate of 85 BOPD.

During the 2009-2010 Plan period, a total of 1 development (investment) wellwork jobs was also completed (1 injectors). The injector development wellwork project was a convert to injector project. The injection work targeted increasing water throughput in selective sands and pattern areas. Injection development wellwork projects contributed an average of 961 bpd of injection per well at a cost of $87,874.

Maintenance wellwork continues to play a major role in maximizing UP Ford base production. During 2009-2010, approximately 44 producer maintenance wellwork projects at a cost of about $114,327/job were performed. 85 injector maintenance projects were also completed at an average cost of about $17,732/job.

Reservoir Management Objectives

The goal of the UP-Ford Reservoir Management Plan is to maximize the profitability of the reservoir. As the recovery mechanism is waterflood, we have to increase the waterflood efficiency by increasing throughput ratio, injection efficiency and volumetric sweep. There are three areas of focus with respect to attaining this goal. First is to maintain the base production and injection rates in existing wells through reactive and proactive wellwork. The second objective is to effectively stimulate and waterflood sands above the AU through selective completion and stimulation techniques. Most of the remaining oil is in these thinner, lower permeability sands, which will only achieve economic production rates if their deliverability can be enhanced through fracture stimulation or horizontal/slant completion and their pressures be increased through waterflooding. The third area of focus is to enhance the producer-injector conformance which will improve sweep efficiency.

Reservoir simulation models will be used to confirm infill locations. Production and injection infill well locations will be identified and drilled to recover oil banked near faults and oil bypassed between producer rows. Profile modifications will be attempted to improve vertical conformance. Completion techniques will be modified to increase injectivity, minimize reservoir damage, and reduce sanding.

Strategies

The development plan for UP-Ford in FY11/12 includes continued activity in this reservoir. The various Unit programs currently in place will be utilized to help achieve the development objectives stated above. Potential new production and injection infill well candidates will be evaluated and the best selected for inclusion in the drilling

schedule based on economic and strategic development criteria. Reservoir studies are ongoing to develop long term depletion plans and to reliably forecast future reservoir performance.

The key strategy for realizing optimal development of the UP-Ford zone is understanding its complex reservoir description. Geologic studies addressing sand quality, continuity and distribution, as well as reservoir faulting and stratigraphy, are critical to this effort. Reservoir models combining the best reservoir description and well performance data will help identify regions of high remaining oil saturation as well as regions with sub-optimal waterflood. Logs such as 3-D resistivity image logs will be run to better understand the thin bedded sands.

UP-Ford 8 and 90 fault blocks have a reservoir flow model but additional work needs to be performed to calibrate it better so the results from the development forecast could be used with confidence. In FY11/12 the model will be further upgraded based on most recent understanding of the geological framework and properties. A depletion study for UP Ford CRB 44 was completed in 2010 due to its low recovery factor and development opportunities have been identified and will be implemented. The UP-Ford 98 block needs further study utilizing seismic, well log, core and production performance data to quantify future development opportunities as its recovery factor is low. Reservoir description studies will be performed to locate and map the most likely areas of sand development.

The in-zone injection program will expand to improve flood performance in the upper, less mature, tight reservoir sands. Fracture stimulation techniques will continue to be refined in an attempt to reduce treatment costs while maintaining or improving effectiveness. Horizontal/slant wells will be drilled as an alternative to fracture stimulation to reduce costs and variable performance.

Critical Issues

To refine the development plans, focus will be on the following key issues during the Program Plan period:

- Develop CRB 44 with infill wells to improve low recovery factor.
- Further exploit alternatives for increasing infill well deliverability primarily through hydraulic fracturing as well as high angle and horizontal completions.
- Horizontal/slant wells are drilled in AK1 sands currently and will be further tested in AE, AF, AI, AM, A0, AR sands in the future.
- Continue to refine non-damaging procedures to complete and work over wells and determine injection water quality requirements.
- Increase pressure support in the upper reservoir sands utilizing in-zone injectors and conformance improvement projects for existing injection wells through stimulation and mechanical methods.
- Continue to delineate the Northern down-dip extent of UP-Ford CRB 44 and CRB 45.

- Evaluate the development potential of the Horst block along the LBU Fault in CRBs 27.
- Evaluate the development potential of the deep sands AU2 through AZ .
- Evaluate the potential of “central” UP-Ford 98.

237 Shale Zone
Reservoir Management Plan

History

The 237 Zone underlies the UP Ford Zone and comprises two distinct sub-zones, an upper clastic interval and a lower shale interval. The lower 237 Zone shale is further subdivided into the Hot Shale and Basal Shale members.

The Hot Shale member of the Lower 237 Zone Is a world-class oil source rock. It is correlative with the Nodular Shale of the western Los Angeles Basin. It probably contributed most of the oil trapped within the Long Beach Unit. The Hot Shale contains a poorly developed foraminite facies, but this has not been specifically targeted to date.

The Basal Shale is also a good, but lesser quality source rock. It has numerous thin dolomitic interbeds and thin quartz cemented sandstones. This facies tends to have higher fracture density than the Hot Shale and has been more productive. It is extremely thick in the eastern LBU where it is determined from 3D seismic to be up to 1600 feet thick. This is ten times thicker than the average thickness found across the western Los Angeles Basin.

About 2.87 MMBO has been produced from the fractured shales of both 237 Zone shale members from six commercial wells within the LBU. Acoustic basement underlies the 237 Zone shales. These rocks include the Miocene San Onofre Breccia and Cretaceous/Jurassic Catalina Schist basement. These fractured reservoirs have contributed an additional 1.35 MMBO from two LBU wells, one of which had a flowing IP of 1800 BOPD.

The first 237 Zone well was completed in 1968 at an initial rate of 1050 BOPD. Eighteen more wells were completed in the LBU, the last one in 2009. All wells reported oil and gas shows while drilling through the lower 237 Zone. Six of the wells were economic, one was marginally economic, eleven were uneconomic and one is still being evaluated. One of the wells was a mechanical failure and did not properly evaluate the lower 237 Zone. The uneconomic wells may have been damaged during drilling or lacked sufficient fracture systems to be productive. Through November 2010 cumulative production from the 237 Zone/acoustic basement is 4.22 MMBO with two active wells in the pool.

In 2006 a 237 team was formed to re-evaluate the fractured shale play. Using seismic coherency mapping and fracture trend measurements taken at local outcrops, Well C-250 was proposed. This was the first 237 zone well drilled in the LBU in over 11 years. C-250 targeted the Hot Shale and Basal Shale with acoustic basement as a secondary target. It was completed in December 2007 and flowed for seven months at rates between 750 and 300 BOPD with only a 2 percent water cut. A pump was installed in July 2008 and the well made 1240 BOPD. Water cut has been rising and at the end of November the rates were 274 BOPD and 668 BWPD. Oil production through the end of October 2010 from Well C-250 is 48.4 MSTB.

In FY08/09, two additional 237 zone wells were drilled from Island Freeman. These were ranked 3rd and 4th out of five proposed wells to build on the commercial C-250 discovery. They were drilled early in the program owing to cost savings related to rig

moves. They targeted a previously drilled structure high thought to have remaining potential. Well D-720A made 1,440 BWPD and 15 BOPD from the original completion of the lower part of the Basal Shale. It was recompleted in the upper part of the Basal Shale and became a 320 BOPD well.

D-562A was a non-commercial well, it having only produced 40 barrels of oil before dying. Multiple acid treatments failed to establish production. This well probably lacks a meaningful fracture network.

Our most recent well, C-355, was drilled in FY09/10 as our first 237 zone completion through cemented liner. It was plagued by drilling and mechanical issues and a side track was necessary. The sidetrack was approximately 850 feet short of planned TD when the drill string became irrevocably stuck. Good oil shows were encountered in both well bores, but we have had difficulty keeping this well producing as the pump rather quickly draws down the fluid level. We are continuing to work this issue.

Two additional wells are planned from Island Chaffee in calendar year 2011 as step-outs to the commercial C-250 well. Each of these wells will include new play elements including a previously untested stratigraphic interval or a new position on structure.

Critical Issues

- To fully understand the 237 reservoir and to refine future development plans, the focus will be on key reservoir issues during the current phase of exploratory/delineation drilling:
- Evaluation of open hole log and mud-log data acquired during drilling to better refine our completion design.
- Continued integration of reservoir performance, stress-field analysis, and geological understanding to high-grade future drilling targets.
- Core the first of the next two wells to determine if the reservoir is a single or dual porosity system and to evaluate the reservoir potential of the thin sands interbedded in the Basal Shale member.

Shallow Gas
Reservoir Management Plan

History

An agreement between the State of California, City of Long Beach, and OLBI regarding the development of shallow and deep gas reserves was finalized in 2006. This Plan contains funding necessary for wellwork associated with producing these reserves, basic facility modifications necessary for production operations, and the gas production associated with the project.

The bulk of the Shallow Gas reserves reside below Island Grissom with additional proven undeveloped reserves accessible from Island White. Gas shows have been found in wellbores originating on Island Chaffee and Pier J. Development of Shallow Gas reserves began from Island Grissom due to the availability of commercially identifiable reserves for development from this location. Shallow Gas production commenced May 18, 2006 from one well. To date five wells have been recompleted as Shallow Gas producers and one horizontal well has been drilled.

A separate production train was installed that collects, measures, and processes gas for sale to Long Beach Energy.

Status

The Shallow Gas reservoirs consist of 5 primary sand bodies: A10, A14, A16, A18 and A20. The Grissom Gas is currently the main Shallow Gas accumulation being produced, with the majority of the current production coming from the A14 sand. To date four of the six wells have been completed in the A16, and one in each of the A20 and A14, respectively. With four wells producing out of the A16 sand a stabilized production rate was maintained at 5,000 mcfd. This rate was maintained until June 2008 when Well A-268 watered out. Well A-260 followed and watered out as forecasted in September 2008. In January of 2009, well A-271 watered out. From this point, production rate for Grissom Shallow Gas production was averaging 4,200 mcfd, with production from two active producers, Well A-301 (horizontal in A16 sand) and Well A-313 (A14 sand completion) which was recently returned to production after an inner liner was installed. In February of 2009, Well A310 completed in the A20 sands was successfully stimulated after a year of non-production. Shallow Gas production sharply declined in October of 2009 when horizontal well A-301 watered out; this event was shortly followed by the recompletion of well A-271 in the A14 sand. From October of 2009 to February of 2010, Grissom Gas production averaged 2500 mscf/d.

In February of 2010, B-403 was recompleted in the A-20 sands as the first step in the development of the White Shallow Gas accumulation with positive results early on. However, higher CO2 content in the White Shallow Gas stream forced Facilities department to reduce/curtail the White Gas rate out of concern for subsea lines. In April of 2010, Well A-268 was recompleted in the A14 sand. During the February 2010 - July 2010, average the total Shallow Gas rate was averaging 2300 mscf/d until subsea line

repairs and facility maintenance forced the shut down the Shallow Gas production. Upon completion of the repairs and maintenance work, near term wellwork projects are to recomplete the Grissom watered out wells up-hole into the A14 sand. Daily rate by sand and cumulative production can be seen in Figure 1.

Additional White Gas development is planned. The original two well development plan has been initiated with the recompletion of well B403, producing from the A20 sand and which will be recompleted up hole as the sands water out. A second well will be completed in the A10 sand. Produced gas is shipped to Grissom for dehydration and processing where it commingles with Grissom Shallow Gas.

Cumulative Grissom production through July 2009 totals 4.571 BCFG (62.1% OGIP) in excess of initially estimated ultimate recovery expected to reach 4.33 BCFG (61.0% OGIP) in 2011 for the Grissom Gas reservoir. To date, White Gas cumulative production does not contribute significantly to the total of Shallow Gas. Including White Gas production the ultimate recovery was expected to reach 6.344 BCFG (61.0% OGIP including both Grissom and White accumulations) by 2015. Underlying aquifer support within the reservoir will affect total gas recovered. However, Grissom OGIP will most likely be revised upward, pending results of petrophysical analysis.

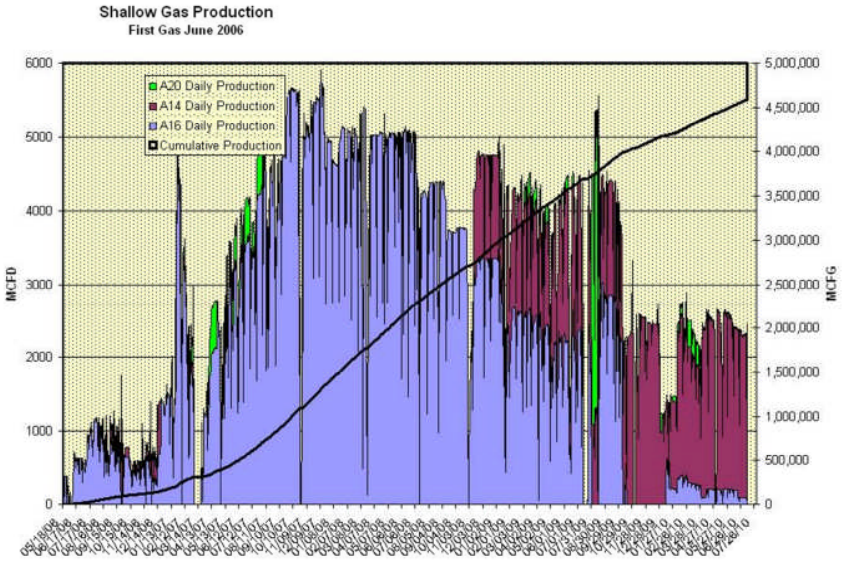


Figure 1: Shallow Gas production by sand

Reservoir Management Objectives

The overriding goal of the Shallow Gas Reservoir Management Plan is to maximize the profitability of the reservoir. Three objectives must be attained to achieve this goal. The first is to understand long-term reservoir energy support through monitoring of aquifer influx and pressure measurement. Understanding the rate of withdrawal to pressure change in the reservoir is fundamental to quantifying recoverable reserves. Through P/Z vs. Cum production analysis and a Fetkovich water influx simulation, production rate at or exceeding 3500 mcfd is required to best outpace the aquifer in the A16 sand. Secondly, all small gas "stringers" should be tested for viable productivity, which will add to development opportunities and increase the reserves volume if they are commercially productive. Lastly, we must focus on utilizing the most ideally situated idle wellbores for Shallow Gas development to maintain a low cost development and maximize recovery through existing assets.

It has been found that sand control is needed in order to maintain the require production rates. Sand control has been installed on previously sanded wells. With the success of Well A-301 horizontal drill well, additional opportunities must be evaluated to optimize the economic success of Shallow Gas expansion through recompletions vs. drill project.

Strategies

The development plan consists in the recompletion of four Grissom gas wells in FY 11/12, mostly in the A14 sands, and one recompletion in the A10 sand in the White Gas accumulation. Reservoir studies will be done on the Pier J and Chaffee gas to better understand the connectivity of the shows and extent of the gas in place. These studies will utilize seismic, well log, and cased hole reservoir sampling data to quantify extensional development opportunities. However, lower gas prices have pushed most of those studies back.

The key strategy for realizing optimal development of the Shallow Gas reservoir is understanding the lateral continuity of the smaller sand sequences. Geologic studies addressing structural uncertainty, continuity and distribution, as well as reservoir faulting and stratigraphy, are critical to this effort. Reservoir studies combining the best reservoir description and well performance data will help identify regions of high remaining hydrocarbon saturation. Geologic model and reservoir simulation tool are under construction to aid in optimizing ultimate recovery through optimal well recompletions, draw down rates and water influx.