

Quarterly Technical Progress Report

IMPROVED EFFICIENCY OF MISCELLY CO₂ FLOODS AND ENHANCED PROSPECTS
FOR CO₂ FLOODING HETEROGENEOUS RESERVOIRS

DOE Contract No. DE-FG26-97BC15047

New Mexico Petroleum Recovery Research Center
New Mexico Institute of Mining and Technology
Socorro, NM 87801
(505) 835-5142

Report Date: July 15, 1997

Contract Date: June 1, 1997

Completion Date: May 31, 2000

DOE Award of 3rd year: \$319,548

Program Manager: Reid B. Grigg

Principal Investigators: Reid B. Grigg
David S. Schechter

Other Major Contributors: Shih-Hsien (Eric) Chang
Boyun (Gordon) Guo
Jyun-Syung Tsau

Contracting Officer's
Representative: Jerry F. Casteel

Reporting Period: June 1, 1997–June 30, 1997

PRRC Report 97-17

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.

ABSTRACT

A new grant, "Improved Efficiency of Miscible CO₂ Floods and Enhanced Prospects for CO₂ 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 CO₂ 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 CO₂ Floods and Enhanced Prospects for CO₂ 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 CO₂ 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 CO₂ 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 CO₂ flooding in heterogeneous reservoirs. The results of this research should expand the list of viable candidates for future CO₂ 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 CO₂ flooding for an additional three years, U.S. Department of Energy has extended the grant entitled: "Improved Efficiency of Miscible CO₂ Floods and Enhanced Prospects for CO₂ 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 CO₂ injection. The extension will continue the progress on understanding CO₂ flooding in heterogeneous reservoirs, further the development of methods to enable CO₂ 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, CO₂/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 CO₂. 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 CO₂ flooding. Special attention will be given to disseminating research results through an extensive technology transfer effort. Because of the importance of CO₂ flooding in the State of New Mexico, additional funds are being provided by a combination of state and industry funds.