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**TITLE: IMPROVED OIL RECOVERY IN MISSISSIPPIAN CARBONATE RESERVOIRS OF KANSAS -- NEAR TERM -- CLASS 2**

Cooperative Agreement No.: DE-FC22-93BC14987

Contractor Name and Address: The University of Kansas Center for Research Inc.

Date of Report: July 14, 1997

Award Date: September 16, 1994

DOE Cost of Project: \$ 3,169,252 (Budget Period 2 05/16/97 -- 05/15/99)

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Reporting Period: April 1, 1997 -- June 30,1997

**OBJECTIVES**

The objective of this project is to demonstrate incremental reserves from Osagian and Meramecian (Mississippian) dolomite reservoirs in western Kansas through application of reservoir characterization to identify areas of unrecovered mobile oil. The project addresses producibility problems in two fields: Specific reservoirs target the Schaben Field in Ness County, Kansas, and the Bindley Field in Hodgeman County, Kansas. The producibility problems to be addressed include inadequate reservoir characterization, drilling and completion design problems, non-optimum recovery efficiency. The results of this project will be disseminated through various technology transfer activities.

At the Schaben demonstration site, the Kansas team will conduct a field project to demonstrate better approaches to identify bypassed oil within and between reservoir units. The approach will include:

- Advanced integrated reservoir description and characterization, including integration of existing data, and drilling, logging, coring and testing three new wells through the reservoir intervals. Advanced reservoir techniques will include high-resolution core description, petrophysical analysis of pore system attributes, and geostatistical analysis and 3D visualization of interwell heterogeneity.
- Computer applications will be used to manage, map, and describe the reservoir. Computer simulations will be used to design better recovery processes, and identify potential incremental reserves.
- Comparison of the reservoir geology and field performance of the Schaben Field with the previously described by slightly younger Bindley Field in adjacent Hodgeman, County.
- Drilling of new wells between older wells (infill drilling) to contact missed zones;
- Demonstration of improved reservoir management techniques, and of incremental recovery through potential deepening and recompletion of existing wells and targeted infill drilling.

**SUMMARY OF TECHNICAL PROGRESS BUDGET PERIOD 2**

Progress is reported for the period from 1 April 1997 to 30 June 1997. Work in this quarter concentrated on finishing the full field reservoir simulation (Task 1.2), generating a final report for Budget Period 1, technology transfer efforts (Task 2.2) and demonstrating the incremental recovery of additional mobile oil through targeted infill drilling (Task 2.1). Two wells using locations identified through the reservoir characterization and simulations were drilled and are awaiting completion.

**Task 2.1 DEMONSTRATION OF RESERVOIR MANAGEMENT STRATEGY**

Two targeted infill drilling locations were drilled at the Schaben Demonstration Site (Subtask 2.1.1). The Ritchie #6 Moore “D-P” (425’ FNL and 1270’ FWL, Section 30-19S-21W) and the Ritchie #3 Humburg “A-P” (920’ FEL and 920’ FSL, Section 25-19S-22W) were drilled, cored, logged and cased on 6/20 and 6/30, respectively. Both wells are waiting on completion. The locations were selected based on using the reservoir description and simulation undertaken as part of Budget Period 1 to optimize recovery. The predicted production and oil recovery from each well as simulated are:

Well Name	Initial Production Oil	First Year Cumulative
#3 Humburg	70 - 100 BOPD	17,000 BO
#6 Moore	50 - 70 BOPD	12,000 BO

Plots of simulated cumulative oil and water production are attached (figures 1 & 2). Following completion, production will be monitored and reservoir performance evaluated. The

incremental contribution to recoverable reserves will be evaluated. In addition, simulations for ten additional primary and alternate locations for infill wells in the Schaben Field were completed (Gerlach and Bhattacharya, 1997).

## **Task 2.2 TECHNOLOGY TRANSFER**

Technology transfer is an ongoing process that includes access to information through the Internet, almost daily inquires and formal presentations. A paper, on the combination of magnetic resonance and traditional petrophysical techniques to determine characterize a heterogeneous reservoir, was presented April 9 at the American Association of Petroleum Geologists (Guy and others, 1997). Two short courses, using materials and results derived from the Class 2 project, were developed and presented as part of a series under the auspices of the Petroleum Technology Transfer Council (PTTC). The courses, which were presented at the Kansas Geological Survey in Lawrence, Kansas, were well received and attended by consultants, independent operators and major companies (Detailed evaluations available through the PTTC). The two courses, related to the Class 2 project, were entitled “**Well-log Analysis on a PC using the PffEFFER Spreadsheet Program**” and “**Reservoir Simulation on a PC using USDOE Boast 3 and Computer Mapping Packages**”. The series of courses are scheduled to be repeated during November at the Downtown Campus of Wichita State University in Wichita, Kansas.

We continue to work with a number of Kansas operators on application of the technologies developed as part of the Class 2 project. We are providing access to the digital data and results from the project through an on-line (Internet) accessible format.

## **REFERENCES**

- 1997, Gerlach, P, and S. Bhattacharya, Simulation of primary and alternate locations for five infill wells, Schaben Field, Ness County, Kansas: Kansas Geological Survey Open File Report 97-46.
- 1997, Guy, W. J., T. R. Carr, E. K. Franseen, S. Bhattacharya, and S. Beaty, Combination of magnetic resonance and classic petrophysical techniques to determine pore geometry and characterization of a complex heterogeneous carbonate reservoir: American Association of Petroleum Geologists Annual Meeting Abstracts, Dallas.

### #3 Humburg AP

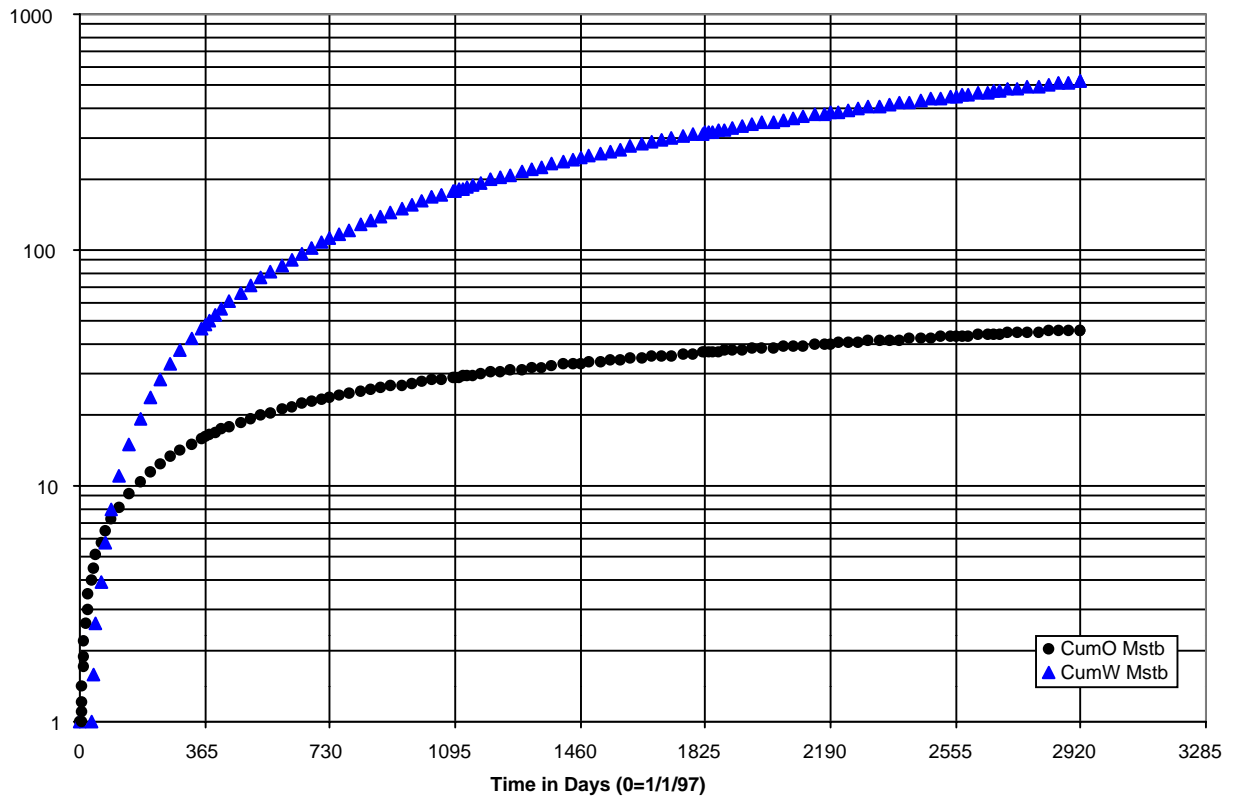


Figure 1.-- Plot of simulated cumulative oil and water for the Ritchie #3 Humburg "A-P" (920' FEL and 920' FSL, Section 25-19S-22W).

#6 Moore DP

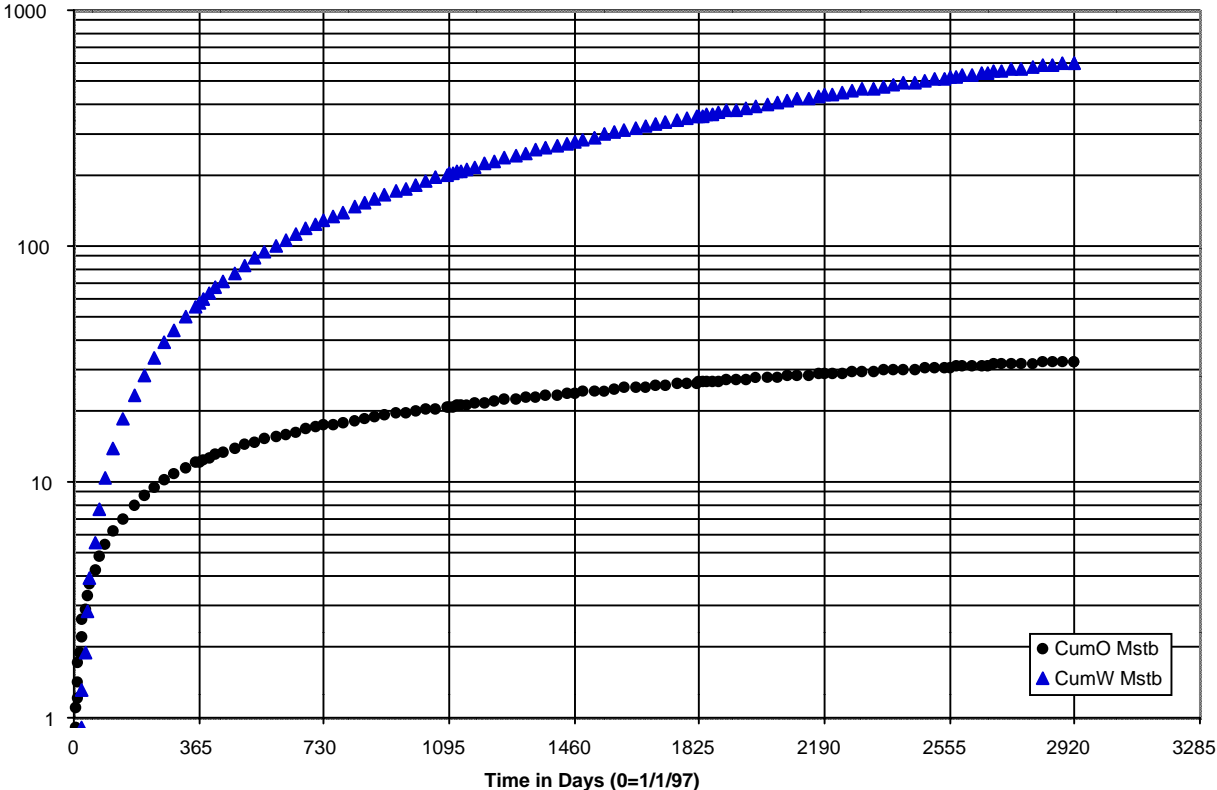


Figure 2.-- Plot of simulated cumulative oil and water for the Ritchie #6 Moore "D-P" (425' FNL and 1270' FWL, Section 30-19S-21W).