

# "INCREASING WATERFLOOD RESERVES IN THE WILMINGTON OIL FIELD THROUGH IMPROVED RESERVOIR CHARACTERIZATION AND RESERVOIR MANAGEMENT"

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City of Long Beach, Department of Oil Properties  
Stanford University, Stanford, CA  
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## **Objectives**

The objectives of this quarterly report are to summarize the work conducted under each task during the reporting period April - June 1997 and to report all technical data and findings as specified in the "Federal Assistance Reporting Checklist".

The main objective of this project is the transfer of technologies, methodologies, and findings developed and applied in this project to other operators of Slope and Basin Clastic Reservoirs. This project will study methods to identify sands with high remaining oil saturation and to recompleat existing wells using advanced completion technology.

The identification of the sands with high remaining oil saturation will be accomplished by developing a deterministic three dimensional (3-D) geologic model and by using a state of the art reservoir management computer software. The wells identified by the geologic and reservoir engineering work as having the best potential will be logged with a pulsed acoustic cased-hole logging tool. The application of the logging tools will be optimized in the lab by developing a rock-log model. This rock-log model will allow us to convert shear wave velocity measured through casing into effective porosity and hydrocarbon saturation.

The wells that are shown to have the best oil production potential will be recompleted. The recompletions will be optimized by evaluating short radius and ultra-short radius lateral recompletions as well as other techniques.

## **Summary of Technical Progress**

### **● Reservoir Characterization**

No further reservoir characterization work was completed as the end of the budget period was June, 1997.

### **● Reservoir Engineering**

Researchers summarized reservoir engineering results for inclusion in the Yearly Report and Project Evaluation Report.

### ● **Deterministic 3-D Geologic Modeling**

No new modelling was attempted. Previous models were generated in digital form for submission to the DOE.

### ● **Pulsed Acoustic Logging**

No dipole logging took place.

### ● **Recompletions**

Recompletion candidate well Z-61 has been perforated across the "F<sub>1</sub>" and "F<sub>0</sub>" sands of the Tar Zone in Fault Block V. The perforations were 0.74 cm (0.29") in size and spaced at one (1) per every other foot. Z-61 is awaiting the steam consolidation completion by a portable steam generator. Should this prove to be cost effective, other operators could contract out portable steam generators provided they have access to fresh water and fuel. Z-61 is a replacement for the ultra-short radius redrill.

Horizontal redrill candidate J-17 was started in early March. The first attempt to hit the target "Hx0" sand failed as the trajectory coming out of the window was too high and corrections could not be made before exiting the target sand. J-17 was then plugged back and successfully redrilled to the target interval. A significant achievement in drilling this well was turning it 90° while still in the target sand.

The liner was perforated with 0.74 cm (0.29") holes, 0° phased, and spaced one (1) hole per ten (10) foot interval from 1001 m (3285') to 1189 m (3900'). A string of thermal insulated tubing with a thermal packer on bottom were installed. The well is waiting on a gas line and meter to be installed by the city gas department.

### ● **Technology Transfer**

Researchers completed and submitted the Yearly and Project Evaluation Reports to the DOE.

Researchers modified their paper titled: "Anelasticity and Dispersion in Dry Unconsolidated Sands" to incorporate new results for presentation to the Stanford Rock and Borehole Geophysics Consortium Annual Meeting.

Researchers presented papers at the April 1997 American Association of Petroleum Geologists (AAPG) Annual Meeting titled: "Fluid Detection and Porosity Determination using Acoustic Logs in the Wilmington Field, CA", and "Application of theoretically derived rock physics relationships for clastic rocks to log data from the Wilmington Field, CA".

Researchers are working on a paper for the 1997 Stanford Rock and Borehole Geophysics Consortium Annual Meeting titled: "Hydrocarbon Detection Behind Casing in the Wilmington Field, CA: Summary of the results of the first phase of a DOE CLASS 3 PROJECT".

Researchers submitted papers "Identifying Patchy Saturation From Well Logs" Dvorkin et al. and "Fluid Detection and Porosity Determination using Acoustic Logs in the Wilmington Field, CA", Moos et al. to Geophysics magazine.

Researchers presented a paper at the May 1997 American Association of Petroleum Geologists (AAPG) Pacific Regional Meeting titled: "Hydrocarbon Detection Behind Casing in the Wilmington Field, CA", Moos and Walker.

Researchers presented a paper at the June 1997 SPE Western Regional Meeting titled: "Locating and Producing Bypassed Oil: A DOE Project Update".

Researchers updated the project's World Wide Web homepage at [http://pangea.stanford.edu/~moos/DOE\\_home.html](http://pangea.stanford.edu/~moos/DOE_home.html) for activities through March of 1997.

Final revisions were made to the CD-ROM which describes and chronicles both DOE projects operated by Tidelands Oil. These CD-ROMs were distributed to the DOE and attendees of the June 1997, SPE Western Regional Meeting.

## **References and Publications**

None