TESTING THE GEOPRESSURED GEOTHERMAL RESOURCE, FRIO FORMATION, TEXAS GULF COAST

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ABSTRACT

Drilling of the first well designed to test the geopressured geothermal resource for a sustained period of time was initiated in July 1978. Regional and site-specific geological and engineering studies supportive of this site were conducted by the University of Texas Bureau of Economic Geology and Department of Petroleum Engineering/Center for Energy Studies with funds from the U.S. Department of Energy. The area sought during these studies had to have reservoir volume of 3 cubic miles, minimum permeability of 20 md, and fluid temperature of 300°F. The Brazoria Fairway, Brazoria and Galveston Counties, best met with these specifications and the Austin Bayou Geothermal Prospect was developed in this fairway. Funds for drilling the No. 1 and No. 2 Pleasant Bayou geothermal test wells in the Austin Bayou Prospect were provided by DOE and the operator of the wells is General Crude Oil Company.

The geopressured sandstone reservoirs occur in the lower part of the Frio Formation between the depths of 14,000 and 17,000 ft. The sandstone units occur at the top of at least seven progradational deltaic cycles; cumulative thickness of all permeable sandstone units is 250 to 300 ft. Each deltaic cycle is composed of a gradational vertical succession characterized by low-permeability prodelta and distal delta-front sandstone and shale at the base grading to permeable distributary-mouth-bar and delta-plain sandstone and shale at the top.

Fluid will be produced from the No. 2 Pleasant Bayou well, stripped of methane and heat, then injected into Miocene sandstones at 6000 to 7000 ft depth in the nearby No. 1 Pleasant Bayou disposal well. The produced water is expected to have salinities ranging from 50,000 to 80,000 ppm, temperature from 300 to 350°F, pressure from 10,000 to 15,000 psi, and 40 cubic feet of methane per barrel. The two-year test period will evaluate the feasibility of long-term production of large quantities of water (ultimately 40,000 barrels per day) from geopressured reservoirs.

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GULF COAST LIGNITE: A STATUS REPORT[1]

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ABSTRACT

Gulf Coast lignite occurs mainly in Eocene strata with the majority of the resources occurring in the lower Eocene Wilcox Group. Strippable resources in the Gulf Coast area area about 20 to 25 billion short tons of which one-half are in Texas. Grade (5000 to 7000 Btu/lb, 20 to 50 percent moisture, 10 to 40 percent ash, and 0.5 to 2 percent sulfur) decreases from west to east with progressively younger stratigraphic units. Seams are typically 2 to 10 ft. thick; differences in continuity and grade can be correlated with depositional system.

Large acreages are under lease — 2.5 million acres in Texas alone. At the near-surface, development drilling is most common whereas exploration drilling is now underway for deep-basin lignite. Deposit size depends on end use, for example, a 150 million ton reserve for power plants and 15 million tons or less for industrial boilers. Mining is by dragline or scrapers at less than 120 ft and stripping ratios of less than 10:1; minimum seam thickness is 2 ft. Reclamation cost is approximately $1000 per acre. Bucketwheel excavators are inevitable as multiseam thin-bed deposits are mined at increasing depths.

All current production is in Texas and was about 21 million tons in 1978. Almost all the production is pulverized fired in mine-mouth plants where lignite produced energy costs 50 cents per million Btu. In Texas, air quality standards (AAQS and PSD) could restrict the siting of future power plants. Future use in atmospheric fluidized bed combustion and medium-Btu gasification is probable. Underground gasification should be commercialized by 1990.

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