

Exploring for Subtle Mission Canyon Stratigraphic Traps with Elastic-Wavefield Seismic Technology

DE-FC26-03NT15421

Program

This project was selected in response to DOE's Oil Exploration and Production solicitation DE-PS26-02NT15376 (September 2002).

Project Goal

The objective of this project is to develop a new seismic technology that will improve exploration for Mission Canyon oolitic limestone stratigraphic traps in the Williston Basin. This technology involves the acquisition of nine-component (9-C) seismic data that will allow independent P, SH, SV, and C images of geologic targets to be constructed. The integrated use of these images provides more seismic-sequence and seismic-facies information than does conventional P-wave seismic technology. The broader goal is to develop these methods for use in many other stratigraphic environments.

Performer

*Vecta Exploration, Ltd.
Dallas, TX*

Project Results

Vecta has successfully acquired 10 square miles of 9-C seismic data and has processed the data through one subcontractor. A second processor has applied substantially more effort in processing and is now 95% complete with a more robust end product. Vecta is contracting with Institut Français du Pétrole in order to develop a more rigorous multicomponent seismic interpretation product. Final interpretation should be complete in August 2005, with a well to be drilled in early 2006.

Benefits

Using elastic-wavefield seismic technology, researchers will be able to construct new lithofacies-sensitive attributes from P and S seismic data and use these attributes to identify changes in lithology, porosity, and permeability. Application of the technology will reach beyond the immediate study area and affect all plays in which one must identify lateral changes in stratigraphy and lithofacies. Successful application of the



Vibratory equipment used as a seismic source during the field acquisition.

technology across multiple basins in the U.S could result in the addition of substantial domestic reserves.

Successful implementation of this technology will impact the following additional economic areas:

- Increased per-well and per-field production.
- Reduced drilling and exploration costs owing to fewer dry holes.
- Reduced development cost and risk.
- More-efficient operations owing to better identification of reservoir.
- Increased identification and ultimate recovery of undiscovered resources.
- Increased exploration activity within domestic basins.
- Seismic acquisition is complete, using a spread of the largest number of active multicomponent geophones in history.
- Processing is 95% complete, with data quality being fair to good.
- Pseudo-sonic logs have been developed for each well within the survey.
- A dipole sonic log has been acquired in a nearby well.

Current Status (June 2005)

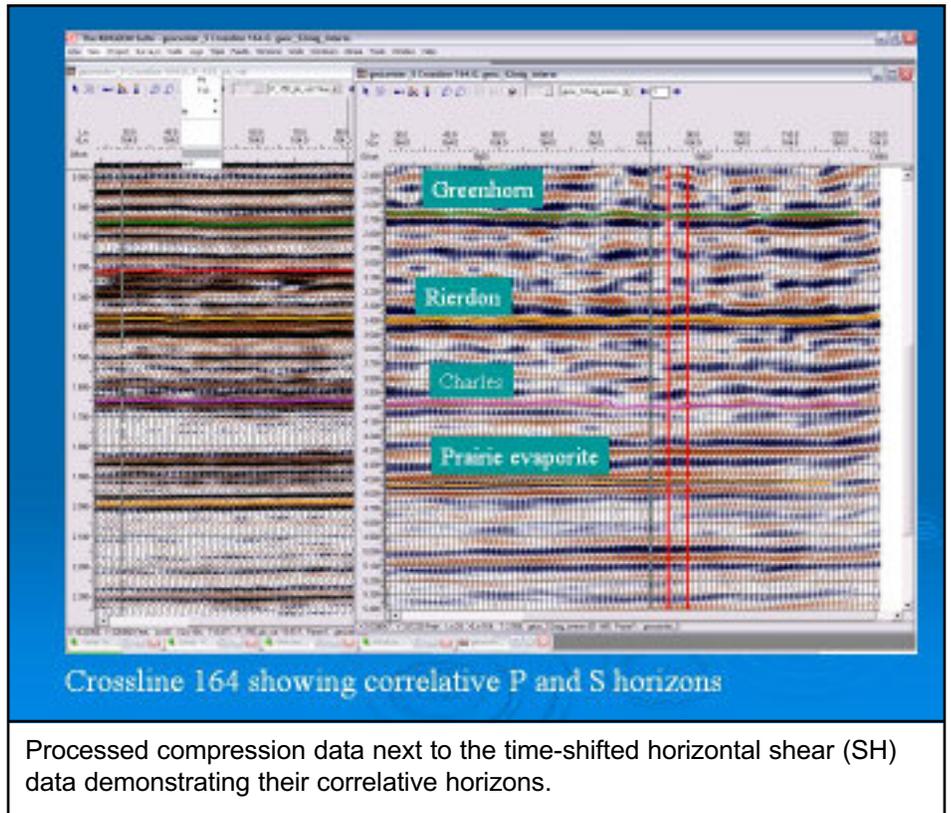
The project is in its third and final year. Upon completion of the final interpretation, a well will be drilled in the survey to validate the entire program. A multicomponent Vertical Seismic Profile will be run in the new well in order to better tie the well information with the surface seismic data.

Background

To date, the exploration risk for Mission Canyon traps has been too high to warrant a consistent level of exploration activity. Conventional 2-D and 3-D seismic data have failed to solve the stratigraphic complexities of the reservoir, and there are limited subsurface data along the trend. The failure of conventional seismic is due to the compressional velocity of the reservoir facies being too similar to the non-reservoir facies and therefore indistinguishable.

Project Summary

The project has achieved these milestones:



Publications

Semi-annual reports submitted to DOE on August 2003, February 2004, August 2004, and February 2005.

Project Start: February 6, 2003

Project End: February 5, 2006

Anticipated DOE Contribution: \$1,199,997

Performer Contribution: \$1,414,150 (54% of total)

Contact Information

NETL – Paul West (paul.west@netl.doe.gov or 918-699-2035)

Vecta – John Beecherl (jbeecherl@beecherl.com or 214-357-0333)