
How an Independant Operator Can Integrate Engineering, Geophysics, and Geology in a Reservoir Study: Grayburg/San Andres of Foster and South Cowden Fields, Ector County, Texas

Robert C. Trentham¹, William C. Robinson² and Richard E. Weinbrandt³

¹Muskoka Consultants, Midland, Texas

²Seismic Decisions, Midland, Texas

³Consultant, Midland, Texas

ABSTRACT

A cooperative two phase study of the Grayburg/San Andres reservoir is being conducted in association with the United States Department of Energy's (DOE) Class II (Shallow Shelf Carbonate Reservoirs) Oil Program. The project is cost shared by Laguna Petroleum Corporation (operator) and the DOE. This study's purpose is to preserve access to existing well bores by identifying additional reserves.

The potential for enhanced oil recovery in this 66 year-old Foster and South Cowden fields is being evaluated by a technical team integrating subsurface geology, 3-D seismic data, and reservoir engineering, and by using state-of-the-art software on both a PC and a high-performance computer workstation. A reservoir model was developed with subsurface control from wire line logs, core, and seismic attribute maps to extract reservoir properties in the inter-well bore space. Production allocation, completion history, and reservoir simulation were integrated with the reservoir model.

The results of the integrated effort are identification of infill drilling and workover locations, and the design of a more effective waterflood. Results of the reservoir simulation indicate: 1) the upper Grayburg flood has been ineffectual, 2) significant potential remains study-wide in the lower Grayburg, and in limited areas in the upper Grayburg and San Andres; and 3) the highly porous (12-14%) San Andres is a poor waterflood candidate because of low permeabilities, although it does contain significant additional primary reserves.

Workovers and new wells drilled based on the reservoir simulation model have, to date, led to the discovery of significant additional reserves in unswept zones. The simulation model also indicates that without this study, all wells in the study area would have been abandoned in ten (10) years. The study also demonstrates that this type of study, previously the domain of major oil companies, can be successfully and cost effectively undertaken by small independent operators.

ACKNOWLEDGEMENTS

We would like to acknowledge James J. Reeves and Hoxie W. Smith for conceiving and managing the DOE study and for being responsible for the geophysical study. Since April 1996, William C. Robinson has been responsible for reprocessing

and reinterpreting the seismic data and for the geophysical study. Also since that date, Robert C. Trentham has been responsible for project management.