**A note on geothermal indicators in southern Hudspeth and Culberson Counties, Texas**

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A NOTE ON GEOTHERMAL INDICATORS IN SOUTHERN HUDSPETH AND CULBERSON COUNTIES, TEXAS

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INTRODUCTION
From September 1975 until August 1979, the Department of Geological Sciences at the University of Texas at El Paso was involved in a program to explore for geothermal energy resources in Trans-Pecos Texas. The program consisted of sampling all available springs, wells and tanks fed by windmills to: 1) locate hot surface waters, and 2) locate hot subsurface waters by use of the silica geothermometer. This paper summarizes the results obtained for the area traversed by the New Mexico Geological Society field conference; results for the entire Trans-Pecos area are reported by Hoffer (1979).

HOT SURFACE WATERS
For this report, thermal water is defined as water with a temperature equal to or exceeding 30°C. This value is some 7°C above the average subsurface water temperature in West Texas and 11°C above the mean annual air temperature.

Eleven thermal water occurrences are located in the field trip area (fig. 1). The largest concentration of thermal springs is at Indian Hot Springs where five of eight springs discharge water at
30°C or above. These springs have been discussed in detail by Reaser and others (1975). Chief Springs discharges the hottest water at a temperature of 46°C. All the thermal waters at Indian Hot Springs have in common the facts that: 1) they are slightly saline, containing 8,300 to 9,500 ppm total dissolved solids; 2) major dissolved solids include sodium and chlorine; and 3) they contain moderately high values of lithium, 2-3 ppm. A complete listing of water chemistry for the thermal occurrences is given in Table 1.

Other thermal water occurrences have been found at Red Bull Springs, in a city well at Sierra Blanca, in two wells southeast of Van Horn and at Hot Wells (fig. 1). During the third day of the field trip we will pass by Hot Wells. Here, two wells were drilled by the Southern Pacific Railroad along their right-of-way in Eagle Flat. The wells are approximately 300 m deep and produce water from basin fill (Reaser and others, 1975). Only one well was available for sampling; its water temperature was 40°C (Hoffer, 1979).

**HOT SUBSURFACE WATERS**

One method used to estimate the temperature of water at depth is to measure the amount of dissolved silica. The direct relationship between the amount of dissolved silica and the minimum water temperature at depth constitutes what is called the silica geothermometer (Fournier and Rowe, 1966).

Silica concentrations and the corresponding calculated minimum surface water temperatures of the thermal waters in this area are included in Table 1. The numbers correspond to the thermal occurrences shown on Figure 1. The calculated subsurface temperature values range from 65°C to 105°C; they average about 89°C.

**CONCLUSIONS**

Exploration for geothermal resources in southern Hudspeth and Culberson Counties indicates the presence of a number of thermal wells and springs. Temperatures of the thermal waters range from 30° to 46°C. Based on the concentrations of dissolved silica, calculated subsurface water temperatures do not appear to be high enough to produce steam for generating electricity. Subsurface temperatures of at least 200° to 250° would be needed to make the area favorable for geothermal development.

**REFERENCES**


