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SITE GEOLOGY OF THE DOE GLADYS McCALL NO. 1 WELL

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ABSTRACT

The geology of the Gladys McCall site is herein discussed. The Gladys McCall well was the first of four awarded to Technadril - Fenix & Scisson (T-F&S) as part of the DOE Design Well Program. Emphasis is made in the report on the geologic conditions encountered in drilling and the site specific geology as determined by electric log correlations, paleo data, and seismic interpretation.

INTRODUCTION

The T-F&S/DOE Gladys McCall No. 1 site is located approximately 2 1/2 miles south of Highway 82, Cameron Parish, Louisiana, at the western edge of the Rockerfeller Wildlife Refuge. It is in Section 27, Township 15 South, Range 5 West, Tidal Marsh Country.

An original Gladys McCall No. 1 well was drilled by a Getty Oil Co. and Buttes Oil and Gas Co. consortium in the fall of 1969. It was a dry hole that reached a total depth of 15,600 feet. This well was chosen for reentry under DOE's Wells of Opportunity Program. The reentry attempt, by Gruy Federal, was abandoned in December 1979, because of failure to effect a tieback of the 7 inch casing at a depth of approximately 3,600 feet.

Interest in the site persisted because of its encouraging reservoir characteristics, so it was contracted by DOE to Technadril - Fenix & Scisson in spring 1980 as a design well and part of the Drilling and Testing Geopressured Prospects Program. The design well was spudded-in approximately 50 feet east of the original Gladys McCall No. 1, within the original pad and levee area.

Geology of the Geopressured-Geothermal Regime

The region is characterized by Cenozoic sand and clay deposits which thicken to the south into the Gulf of Mexico Geosyncline, and which have been faulted prior to and during sedimentation (Figure 1). The geopressured-geothermal regime of the site consists of Late Oligocene (Anahuac) into Middle Miocene (Duck Lake) formations, with reservoir sands extending between 14,500 and 17,000 feet. Some prominent microfossils are Globigerina, Cristalleria, and Robulus species. Siphonina davisi was of major significance in correlating well log data.

Geologic interpretation was made primarily from correlation of well E-logs for the Sun Oil Sturlese, Getty Buttes McCall, Union California Miller, and Pan Am State Lease wells and secondarily, the Cherryville Miller and the Union Texas J. F. Sturlese wells. Two north-south seismic lines were studied to determine the position and dip of faults in the site area.

Below 17,200 feet in the Dr. Miller well (Figure 2) is what is believed to be an original depositional surface of thick shale, possibly Middle Oligocene of Frio Age.

Early in the Miocene period, sands, and later, sands and silts, were deposited onto this from the north-northwest, with down-to-the-basin faulting occurring on the west-southwest. The result, following lithification, is an Early to Middle Miocene graben of some 1,500 feet of stratigraphic separation. One proof of this is that the same ecologic zonation with Siphonina davisi found in the Dr. Miller well at 17,240 feet is found in the Dorothy Sturlese well at 15,720 feet.

Following the deposition, there was uplift and some tilting of the beds along the north bounding fault, to a west-southwest dip. Seismic data has been extrapolated to show this north fault passing below the T-F&S/DOE Gladys McCall No. 1 site at approximately 16,500 feet. At that depth, it may be lost or become one with the sand-to-shale transition. Regardless, for test well purposes, a total depth of 16,500 feet was recommended for the T-F&S/DOE Gladys McCall No. 1.

Sometime in the Middle Miocene, a north dipping fault appeared which was antithetic to the south dipping fault appearing in Figure 2; it crossed the T-F&S/DOE Gladys McCall No. 1 site at 12,100 feet. Other than this fault, the strata above the geopressured-geothermal regime is fairly regular and undisturbed into the Pliocene.

A second geologic interpretation had the south dipping fault crossing the T-F&S/DOE Gladys McCall No. 1 site at about 14,900 feet, cutting out some

1,000 feet of section in the T-F&S/DOE Gladys McCall No. 1. This interpretation had the sand in T-F&S/DOE Gladys McCall No. 1 that begins at 15,100 feet correlated with the sand in the Dr. Miller well beginning at 16,300 feet. This possibility was not objectively discounted, although two other independent geologic interpretations and the paleo data favored the previous interpretation.

The first interpretation has the northwestern most fault as demarking a graben, and the two other faults as demarking a horst within the graben. Fortunately, this possibility did not affect drilling or reservoir conditions, so its implications were not given additional consideration. Regardless, attention is called to the Cherryville well in Figures 1 and 3.

The Cherryville well cannot be logically correlated within the geopressured-geothermal regime, because it is faulted completely out of the picture. What may be significant is that no well developed sands appeared in the Figure 3 log, supporting the statement that there was no significant deposition north of the graben-limiting fault.

Forecast of Design Well Production Parameters

The geopressured-geothermal regime was entered at an approximate 14,300 foot depth. Potential production horizons are expected to be 14,560-14,780; 15,150-15,500; 15,500-15,620; 16,380-16,670; and 16,880-17,000 feet for a combined reservoir volume of 1.45 cubic mile.

Temperatures through the forecast reservoir elevations are expected to rise from 275°F to 330°F (uncorrected). A bottom-hole pressure of 15,300 psi is forecast. The average porosity of the combined reservoir is 15.8%, while permeability ranges from 2 to 47 MD with a geometric mean of 6 MD. Salinity is forecast at 100,000 ppm sodium chloride; therefore, natural gas content will likely be in the 35-40 cu.ft./bbl. range.

REFERENCES

Gruy Federal, Inc.; "Recommendation to Drill, Test, and Evaluate a Geopressured-Geothermal Resource Test Well in Cameron Parish, Louisiana;" September 20, 1979.

Gruy Federal, Inc.; "Detailed Reentry Prognosis for Geopressure-Geothermal Testing of Gladys McCall No. 1 Well;" June 16, 1978; NVO/1528-6A.

Gruy Federal, Inc.; "Final Report, Gladys McCall No. 1 Well Cameron Parish, Louisiana;" January, 1979; NVO/1528-4.

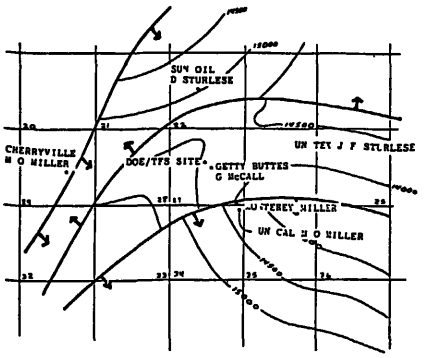

Figure 1 - Structural Geology Map for the Gladys McCall Site

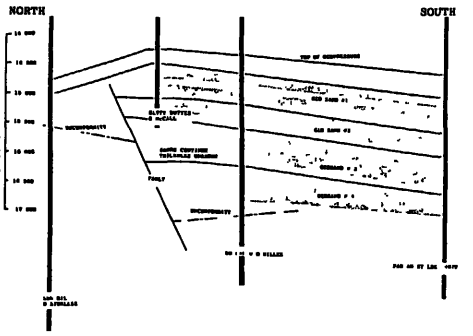

Figure 2 - North-South Cross-section Through Gladys McCall Site

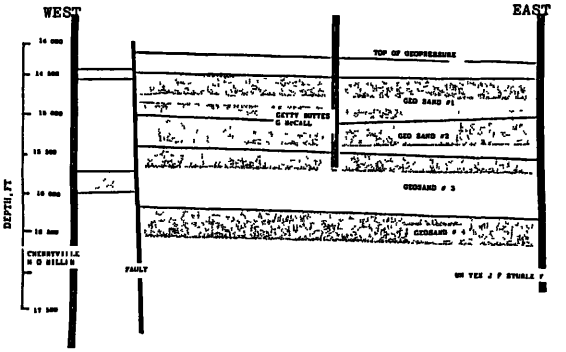

Figure 3 - East - West Cross-section through Gladys McCall Site