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

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The University of Kansas Center for Research Inc.

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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.

Project Status

The project began in September of 1994, and will run through 1998.

Project Description

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.

The project is an effort to make Kansas producers more aware of potentially useful technologies and to demonstrate in actual oil field operations how to apply them. For many producers, especially independents, such information is important for continued production. A major emphasis of the Kansas project will be collaboration of University scientists and engineers with the independent producers and service companies operating in the state. An extensive technology transfer effort will be undertaken to inform other operators of the results of the project. In addition to traditional technology transfer methods (e.g., reports; trade, professional, and technical publications; workshops; and seminars) a public domain relational database and computerized display package will be made available through the Internet and other means of digital access.

Summary of Technical Progress

General Overview.--Progress is reported for the period from 1 April 1995 to 30 June 1995. Work in this quarter has concentrated on reservoir characterization (Task 1.2), with the initiation of technology transfer (Task 1.3). Difficulties still remain in the drilling of the final two wells. The bulk of work to date has concentrated on Task 1.1. Some preliminary work on reservoir characterization (Task 1.2) has been completed, and related technology transfer has been initiated.

Task I.1 - Acquisition and Consolidation of Available Data (Target Completion Date: 4/2/95). Delayed Completion (9/30/95).

Summary of work in last quarter.--Acquisition and consolidation of existing geologic and digital log data were complete last quarter. As reservoir analysis progresses, minor quality problems with the digital data are uncovered (e.g., spurious data within a digital log curve). These errors are corrected either manually or sent back to the digitizing contractor. Work is complete on the acquisition of a production data. We will continue to investigate additional sources of production and productivity data (e.g., Kansas Corporation Commission).

After protracted permitting and scheduling problems, the first of three new wells with modern log suites and core data was drilled during the first quarter. The #4 Moore "B-P" Twin was spuded on 4/25 and completed on 6/13. Daily drilling and completion reports are attached. An excellent core was recovered and described. The core has lead to the development of a new geologic reservoir model for the Schaben Field. The Ritchie Exploration as operator is

pushing to expedite the permitting and drilling of the remaining two wells. Subject to hole conditions and tool availability we are still working on running a magnetic resonance imaging log (MRI) in at least one of the remaining wells.

Summary of planned work for next quarter.-- This task has been delayed by a contentious operator and his use of the permitting process to delay the drilling of the wells. The remaining two wells should be drilled this quarter.

Task I.2 - Reservoir Characterization (Target Completion Date: 3/3/96).

Summary of work in last quarter.--The biggest breakthrough was in development of the ability to bin, load, and display well log data from Schaben Field as a 3D "pseudoseismic" volume. The preliminary results were briefly presented at the DOE contractor's meeting. The presentation lead to several contacts concerning possible cooperative work with other DOE contractors. At Schaben we are using the "Pseudoseismic" approach to recognize and map small faults and stratigraphic geometries within the reservoir units.

The core recovered from the #4 Moore "B-P" Twin has resulted in a modification of our view of the Schaben reservoir and the Mississippian reservoirs of Kansas, in general. If the multi-tiered karst model is valid, numerous vertically and laterally segregated reservoir compartments would be expected. We will continue to work to provide additional data that confirms or modifies this model.

Work continues on petrophysical analysis making use of newly developed analysis package (PfEFFER). PfEFFER stands for "Petrofacies Evaluation of Formations for Engineering Reservoirs".

Engineering analysis and simulation has picked up with the additional of a dedicated research assistant.

Overall, our geologic understanding of the Schaben reservoir has increased significantly over the last quarter.

Summary of planned work for next quarter.-- Analysis of data from the remaining new wells along with development of a descriptive reservoir model will continue. Engineering analysis and initial simulation efforts will be underway. The 3D geologic analysis of the Schaben Field should be nearly complete.

Task I.3 - Technology Transfer (Target Completion Date: 8/4/96).

Summary of work in last quarter.-- Technology transfer is beginning to ramp up. The presentation at the DOE contractor's conference resulted in several contacts concerning possible cooperative work with other DOE contractors. These contacts and discussions center on application of the "pseudoseismic" approach to other projects. An open-file report on the "pseudoseismic" approach is available over the Internet (http://crude1.kgs.ukans.edu/publication/carr.html). An abstract on the Schaben was submitted to the Platform Carbonates Workshop to be held in Norman, Oklahoma (3/96).

Summary of planned work for next quarter.--Presentations will be prepared for the Oklahoma conference and the AAPG national meeting. We also plan to highlight the Schaben project at the Kansas Geological Survey's booth at the national AAPG meeting. A scientific paper is being prepared on the "pseudoseismic approach". We will continue our work with Kansas operators on application of the technologies developed as part of the Class II project.