Integrated Approach Towards the Application of Horizontal Wells to Improve Waterflooding Performance

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1. OBJECTIVES

The overall purpose of the proposed project is to improve secondary recovery performance of a marginal oil field through the use of an appropriate reservoir management plan. The selection of plan will be based on the detailed reservoir description using an integrated approach. We expect that 2 to 5% of the original oil in place will be recovered using this method. This should extend the life of the reservoir by at least 10 years.

The project is divided into two stages. In Stage I of the project, we selected part of the Glenn Pool Field - Self Unit. We conducted cross borehole tomography surveys and formation micro scanner logs through a newly drilled well. By combining the state-of-the-art data with conventional core and log data, we developed a detailed reservoir description based on an integrated approach. After conducting extensive reservoir simulation studies, we evaluated alternate reservoir management strategies to improve the reservoir performance including drilling of a horizontal injection well. We observed that selective completion of many wells followed by an increase in the injection rate was the most feasible option to improve the performance of the Self Unit. This management plan is currently being implemented and the performance is being monitored.

Stage II of the project will involve selection of part of the same reservoir (Berryhill Unit - Tract 7), development of reservoir description using only conventional data, simulation of flow performance using developed reservoir description, selection of an appropriate reservoir management plan, and implementation of the plan followed by monitoring of reservoir performance.

By comparing the results of two budget periods, we will be able to evaluate the utility of collecting additional data using state-of-the-art technology. In addition, we will also be able to evaluate the application of optimum reservoir management plan in improving secondary recovery performance of marginal oil fields.

Successful completion of this project will provide new means of extending the life of marginal oil fields using easily available technology. It will also present a methodology to integrate various qualities and quantities of measured data to develop a detailed reservoir description.

2. STAGE I PROJECT MONITORING

During the summer of 1995, we started implementing the reservoir management plan in the Self Unit. Last quarter, after evaluating each individual well, we decided to install electrical submersible pumps to produce three wells. The other three wells required the use of rod pumps. Production from the field improved significantly once the pumps were installed. Over the last two years, an average daily production has been approximately 40 to 45 bbls/day. Compared to a base line production of 13 bbls/day before the implementation, this is more than a 200% increase in production.

3. FIELD IMPLEMENTATION FOR STAGE II

In the previous annual report, we provided with a detailed field implementation plan for Tracts 7 and 9. At present, we are designing a deviated well to be drilled in Tract 9. The location has been finalized, the well plan has been finished, and overall completion strategy has been determined. We are finalizing the AFE for the overall implementation. This overall implementation will include converting well no 61 into an injector, re-perforating wells M-3A and M-4A, and drilling a deviated production well between 61 and M-3A/M-4A in east west direction. The total length is expected to be about 500 ft, and the well would be completed in zones A through D. We expect to drill this well in the next quarter and provide some preliminary results in the next quarterly report.

4. TECHNOLOGY TRANSFER

While we are working on implementation of the reservoir management plan, we are also making a concerted effort to transfer the technology. During this quarter, we are working several publications. These include:

Glenn Pool Field, Oklahoma: A Case of Improved Production from a Mature Reservoir.

American Association of Petroleum Geologists Bulletin.

Revised manuscript submitted; expected publication Fall, 1998.

Facies Architecture of the Bluejacket Sandstone in the Eufaula Lake Area, Oklahoma: Implications for Reservoir Characterization of the Subsurface Bartlesville Sandstone.

American Association of Petroleum Geologists monograph series.

Revised manuscript submitted; expected publication January, 1999.

Sequence Stratigraphy of the Middle Pennsylvanian Bartlesville Sandstone, Northeastern Oklahoma: A Case of an Underfilled Incised Valley.

American Association of Petroleum Geologists Bulletin.

Submitted for peer review; decision expected August, 1998.

Untitled Logging Technology in preparation by BDM Petroleum Technologies staff.

Society of Professional Well Log Analysts monograph series.

Submitted revised manuscripts, in peer review; publication date unknown.

Application of Borehole Imaging for Meandering Fluvial Facies Architecture Reconstruction of the Bartlesville Sandstone, Oklahoma.

American Association of Petroleum Geologists Bulletin.

About 80% complete; expected submission for peer review August, 1998.