

EXECUTIVE SUMMARY

The project “Mini-Waterflood: A New Cost Effective Approach to Extend the Economic Life of Small, Mature Oil Reservoirs” will be lead by the Petroleum Engineering Department of New Mexico Institute of Mining and Technology (aka New Mexico Tech), with the assistance of the Petroleum Recovery Research Center in acquiring core measurements. The Principal Investigator will be Dr. Thomas W. Engler. The project relies on a strong partnership between New Mexico Tech and Armstrong Energy Corporation, a small independent operator in Southeast New Mexico. Armstrong Energy has committed to providing significant resources to the success of the project; most noteworthy are the acquisition of core for analysis and the drilling of several wells to acquire additional data and verify the mini-waterflood concept.

The goal of this project is to demonstrate the feasibility of successfully waterflooding small oil reservoirs that are not conducive to a fully-developed, patterned waterflood. These marginal plays have frequently been ignored, i.e., they are not the highly visible plays that received previous attention to secondary and/or tertiary recovery by major producers. Typically these types of reservoirs are shallow discoveries after deeper targets proved non-productive. To address this shortfall, a “mini-waterflood” design is proposed, that is, a non-traditional, water injection program to provide pressure maintenance and improve sweep efficiency.

In general, the reservoirs of interest are small and thin in extent, shallow, at low pressure and temperature, and have unfavorable mobility ratios. Initial primary energy was not sufficient to produce the oil; however, significant mobile oil remains to be recovered. Adding energy, in this case by waterflooding, is anticipated to improve oil recovery and extend the reservoir life under these poor conditions.

The main components of the proposed work, experimental core displacement studies and field simulation, will provide critical information to the design and success of the mini-waterflood. Core displacement studies provide a quantitative measure of the mobile oil available for secondary recovery, in this case, subject to unusual reservoir conditions. The results will be coupled with improved reservoir characterization and subsequently scaled to field level using reservoir simulation. The objective of the reservoir simulation will be to investigate various development and injection plans and prioritize with regards to oil recovery. The impact of injection rates and pressures will be investigated. Understanding the effect of these controllable parameters is essential to the mini-waterflood design.