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STRUCTURE, STRATIGRAPHY, AND TECTONICS OF THE DIXIE VALLEY GEOTHERMAL SITE, DIXIE VALLEY, NEVADA

Gabriel L. Plank

Department of Geological Sciences
University of Nevada, Reno
Reno, NV 89557

ABSTRACT

Tens of millions of dollars have been spent drilling high-temperature wells within or in the vicinity of the Dixie Valley geothermal reservoir which have ultimately proven to be unproductive. Because the potential exists for further development of the field(s), it is important to assess the details of rock geometry and type on both sides of the range front fault which seems to delineate in some fashion the geothermal reservoir.

There exists a large body of industry surface and subsurface geological and geophysical data in the area of the geothermal site. Exploration and production to date have proven at least one large geothermal field to exist in Dixie Valley, and there remains the potential for others to be found in parts of the valley which have seen little or no deep drilling to date. However, a number of wells with temperatures high enough for power generation have been unsuccessful in penetrating the fractures required for production. These wells occur both between other successful production or injection wells and outside the boundaries of the known reservoir. From the relatively large number of these dry wells and dry legs it is readily apparent that an improved knowledge and understanding of the details of the local geology should be obtained before additional drilling is undertaken. The geology is complex and most new wells continue to add to the apparent complexity.

A new strategy for enhancing the resolution of the geothermal reservoir involves the detailed mapping of the footwall of the range front fault, exposed along the east face of the Stillwater Range, in order to infer the structure of the slip face of the hanging wall. After detailed maps and structural models are well established and projected beneath the geothermal site, seismic reflection data will be reprocessed in support of the hypothesized subsurface architecture. In the same way, well cores, logs, and other available geophysical data will be reassessed to substantiate structural models. The final task will be to produce a map of the hanging wall and a map of probable permeability variations therein. This will lay the groundwork for a more comprehensive 3-D representation of the reservoir.