Quarterly Technical Progress Report

IMPROVED EFFICIENCY OF MISCIBLE CO_2 FLOODS AND ENHANCED PROSPECTS FOR CO_2 FLOODING HETEROGENEOUS RESERVOIRS

DOE Contract No. DE-FG26-97BC15047

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DISCLAIMER

ABSTRACT

A new grant, "Improved Efficiency of Miscible CO_2 Floods and Enhanced Prospects for CO_2 Flooding Heterogeneous Reservoirs," DOE Contract No. DE-FG26-97BC15047, has been awarded and started on June 1, 1997. This work will examine three major areas in which CO_2 flooding can be improved: fluid and matrix interactions, conformance control/sweep efficiency, and reservoir simulation for improved oil recovery.

EXECUTIVE SUMMARY

A new grant, "Improved Efficiency of Miscible CO_2 Floods and Enhanced Prospects for CO_2 Flooding Heterogeneous Reservoirs," DOE Contract No. DE-FG26-97BC15047, has been awarded and started on June 1, 1997. This work will examine three major areas in which CO_2 flooding can be improved: fluid and matrix interactions, conformance control/sweep efficiency, and reservoir simulation for improved oil recovery.

INTRODUCTION

Because of the importance of CO_2 flooding to future oil recovery potential in New Mexico, west Texas, and the entire United States, the Petroleum Recovery Research Center (PRRC) pursues a vigorous research program. We are investigating new concepts to improve the effectiveness of CO_2 flooding in heterogeneous reservoirs. The results of this research should expand the list of viable candidates for future CO_2 flooding to include low-pressure reservoirs and many more heterogeneous or fractured reservoirs.

SUMMARY OF TECHNICAL PROGRESS

To provide continued support for oil recovery research by CO_2 flooding for an additional three years, U.S. Department of Energy has extended the grant entitled: "Improved Efficiency of Miscible CO_2 Floods and Enhanced Prospects for CO_2 Flooding Heterogeneous Reservoirs." The New Mexico Petroleum Recovery Research Center (PRRC) is well known as a premier institution for improved oil recovery (IOR) research, and, in particular, research on the use of high pressure CO_2 injection. The extension will continue the progress on understanding CO_2 flooding in heterogeneous reservoirs, further the development of methods to enable CO_2 flooding in more heterogeneous reservoirs, and continue the dissemination of this information to promote successful implementation of these methods. The research will proceed in three related areas:

- Fluid and matrix interactions (understanding the problems): interfacial tension (IFT), phase behavior, development of miscibility, capillary number (Nc), injectivity, wettability, gravity drainage, etc.
- Conformance control/sweep efficiency (solving the problems): reduction of mobility using foam, diversion by selective mobility reduction (SMR) using foam, improved injectivity, WAG, horizontal wells, etc.
- Reservoir simulation for improved oil recovery (predicting results): gravity drainage, SMR, CO_2/foam flooding, IFT, injectivity profile, horizontal wells, and naturally fractured reservoirs.

All areas originate from research on the mechanics of oil recovery by high pressure CO_2. Experience gained during the current project is relevant to our continued efforts. Each of the areas will increase both quantity of oil produced and efficiency of oil recovery from CO_2 flooding. Special attention will be given to disseminating research results through an extensive technology transfer effort. Because of the importance of CO_2 flooding in the State of New Mexico, additional funds are being provided by a combination of state and industry funds.