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GEOPHYSICAL STUDIES OF A GEOTHERMAL AREA IN THE SOUTHERN RAFT RIVER VALLEY, IDAHO

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The U.S. Geological Survey in cooperation with the Atomic Energy Commission has made gravity, magnetic, refraction seismic, resistivity, audio-magnetotelluric, self-potential, and telluric current surveys in a study of the geothermal resources in the southern Raft River Valley. The geophysical data indicate that the maximum thickness of Cenozoic sedimentary and volcanic rock underlying the valley is about 2 km and that the valley is bounded by normal faults on the east and south and by a complex system of faults on the west. Large gravity, magnetic, and total field resistivity highs within the valley east of Jim Sage Mountains reflect a mass at a relatively shallow depth, which is probably igneous rock but too old to relate directly to a geothermal system. The seismic interpretation divides the valley into four areas where the Cenozoic rocks have distinctive seismic velocities. These areas appear to relate to known or inferred structures and to a suspected zone of shallow warm water. Resistivity anomalies reflect compositional variations in the Cenozoic rocks and variation in degree of induration and alteration. Although no large reservoir of hot water in the Cenozoic rocks has been identified yet, the resistivity soundings show a 2-5 ohmmeter resistivity unit with a thickness of 1 km underlying a large area of the valley, which may in part be indicative of hot water. Observed self-potential anomalies are believed to indicate zones where warm water is ascending to near the surface. The warm water occurring in springs and wells in the area northeast of The Narrows may relate to deep circulation control by the intersection of north-trending faults east of the Jim Sage Mountains with a northeast-trending structure passing through The Narrows.