DOE/BC/14951--12

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

(Contract No. DE-FC22-93BC14951)

Submitted by

University of Tulsa
Tulsa, OK 74104

Principal Investigator : Balmohan G. Kelkar
Co-Principal Investigators: Chris Liner, Dennis Kerr
Contract Date : January 1, 1993
Completion Date : December 31, 1996
Reporting Period : April 1 - June 30, 1995
Government Award : \$ 250,973

Contracting Officer's Representative

Ms. Rhonda P. Lindsey
U.S. Department of Energy
Bartlesville Project Office
P. O. Box 1398
Bartlesville, OK 74005

RECEIVED
ASDOE/PETC
95 JUL 10 AM 10:11
U.S. DEPARTMENT OF ENERGY

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

MASTER

at

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

Objectives

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

To accomplish the goals of the project, it is divided into two stages. In Stage I, we will select part of the Glenn Pool field (William B. Self Unit), and collect additional reservoir data by conducting cross bore hole tomography surveys and formation micro scanner logs through newly drilled well. In addition, we will also utilize analogous outcrop data. By combining the state of the art data with conventional core and log data, we will develop a detailed reservoir description based on integrated approach. After conducting extensive reservoir simulation studies, we will evaluate alternate reservoir management strategies to improve the reservoir performance including drilling of a horizontal injection well. The management plan will be implemented and the performance will be monitored. If the performance is encouraging, we will enter into second budget period of the project.

If continued, the second budget period 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.

A 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.

Summary of Technical Progress

In the last three months, we are busy implementing the reservoir management plan in the field. Initially six wells were targeted for re-completion and stimulation. The original plan was to complete the wells by the end of April. Unfortunately, due to unforeseen inclement weather in Tulsa and the surrounding vicinity, the plan had to be postponed. Due to excessive rains, it was very difficult to move completion rig in the field. Finally, we started the implementation plan in May. All the six wells - five producing and one injection wells - were first perforated at the desired sections based on the flow simulation results. In addition, the perforations were acid stimulated. We had some problems in acid stimulation at the beginning. The initial pressure requirements were excessively high before the stimulating fluid could be injected in some of the perforations. We modified the procedure by first soaking the desired interval with acid for few minutes followed by the injection of the stimulating fluid. This solved the problem and rest of the operation went smoothly.

Our initial response from all the six wells has been better than anticipated. Using the existing pumps, we are unable to pump down the fluid level in any of the five wells. Our next task is to re-size the pumps so that we can fully benefit from the reservoir management implementation. The injection well can also take lot more water than it could take before. Therefore, we need to increase our ability to inject more water. We have ordered a new injection pump to increase the injection rate. The pumping station should be finished by the third week of July. After that, we will be able to inject more water in the Self Unit.

In general, we believe that once the plan is fully implemented we should be able to see an increase in the oil production. By the next quarterly report, we should have some estimates of the increase in the oil production.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.