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GEOTHERMAL DIRECT HEAT PROGRAM

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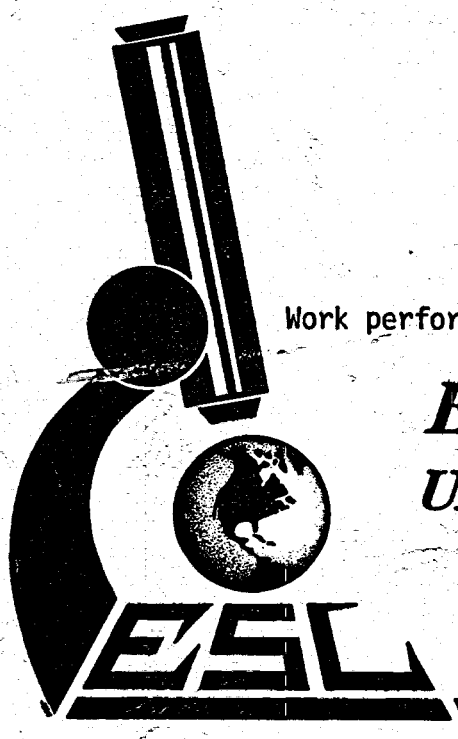

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ASSESSMENT OF GEOTHERMAL POTENTIAL IN OKLAHOMA

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Abstract

The Oklahoma Geological Survey program to assess geothermal potential in the State involves two types of activity. One part of our program is directed toward the preparation of a detailed geothermal-gradient map of Oklahoma at a scale of 1:500,000. Our second area of activity concerns site-specific investigations of gradient and subsurface conditions in areas that appear to have geothermal potential.

The best and most detailed geothermal-gradient map prepared for Oklahoma to date was the result of thesis research done at Oklahoma State University. Unfortunately, the Panhandle and northeastern and southeastern Oklahoma were not included in the study, so that these areas remained to be mapped. The American Association of Petroleum Geologists' North American Geothermal Project provided the data base for the Oklahoma State University work. Several correction factors (such as maximum time since circulation, air-drilled versus mud-drilled, and geologic provice) were applied to the raw data and to electric-log data in determining gradients.

We are expanding this program to the unmapped areas of the State and have identified several specific areas that warrant detailed study. One of these areas is northeast of Tulsa, where recent mapping has shown the highest gradients (2.4°F/100 feet) noted thus far. Such high gradients were not originally anticipated in the northeastern Oklahoma province. We are presently mapping the southeastern part of Oklahoma and collecting data for the Panhandle. We anticipate completion of this mapping sometime this summer.

The objectives of this part of the program are twofold. First, we will make equilibrated temperature measurements to establish the presence of a geothermal anomaly. Our second objective will be to make estimates of the volume and deliverability of formation water potentially available for geothermal applications. These studies are similar to the reserve calculations commonly made by reservoir engineers. Studies of the Cromwell and Spiro sandstones (Lower Pennsylvanian) in the Haskell County area are nearing completion, and similar investigations of subsurface formations in Pittsburg County will soon be initiated.

Temperature data from electric logs usually indicate geothermal gradients that are somewhat lower than measurements obtained after thermal equilibration. Our field-confirmation work will permit us to determine two important factors with respect to the relation of electric-log temperature data to equilibration temperatures. We then will be able to ascertain (1) the magnitude of the variation and (2) whether the variation is systematic. If the difference between electric-log temperature and true temperature is systematic, it may be possible to make a standard correction to the geothermal-gradient map in order to obtain an approximation of equilibration temperatures. Should the difference, however, vary with other characteristics (such as petrophysics or geologic province), correction factors will be somewhat more complicated.