**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

Reporting Period Start Date: **July 1, 2004**

Reporting Period End Date: **September 30, 2004**

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Issue Date: **October 29, 2004**

Cooperative Agreement No. **DE-FC26-00BC15127**

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Progress Report July 1, 2004- September 30, 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 fourth 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. Most prominently, the large North Flank block running parallel and to the north of the main field area was determined to be probably oil bearing. This fault block lies in a bad seismic data area. The old 3D data was reprocessed to enhance the data quality in this area and refine this prospect. Drilling operations commenced on the North Flank appraisal well. The perforations in 3242-13 were squeezed in preparation for redrilling of the well across the north boundary fault.

Experimental

Not applicable for the work performed.

Results and Discussion

Task II – New Data

Static bottom hole pressure data was obtained from 3242-18 after installation of the ESP equipped with a Phoenix multi-sensor. The Monterey reservoir pressure at the datum was determined to be 1318 psia.

Task IV-1—Produced Water Re-Injection

The design study of the three phase separation capacity of the two Holly production separators was completed. This study showed that the production separators can be reconfigured at minimal cost to separate up to 40,000 BFPD at Holly. The equipment to complete these modifications has been ordered and we expect to separate more than 90% of the produced water from the Monterey at Holly by the first quarter of 2005. This water will be re-injected into the Monterey in wells 3120-10 and 3242-8-4. On the basis of the simulation model prepared by USC, this produced water re-injection will add as much 6 MMBO to the Monterey ultimate recovery by partially arresting the pressure decline.

Task IV-2—Downhole Water Separation ESP's

A workover was conducted to install an ESP in 3242-18. Although this was a conventional ESP, the unit was equipped with a Phoenix downhole multi-sensor in order to gather design data for 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

Construction of 3D dual porosity simulation model has commenced using the new GoCad model developed from the reprocessed seismic data. The model will be used to predict the reserves that will be developed by the new wells. The flowing plot shows a screen capture of the current model in CMG.

New Wells

An inactive well, 3242-13, will be re-drilled to the north to a location just updip of the 3242-10 exploratory well that first tested oil from the North flank. The existing perforations have been squeezed and the well is currently being prepared for sidetracking.

Sespe Development

We are using the reprocessed 3D seismic data to confirm the trapping mechanism and size of a Middle Sespe accumulation that was identified by Arco exploration well 208-102, drilled in 1985. The logs in this well indicate approximately 200' of net oil pay. However, Arco lost the bottom hole section of this well before they could effect a DST. Venoco plans to drill an appraisal well into this structure during the fourth quarter of 2004.

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 fourth quarterly technical report for Budget Period II. Two significant new projects are underway. The first new fault block appraisal well is underway to test the North flank prospect identified from seismic reprocessing. 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 Q1 2005. These two projects could add more 35 MMB of reserves to South Ellwood field.

References

SPE 77494, Using Computational Fluid Dynamics Simulation to model fluid motion in Process vessels on offshore fixed and floating platforms, Ted Frankiewicz and Chang-Ming Lee, 2002