**An Advanced Fracture Characterization and Well Path Navigation System
for Effective Re-Development and Enhancement of Ultimate Recovery from
the Complex Monterey Reservoir of South Ellwood Field, Offshore
California**

Quarterly Technical Progress Report

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Progress Report October 1, 2004- December 31, 2004

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Abstract

Venoco Inc, intends to re-develop the Monterey Formation, a Class III basin reservoir, at South Ellwood Field, Offshore Santa Barbara, California.

Well productivity in this field varies significantly. Cumulative Monterey production for individual wells has ranged from 260 STB to 8,700,000 STB. Productivity is primarily affected by how well the well path connects with the local fracture system and the degree of aquifer support. Cumulative oil recovery to date is a small percentage of the original oil in place. To embark upon successful re-development and to optimize reservoir management, Venoco intends to investigate, map and characterize field fracture patterns and the reservoir conduit system. State of the art borehole imaging technologies including FMI, dipole sonic and cross-well seismic, interference tests and production logs will be employed to characterize fractures and micro faults. These data along with the existing database will be used for construction of a novel geologic model of the fracture network. Development of an innovative fracture network reservoir simulator is proposed to monitor and manage the aquifer's role in pressure maintenance and water production. The new fracture simulation model will be used for both planning optimal paths for new wells and improving ultimate recovery.

In the second phase of this project, the model will be used for the design of a pilot program for downhole water re-injection into the aquifer simultaneously with oil production. Downhole water separation units attached to electric submersible pumps will be used to minimize surface fluid handling thereby improving recoveries per well and field economics while maintaining aquifer support.

In cooperation with the DOE, results of the field studies as well as the new models developed and the fracture database will be shared with other operators. Numerous fields producing from the Monterey and analogous fractured reservoirs both onshore and offshore will benefit from the methodologies developed in this project.

This report presents a summary of all technical work conducted during the fifth quarter of Budget Period II.

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Introduction

The Field Demonstration site for this Class III (basin clastic) Program Proposal is the South Ellwood Field located offshore California. The Monterey Formation is the main producing unit in the South Ellwood Field and consists of fractured chert, porcelanite, dolomite, and siliceous limestone interbedded with organic mudstone. This reservoir has an average thickness of 1,000 feet, and lies at subsea depths of approximately -3,500' to -5,000'.

Venoco and USC jointly submitted an application to conduct a DOE co-operative investigation of the Monterey formation at South Ellwood in June 2000. The DOE granted this application in July 2000.

Executive Summary

Venoco and USC prepared a proposal for a DOE sponsored joint investigation of the fractured Monterey formation. It was agreed that Venoco would construct the geologic model for the field and gather new reservoir data as appropriate. USC would then develop a simulation model that would be used to optimize future hydrocarbon recovery. Joint Venoco-USC teams were established to manage the flow of data and insure that Venoco and USC activities remained synchronized. A co-operative agreement was signed with the DOE on July 31, 2000.

During Budget period I, Venoco worked with USC to develop a new geological and engineering model of the Monterey formation. This cooperative work between USC and Venoco has made several contributions to the tech transfer goal of the U.S. Department of Energy. The most significant of these were; the development of an interactive database on the Monterey Formation, a new simulation algorithm for the description of fracture-controlled Monterey Reservoirs, a pattern recognition method for analysis of well log data and methods for subsurface control of high water production. USC no longer participates in the project after the conclusion of Budget Period I activities.

The primary goal of the Budget Period II is to develop the new fault blocks identified as a result of the field re-evaluation conducted during Budget Period I. A Lower Sespe prospect was identified by an exploration well drilled from a jack-up in 1985. We have used the reprocessed 3D to image the South Ellwood structure at Sespe level. 3242-19 is currently being sidetracked to appraise this Lower Sespe structure. A second exploratory well will be drilled in 2005 to test the North Flank block of the Monterey.

Experimental

Not applicable for the work performed.

Results and Discussion

Task II – New Data

None

Task IV-1—Produced Water Re-Injection

The two existing group separators (V-107 and V-108) will be retrofitted with new internals to allow three phase water separation. NATCO, the original designer of the group separator has designed and will supply new vessel internals for retrofitting these separators. Upgrades will include a new propitiatory “Porta Test Revolution” inlet separation device, a higher water weir and new water level control, alarm and shutdown instrumentation. The “Porta Test Revolution” inlet separation device utilizes centrifugal force to separate gas from the liquid without foaming. The higher water weir will allow longer liquid retention time to provide more complete water oil separation. New water level instrumentation will be installed. These improvements will reduce the water cut in the oil shipped to Ellwood to approximately 10%. The Revolution devices have been ordered and we will commence modifications of the separators in March 2005.

New water injection lines will be installed to route the water to the wells for injection - wells 3120-10 and 3242-8 will be converted for injection. Flow lines and gas lift lines will be removed from these wells. The lines as designed, will allow installation of future water injection pumps when needed. Well 3242-8-4 is a very low volume producer completed in the Monterey M2 through M6 units. An additional nearby well 3120-10 will be used as a second disposal wellbore. This idle well is completed in the Upper Monterey M1-M3 units. Workovers to recomplete these two wells in the heavily fractured Lower Monterey M7 unit will be conducted in the first quarter of 2005. The target water injection rate will be 10,000 BWPD. Offshore water injection is expected to commence in May 2005. The California State lands Commission has approved this project.

Task IV-2—Downhole Water Separation ESP’s

Centrilift has begun detailed design of the proposed downhole separator ESP that will be run in 3120-16 next year.

Task IV-3—Development of New Fault Blocks

South Ellwood 3D Simulation Model

A reservoir simulation model of the Monterey was constructed using CMG. The model is presently being history matched to production and pressure data. A reasonable match on field gas and oil rates was obtained but certain key wells such as the new well, 3242-7-2, could not be matched in detail. The model was refined by adding additional faults to better model individual well performance.

South Ellwood History Match Oil Rate SC

South Ellwood Model History Match Gas Rate SC

New Well 3242-19 RD1

We are currently drilling a well to appraise a Lower Sespe trap that was discovered by Arco's exploratory well ST208-102. This well drilled to the west to test sandstone reservoirs in the middle Sespe to Coldwater formations. Strong oil indications were seen in this zone. The new well was drilled out of the 9-5/8" casing of 3242-19ST on 26 November, 2004 within the Rincon Formation. Two fault repeated sequences of Vaqueros-Sespe were penetrated. By the end of December the well had reached a depth of 8200ft and 7-5/8" casing was set and cemented at 8187ft. The fault information revealed by this well is being incorporated into the structural model of the field.

Task V- Project Management

Project review meetings were held on a monthly basis in Carpinteria. Individuals working on the project during this quarter included:

Reservoir Studies:

Steve Horner

Geological/Geophysical Modeling

Marc Kamerling, Chris Knight

Project Management:

Steve Horner

Task VI-Technology Transfer

None

Conclusions:

This is the fifth quarterly technical report for Budget Period II. Three significant new projects are in progress. The first new fault block appraisal well is underway to test the Sespe prospect identified from seismic reprocessing. A second exploratory well will be drilled in the first quarter of 2005 to appraise the North flank block of the Monterey. In addition, we have completed design work to separate and re-inject all produced water back into the Monterey at Holly. Equipment has been purchased to modify the Holly separators and we expect to complete the project by Q2 2005. These projects could add more than 30 MMB of reserves to South Ellwood field.

References

SPE 90409, Identification and Resolution of Water Treatment Performance Issues on the 135 D Platform, Chiffon Yang, Michel Galbrun, Schlumberger, Ted Frankiewicz, Natco, 2004