

Geological Society of America, Abstracts with Programs,  
v. 15, no. 5, p. 311. 1983

A NEW FLOW MODEL FOR THE BOISE GEOTHERMAL SYSTEM

MAYO, Alan L., University of Colorado - Colorado  
Springs, Colorado Springs, CO 80933

Nº 25289

Thermal waters (maximum temperature about 95° C) from the Boise geothermal system have been used for space heating since the turn of the century. During the past 10 years the State of Idaho and private companies have constructed several production wells having artesian flows up to 1000 gpm.

The generally accepted model of the thermal flow system is one of recharge in the foothills of the Idaho Batholith, deep circulation and heating in the granitic basement rocks and rapid upward movement to the near surface via the Boise Foothills fault system. Thermal waters are then thought to move into the thin overlying volcanoclastic sequence which overlies the basement rocks. The thermal system is confined by a "blue clay" layer above which cooler aquifers occur.

Chemical and isotopic samples were collected from the thermal and non-thermal aquifers. The absence of an  $^{18}\text{O}$  shift in the thermal waters suggests they were never heated above 100° C; thus their circulation depths are limited.  $^{14}\text{C}$  ground-water ages of less than 12,000 radiocarbon years do not substantiate the long residence times expected with deep circulation in the basement rocks. Ionic exchange of  $\text{Ca}^{2+}$  in the thermal water do, however, suggest migration of thermal water from granitic aquifers to the overlying volcanoclastic aquifers.

From the geochemical and isotopic data and the high heat flow along the Foothills fault system a new flow model of the thermal regime has been developed. The model consists of deep, closed cell, convective heat transfer and ground-water flow in the crystalline basement rocks from which heat is conductively transferred to a shallowly circulating ground-water system near the crystalline-volcanoclastic contact. This shallow system is recharged in the foothills of the Idaho Batholith, is heated near the Foothills fault and then flows into the volcanoclastic sequence via faults in the Foothills fault zone.