DOE/BC/14936--T3

TECHNICAL PROGRESS REPORT

Title:	APPLICATION OF ADVANCED RESERVOIR CHARACTERIZATION, SIMULATION, AND PRODUCTION OPTIMIZATION STRATEGIES TO MAXIMIZE RECOVERY IN SLOPE AND BASIN CLASTIC RESERVOIRS, WEST TEXAS (DELAWARE BASIN)
Cooperative Agreement No.:	DE-FC22-95BC14936
Institution:	Bureau of Economic Geology The University of Texas at Austin University Station, Box X Austin, Texas 78713-7508
Date of Report:	June 30, 1995
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Government Award for this Budget Period:	$1,010,208
Program Manager:	Edith C. Allison
Principal Investigator:	Shirley P. Dutton
Contracting Officer's Representative:	Edith C. Allison
Reporting Period:	April 1, 1995 - June 30, 1995

DISCLAIMER

OBJECTIVES

The objective of this project is to demonstrate that detailed reservoir characterization of slope and basin clastic reservoirs in sandstones of the Delaware Mountain Group in the Delaware Basin of West Texas and New Mexico is a cost-effective way to recover a higher percentage of the original oil in place through strategic placement of infill wells and geologically based field development. Project objectives are divided into two major phases. The objectives of the reservoir characterization phase of the project are to provide a detailed understanding of the architecture and heterogeneity of two fields, the Ford Geraldine Unit and Ford West field, which produce from the Bell Canyon and Cherry Canyon Formations, respectively, of the Delaware Mountain Group and to compare Bell Canyon and Cherry Canyon reservoirs. Reservoir characterization will utilize 3-D seismic data, high-resolution sequence stratigraphy, subsurface field studies, outcrop characterization, and other techniques. Once the reservoir characterization study of both fields is completed, a pilot area of approximately 1 mi^2 in one of the fields will be chosen for reservoir simulation.

The objectives of the implementation phase of the project are to (1) apply the knowledge gained from reservoir characterization and simulation studies to increase recovery from the pilot area, (2) demonstrate that economically significant unrecovered oil remains in geologically resolvable untapped compartments, and (3) test the accuracy of reservoir characterization and flow simulation as predictive tools in resource preservation of mature fields. A geologically designed, enhanced recovery program (CO_2 flood, waterflood, or polymer flood) and well-completion program will be developed, and one to three infill wells will be drilled and cored. Through technology transfer workshops and other presentations, the knowledge gained in the comparative study of these two fields can then be applied to increase production from the more than 100 other Delaware Mountain Group reservoirs.

SUMMARY OF TECHNICAL PROGRESS

Geophysical Characterization

The design of the 3-D seismic program is complete, and seismic acquisition began on May 26, 1995. By the end of the quarter, seismic acquisition was 50% complete. The following 3-D parameters are being used.

Area	36 square miles
Bin Size	110' x 110'
Spread	8 lines x 96 channels/line (768 channels live)
Receiver line spacing	1100'
Receiver flags	220'
Receiver arrays	24 geophones/linear array
Array dimension	220' inline, 100' crossline
Source line spacing	880'
Source flags	220'
Source arrays	4 vibs x 8 sweeps (Using 5 vibs)
Sweep	8–60 Hz/12 sec long
Sample rate	2 millisecs
Listen time	4 secs

Seismic field tapes are being sent to the Conoco Research Lab in Ponca City, Oklahoma. The lab has now received 60% of the field tapes and 100% of the surface-elevation survey tapes. Lab personnel are performing quality control on all the headers before beginning to process the raw files.

Reservoir Characterization

Data gathering and data base construction started for the Ford Geraldine Unit (FGU) of Ford Geraldine field (FGF) and for Ford West field (FWF). Paper copies of 385 wireline logs from a total of 170 wells, from both the FGU (152 wells) and the FWF (18 wells), were obtained by Bureau of Economic Geology scientists at Conoco's offices in Midland. Most logs consist of a gamma-ray curve, but some also include neutron, sonic, density, or resistivity curves. Curve digitization using Neuralog software started at the end of the quarter. Also, four floppy disks containing well-completion data of FGU and FWF wells were provided to the Bureau of Economic Geology by Conoco.

Gathering of core data is under way. Information from 65 wells, of which 62 are from the FGU and 3 are from the FWF, has been obtained from well files at Conoco, Midland. Data consist of graphs or tabulations of conventional petrophysical determinations from 60 wells, capillary pressure data from 9 wells, and core gamma-ray logs from 9 wells. Inventory data of the BEG's Core Research Center (CRC) indicate that a total of 2,320 ft of core from 29 wells from the FGF and the FWF is in storage at the CRC. Core descriptions of one of these wells are included in A. M. Linn's Master's thesis (1985). Cores from 7 of the wells were described by R. W. Ruggiero in his Master's thesis (1985). Also, main publications on the stratigraphy and reservoirs in the Delaware Sandstone Group are being gathered and reviewed.

PLANNED ACTIVITIES

Activities in the upcoming quarter will focus on (1) completion of the seismic data acquisition, (2) initiation of seismic processing, and (3) completion of the data base for reservoir characterization. At the present rate, seismic acquisition will be complete at the end of July or beginning of August. Seismic processing will begin in July, and interpretable records should be available in about four months. In the upcoming quarter we also plan to begin building velocity geometries. Finally, data gathering and data base construction that started the Ford Geraldine Unit and for Ford West field are scheduled to be completed next quarter.

REFERENCES

Linn, A. M., 1985, Depositional environment and hydrodynamic flow in Guadalupian Cherry Canyon Sandstone, West Ford and West Geraldine fields, Delaware Basin, Texas: Texas A&M University, Master's thesis, 152 p.

Ruggiero, R. W., 1985, Depositional history and performance of a Bell Canyon sandstone reservoir, Ford Geraldine field, West Texas: The University of Texas at Austin, Master's thesis, 242 p.

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