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KANSAS DOE-STATE COUPLED GEOTHERMAL PROGRAM

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The initial stages of evaluation of the geothermal resources of Kansas began in August, 1979, with contractual U.S. Department of Energy funding provided to the Kansas Geological Survey. The initial effort consisted of five major parts:

PART 1. Bottom hole temperatures from about 70,000 (yes, seventy thousand) petroleum exploration holes were extracted manually from electric logs and punched on cards. The data are now ready to be computer processed in order to prepare a geothermal gradient map for Kansas. The data are of highly variable quality, so we will experiment with sorting and filtering techniques to establish a consistent data base for the map. The highest temperatures noted are in the 75°C range at depths of roughly 1.5 km.

PART 2. The Kansas Geological Survey is a partner with the Kansas District of the USGS Water Resources Division in a drilling program to explore the hydrologic properties of the Ordovician Arbuckle Formation in Kansas. A total of four holes have been or will be drilled to average depths of about 1 km. In order to extract maximum geothermal information from these holes, geothermal funds are being used to extend the holes into the Precambrian to recover core of basement rocks. Drilling on one hole has been completed and approximately 8 meters of 10 cm diameter core was recovered. The rock is a granite porphyry, and geochemical analyses are just beginning. Drilling on the second hole is proceeding at this writing (21 January 1980), and the other two holes will be drilled in succession by the same contractor. Total drilling costs are approximately $600,000, of which about $30,000 is geothermal funding.

PART 3. Heat flow measurements will be performed on the holes drilled in Part 2 above and several other available deep holes will be thermally logged. This work is being performed on a subcontractual basis by Dr. David Blackwell of Southern Methodist University. Thermal logging has been performed on two holes in depths of 350 to 400 meters. Preliminary analysis of the thermal logs indicates geothermal gradients of 31°C and 36°C per kilometer in holes near Frontenac, Kansas and Osawatomie, Kansas, respectively.

PART 4. In order to develop our own capability to make heat flow measurements, the Kansas Geological Survey is purchasing a thermal logger and building thermal conductivity probes. We are also purchasing an intelligent graphics terminal to facilitate processing and display of geothermal gradient data from petroleum exploration holes.

PART 5. Contractual funds were used to complete the last 25% of aeromagnetic coverage needed to complete the aeromagnetic map of Kansas. Approximately 10,000 line miles of coverage were obtained using our own aircraft and equipment at an average acquisition cost of $2.50 per mile.

FUTURE PLANS

During our next contractual year the aeromagnetic data will be processed to complete the statewide aeromagnetic map. Heat flow measurements will be completed, as will the deep drilling program. Acquisition of gravity data in areas of thermal and magnetic anomalies will begin. Some of the wells in our statewide hydrologic network will be thermally logged.

In related (but separately funded) projects, microearthquake activity is being monitored statewide down to a local magnitude of 1.5 - 2.0 level. As a result

of our efforts, a deep crustal reflection profile is being run from extreme northeast Kansas 200 km westward to north-central Kansas by the Consortium for Continental Reflection Profiling (COCORP). These studies should greatly assist in improving our perception of the tectonic and geothermal regimes in the Midcontinent.