DOE/BC/14938--2

TITLE: ADVANCED RESERVOIR CHARACTERIZATION IN THE ANTELOPE SHALE TO ESTABLISH THE VIABILITY OF CO2 ENHANCED OIL RECOVERY IN CALIFORNIA'S MONTEREY FORMATION SILICEOUS SHALES

Cooperative Agreement No.: DE-FC22-95BC14938

Contractor Name and Address: Chevron USA Inc., Production Company (CPDN), 5001 California Avenue, Bakersfield, California 93309

Date of Report: June 30, 1996

Award Date: February 7, 1996

Anticipated Completion Date: June 11, 1998

Government Award for Current Fiscal Year: $ 2, 334,048

Principal Investigator: Stephen C. Smith, CPDN

Project Manager: Edith Allison, Bartlesville Project Office

Reporting Period: April 1, 1996 - June 30, 1996

Objective

The primary objective of this research is to conduct advanced reservoir characterization and modeling studies in the Antelope Shale reservoir. Characterization studies will be used to determine the technical feasibility of implementing a CO_2 enhanced oil recovery project in the Buena Vista Hills field. The Buena Vista Hills pilot CO_2 project will demonstrate the economic viability and widespread applicability of CO_2 flooding in fractured siliceous shales reservoirs of the San Joaquin Valley. The research consists of four primary work processes: Reservoir Matrix and Fluid Characterization; Fracture Characterization; Reservoir Modeling and Simulation; and, CO_2 Pilot Flood and Evaluation. Work done in these areas can be subdivided into two phases or budget periods. The first phase of the project will focus on the application of a variety of advanced reservoir characterization techniques to determine the production characteristics of the Antelope Shale reservoir. Reservoir models based on the results of the characterization work will be used to evaluate how the reservoir will respond to secondary recovery and EOR processes. The second phase of the project will include the implementation and evaluation of an advanced EOR pilot in the West Dome of the Buena Vista Hills field.

Summary of Technical Progress

The Buena Vista Hills project realized it's first major milestone in the second quarter of 1996 with the pending drilling of proposed project injection well. Regional fracture characterization work was also initiated in the second quarter. This report will summarize the status of those efforts.

Proposed Project Injection Well

The 653Z-26B well, located in Section 26, T31S-R23E, Kern County, California is scheduled to spud on July 1, 1996 after a fairly lengthy environmental review and permitting process. This well is being drilled in a position to serve as an injection well for any future enhanced oil recovery pilot project. The well is planned to be drilled to a total depth of 5000 feet and penetrate the entire productive Antelope Shale reservoir. It is anticipated that it will take 30 days to drill and complete this well. The well will be cased and will remain inactive pending the results of the reservoir characterization and modeling studies.

DISCLAIMER

Extensive data collection will take place in this project well. The well will be deviated to increase the chance of intersecting natural fractures. Approximately 900-1000 feet of core will be cut and recovered in the Antelope Shale utilizing "low-invasion" and "soft" core handling techniques. After coring operations are completed, the wellbore will be logged with "state-of-the-art" open hole logging tools to collect data that will assist in the reservoir characterization process. Core Laboratories, Terra Tek, Dowell-Schlumberger, Chevron Petroleum Technology Company, and Horizon Mud Logging will all assist with the wellsite data collection process.

Regional Fracture Characterization

Regional fracture characterization studies are underway. Advanced Resources International (ARI) and Stanford University are assisting with these project tasks. ARI has gathered regional gravity, magnetic, and remote sensing data and begun reviewing that data. ARI will assist by integrating micro-, meso-, and macro-scale fracture data to better understand field-scale reservoir fracture data . This analysis will then also be analyzed within a basin-scale tectonic framework. The results of this work will provide a fracture characterization analog for other fields in the San Joaquin Valley with similar structural/strain and depositional histories.

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