

P R O J E C T facts

DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

OIL recovery
P R O G R A M

THE MICHIGAN TECH PROJECT — USING HORIZONTAL DRILLING TO GIVE AN OLD OIL FIELD NEW LIFE

PRIMARY PROJECT PARTNER

Michigan Technological University
Houghton, MI

FOSSIL ENERGY PROGRAM Oil Recovery Field Demonstrations

MAIN SITE
Crystal Lake
Montcalm County, MI

TOTAL ESTIMATED COST
\$2.6 million

COST SHARING
DOE - \$1.1 million
Non-DOE - \$1.5 million

DE-FC 22-93BC14983

Project Description

Horizontal drilling — drilling down, then angling the well-bore horizontally into a formation — has become one of the most promising technologies for boosting oil flow from many aging or unproductive fields.

In the Dundee Formation of Michigan, as much as 85% of the oil known to exist has been bypassed. Early production techniques were poorly conducted, and today Michigan's leading oil-producing formation is at risk of being abandoned despite millions of remaining barrels of crude oil.

The Department of Energy's Office of Fossil Energy is co-funding a project that could give new life to the formation.

In September 1995, following sophisticated analyses and computer modeling of the Crystal Field in Montcalm County, the project operator, Cronus Development Corporation, drilled a horizontal well into the Dundee formation at a depth of 3200 feet. The well extends for over 150 feet in the 12-15 foot thick formation. Completed in early October, the well is producing at a rate in excess of 100 barrels per day. The best conventional well in the field is currently producing only 5 barrels per day.

The estimated reserves for this well are 200,000 barrels of oil. The overall goal of the project is to drill an additional 8-12 horizontal wells. Additional work comprises analysis of 30 other Dundee fields in Michigan, to aid in determining appropriate candidates for development in a similar manner. Further analysis of features such as fracturing, fracture density, and the irregular top surface of the oil reservoir will help in designing the optimal strategy for horizontal drilling.

Program Goal

Horizontal drilling is one of the most promising technologies available for oil production. Known since before mid-century, horizontal drilling has come into its own with the advent of modern improvements in guidance and control of bit direction and extent. Use of this technology has resulted in significant incremental oil production in many areas of the U.S.

In the current project, Michigan Technological University has used the technique in a part of the Michigan Basin where standard vertical drilling, combined with poor field management, has left much of the oil still in the ground. Michigan Tech's successful horizontal well has produced better than 100 barrels of oil per day, compared to the average of 5 barrels per day for conventional wells. Further development in this field is expected to produce an additional 2 million barrels. If other abandoned Dundee fields are redeveloped in a similar manner, the additional oil produced will probably be about 80 to 100 million barrels.

Project Partner

MICHIGAN TECHNOLOGICAL UNIVERSITY
Houghton, MI

CRONUS DEVELOPMENT CORP.
Traverse City, MI

UNIVERSITY OF WESTERN MICHIGAN
Kalamazoo, MI

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Project Benefits

This project is part of an intense nationwide effort begun three years ago by the Department of Energy to forestall the premature abandonment of some of the Nation's most important domestic oil reservoirs.

The Dundee Formation in Michigan is an example of a "shallow-shelf carbonate reservoir," meaning that it was formed from shallow ocean shelves that once existed as far north as the Canadian border.

The Department of Energy has assigned this geologic class of reservoirs one of its highest priorities, because many oil fields of this class are being abandoned despite the large quantities of crude oil they still contain.

In the Dundee formation alone, as much as 100 million barrels of potentially recoverable crude oil could be lost unless new, more cost-effective technologies can be developed and applied reliably. Horizontal drilling, combined with improved methods of analyzing the strata of oil-bearing formations, offers hope that much, if not all, of this oil can be recovered.

The completion of the first horizontal well in the Crystal Field, with production of more than 100 barrels of oil per day, marks the successful beginning of the project. The addition of several horizontal wells, similar to the demonstration well, will likely add another 2 million barrels (or more) to the cumulative production of the field over the next few years. Extended to other Michigan Basin fields, the technique could lead to additional production of 80-100 million barrels.

Nationwide, techniques like horizontal drilling, new computer modeling and analysis methods, and other technologies might ultimately add from 10 billion to 30 billion barrels of crude oil to the Nation's reserves, which now stand at about 25 billion barrels.

This new supply will be from existing fields — not from new fields opened in environmentally sensitive regions, or those controlled by foreign nations.

CONTACT POINTS

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Cost Profile (Dollars in Millions)

	Budget Period 1		Budget Period 2	
	04/28/94	10/27/95	04/27/98	04/27/98
Department of Energy*	\$0.80		\$0.29	
Private Sector Partners	\$0.94		\$0.59	

* Obligated Funding

Key Milestones

