

P R O J E C T facts

DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

OIL recovery
P R O G R A M

INJECTING AIR TO BOOST OIL PRODUCTION IN A LOUISIANA FIELD — THE AMOCO PROJECT

Project Description

West Hackberry Field in Cameron Parish, Louisiana, is a typical "watered out" Gulf Coast oil reservoir. The formation lies 8,800 to 9,000 feet deep and is steeply tilted, dipping as much as 35 degrees from horizontal. After decades of production, reservoir pressure has declined by 25%, and water has intruded into the formation, preventing economical production; as much as one-half of the field's original oil remains unproduced.

Now, as part of a Department of Energy Oil Recovery Field Demonstration project, Amoco will attempt to repressurize the reservoir by injecting air. The plan is to create a gas cap and force the water level to recede to its original position. The target zone is the Camerina sands on the west flank of the field. Amoco researchers believe that once the necessary gas caps are created, the natural tilt of the reservoir will allow oil to drain to the lower section of the reservoir, a process called "gravity drainage." Properly placed wells drilled into this section should be able to recover most of the remaining oil.

A secondary effect—spontaneous combustion of oil with oxygen could create a front of combustion gases in the reservoir. These gases could push oil more rapidly through the rock, accelerating the drainage process and boosting production. Speed, however, is relative. In this project, the reservoir's response is measured in years. Gas caps can be created within about four years, but the process of gravity drainage is expected to take much longer. If successful, additional oil from the West Hackberry Field could be recovered for as long as 15 more years.

Air injection began in November 1994. Well tests indicate that reservoir pressure is increasing and combustion is occurring. Production has increased in wells high on the geologic structure. Reservoir pressure and production are being monitored.

Program Goal

Maximizing the economic producibility of the U.S. domestic oil resource is a primary goal of the Department of Energy's Oil Program. In an era of depressed oil prices, cost reduction and more efficient recovery processes are essential to economic operation, particularly in mature, watered-out fields with marginal production.

As part of its Oil Recovery Field Demonstration Program, the Department is cost-sharing projects designed to demonstrate technologies that can assist producers in achieving more efficient, economical operation. Amoco is demonstrating a new method of overcoming declining reservoir pressure and high water level. In partnership with Louisiana State University, Amoco has injected pressurized air to form a gas cap at the top of the West Hackberry Field, lowering the water level so that the remaining oil will flow down the tilted reservoir strata to production wells. Spontaneous combustion with the oxygen is also creating increased pressure to move the oil more rapidly through the strata.

If successful, the project could produce 4.7 million additional barrels of oil from the West Hackberry Field, and the recovery potential for the rest of the Gulf Coast and other applicable fields throughout the U.S. is estimated in the hundreds of millions of barrels.

PRIMARY PROJECT PARTNER

**Amoco Production
Company**
Houston, TX

FOSSIL ENERGY PROGRAM

**Oil Recovery Field
Demonstration**

MAIN SITE

West Hackberry Field
near Lake Charles, LA

TOTAL ESTIMATED COST

DOE - \$10.0 million
Non-DOE- \$ 10.0 million

DE - FC22 - 93BC14963

Project Partners

AMOCO PRODUCTION COMPANY
Houston, TX

LOUISIANA STATE UNIVERSITY
Baton Rouge, LA

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Project Benefits

The United States faces a serious problem in maintaining a viable domestic oil industry. Most of its oil reservoirs, particularly in the lower 48 States, are mature fields. They have been produced to the point where the most economical, accessible oil is exhausted. Yet, in many of these reservoirs, one-half to two-thirds of the original oil in the field remains.

Many reservoirs, especially in the Gulf Coast area, face the same problem confronting Amoco in the West Hackberry Field near Lake Charles. The decline in natural reservoir pressure, brought about by decades of oil production, has allowed the water table to rise in the formation. Wells that once produced large quantities of oil now produce large quantities of water.

As sites like West Hackberry oil field become watered out, producers must often pull out, dismantling surface facilities, removing piping, and plugging wells. Even if the price of oil rises in the future, the costs of returning this infrastructure to the field is exorbitant, well above the economic break-even point.

The result is that a substantial quantity of oil—one-half to two-thirds of the original oil in place—is abandoned. Essentially it is lost forever.

The Amoco project is intended to show producers a technology that could maintain the productive life of many of these endangered fields. The process, called "double displacement," is intended for those fields where water intrusion has left much of the remaining oil unproducable.

Creating a gas cap that can force the oil/water contact level back to its original position in a formation can give producers an opportunity to extract more of the remaining oil in the field. Amoco estimates that in the West Hackberry project area, as much as three million barrels of additional oil could be recovered.

If successful, the overall recovery potential for this process is considerable—in the hundreds of millions of barrels. It could be applied to the hundreds of similar oil reservoirs throughout the Gulf Coast, and to many other areas of the United States where structured reservoirs contain the appropriate dipping strata and high-temperature environment.

CONTACT POINTS

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Cost Profile (Dollars in Millions)

	Budget Period 1		Budget Period 2	
	09/03/93	04/02/97	07/02/00	
Department of Energy*	\$6.0		\$4.0	
Private Sector Partners	\$6.0		\$4.0	

* Obligated Funding

Key Milestones

