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GEOLOGY AND GEOTHERMAL RESOURCES OF THE SALTON
TROUGH, CALIFORNIA IN RELATION TO RIFT ZONE TECTONICS

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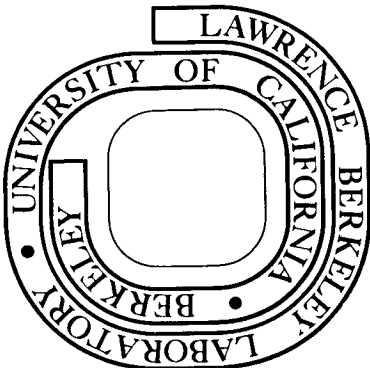
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GEOLOGY AND GEOTHERMAL RESOURCES OF THE SALTON
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The 225 km long by 60 km wide Salton Trough of southeastern California and the adjacent area of the Cerro Prieto geothermal field in Mexico exhibit zones of step-faulting with 1 km or more of cumulative vertical offset, high heat flow, earthquake activity, young volcanics, and tensional basins that suggest major components of rift tectonics. Drilling and geophysical exploration of six geothermal energy fields has yielded data that elaborate on the earlier idea of "pull-apart-basins" between en echelon transform faults. Observations along the transform-rift junctions in the FAMOUS area of the Mid-Atlantic Ridge provide a useful tectonic model. Specifically, Transform-A is 20 km long with an 8 km wide valley that contains an axial zone 3 km in width and a vertical relief of 600 m. Slopes of the axial zone are 30° to 45° and show normal faulting of greater than 60° . There is also a topographic depression at the intersection of Transform-A and the rift axis, pillow lavas, hydrothermal activity, and dike swarms. These details and scales fit models for the Salton Trough geothermal area. Ongoing submersible research at the Tamayo Fracture Zone-East Pacific Rise Junction south of Baja California appears to offer a complimentary analogy. Slivers of the five major strike slip faults in the Salton Trough--the San Jacinto, Elsinore, San Andreas, Imperial and Cerro Prieto-- separate wedge-shaped blocks and may be characterized as

"leaky transforms" that aid in explaining observed geothermal anomalies. Earthquake hypocenters range from 0 to 15 km with clusters at 2 and 5 km in a 20 km thick crust. A sedimentary rock section 4 to 6.5 km in thickness fills the trough and was derived from the ancestral Colorado River delta, yet also consists of shallow marine, lake, and coal units that together have almost kept pace with subsidence. Hydrothermal metamorphism is occurring at depths of 1 to 2.5 km in these units as a result of temperatures that reach 350°C. Flooring the depression and outcropping to the northeast and southwest are volcanic, plutonic, and metamorphic rocks ranging in age from Pre-Cambrian to late Tertiary. A generalized heat flow of 2.5 heat flow units (hfu) for the Salton Trough is compared to a 1.5 to 2.5 hfu in the nearby fault-block ranges. On a regional scale it is suggested that the Salton Trough be viewed as the southwestern edge of a pervasive continental crust rift system that merges with the adjacent Basin and Range system, but this rifting has been masked by the right lateral transform movement of the San Andreas zone.

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