

PROJECT facts

DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

OIL technology
PROGRAM

BOOSTING OIL PRODUCTION IN THE WILLISTON BASIN OF MONTANA AND THE DAKOTAS

PRIMARY PROJECT PARTNER

**Luff Exploration
Company**
Englewood, CO

FOSSIL ENERGY PROGRAM

**Oil Recovery Field
Demonstrations**

MAIN SITES

Richland County, MT
Bowman County, ND
Harding County, SD

TOTAL ESTIMATED COST

\$3.6 million

COST SHARING

DOE - \$1.8 million
Non-DOE - \$1.8 million

DE-FC22-93BC14984

Project Description

The Luff Exploration Company oil recovery project will bring a host of new, high-technology oil production tools to independent producers in the carbonate basins of Montana and North and South Dakota.

The project is part of the Department of Energy's Class II Oil Recovery Field Demonstration Program, an intensive effort to demonstrate promising ways to keep many of the Nation's most endangered oil reservoirs in production. The Class II designation signifies the second round of the program, begun in 1993, which focused on shallow shelf carbonate reservoirs.

In one part of the project, Luff Exploration will test one of the industry's most important new advances in petroleum technology — 3-dimensional seismic surveying. 3-D surveying can reveal untapped, oil-bearing pay zones in complex reservoirs with unparalleled resolution.

With a more accurate description of a reservoir's architecture, Luff will target infill drilling — drilling between existing wells — to tap missed or bypassed reservoir zones. In some existing wells, Luff will attempt to improve production by using a high-pressure jetting lance to drill multiple, short-length horizontal penetrations that radiate out from the main well-bore.

The company will also examine whether waterflooding — injecting water into the reservoir to force oil through the reservoir rock to production wells — is technically and economically feasible in the target carbonate formations.

The project team acquired and analyzed new 3-D seismic data and re-analyzed older 2-D seismic data to describe the complex geological characteristics of the Red River and Ratcliffe reservoirs in the Williston Basin. Detailed engineering studies are being conducted to further refine the description of the reservoirs. The jetting lance well completion technology is currently scheduled for testing in several Red River reservoirs in early 1996. Field assessments of water injection for improving oil recovery have commenced in anticipation of the field pilot.

Program Goal

DOE's Oil Program promotes the development and application of a variety of oil field technologies that can reduce operating costs and increase oil production. In many cases a single technology can achieve that goal, but quite often a combination of technologies can promote synergy, in which the separate techniques or methodologies enhance each other, producing a combined effect greater than the sum of their individual contributions.

Luff Exploration Company's Williston Basin Class II Oil Field Recovery Demonstration Project uses that approach, combining 3-D seismic surveying, infill drilling with horizontal boreholes and water-jet-created laterals, and waterflooding to effect maximum improvement in locating and producing oil from low-permeability carbonate reservoirs in fields with high drilling costs.

If successful, this project could provide operators with the a combination of technologies that could add as much as 200 million additional barrels of oil from the Williston Basin.

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Project Benefits

The Luff Exploration project is intended to show ways to prolong the economic life of existing oil wells. If successful over its 4-year test production period, the joint project with the Department of Energy will add nearly 600,000 barrels of additional production. If the technologies demonstrated gain widespread commercial acceptance in the Williston Basin of Montana and the Dakotas, it may be possible to add nearly 200 hundred million barrels of new oil production to the Nation's domestic supply.

Specifically, the Luff project is expected to show oil field operators the individual and collective benefits of using:

- 3-D seismic surveying to identify zones of oil that may have been missed during prior production.
- Targeted infill drilling to tap the oil production potential of these bypassed zones.
- New well completion techniques, such as creating short lateral offsets with high-pressure jetting lance technology to enhance the effectiveness of production wells.
- Waterflooding to move additional oil through various Williston Basin reservoirs to production wells.

If these techniques are successful, operators in the Williston Basin could potentially boost recovery from their fields by about one-third more than the cumulative oil production to date. The result could be substantial quantities of additional oil production from U.S. reservoirs, preserving high-quality jobs in the Nation's oil fields, enhancing U.S. future energy security and providing positive impact on the local and national economies.

CONTACT POINTS

Larry A. Carrell

Luff Exploration
Englewood, CO
Phone: (303) 861-2468
FAX: (303) 861-2481

Chandra M. Nautiyal

U.S. Department of Energy
Bartlesville Project Office
Bartlesville, OK
Phone: (918) 337-4409
FAX: (918) 337-4418
e-mail: cnautiya@bpo.gov

Cost Profile (Dollars in Millions)

	Budget Period 1		Budget Period 2	
	06/10/94	09/01/95	06/09/97	06/09/97
Department of Energy*	\$0.5		\$1.3	
Private Sector Partners	\$0.5		\$1.3	

* Obligated Funding

Key Milestones

