SEISMOTECTONICS
OF THE
CERRO PRIETO GEOTHERMAL AREA

by

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ABSTRACT

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The Cerro Prieto geothermal area lies within Mexico, approximately 25 km south of the California border, and between the en echelon offset of the Cerro Prieto and Imperial faults. Data obtained from a six-week eight-station microseismic survey, conducted in southwesternmost Arizona by the Arizona Earthquake Information Center (AEIC), were combined with phase arrival times and first motion data from permanent stations within the joint USGS-California Institute of Technology southern California Network and the Centro de Investigación Cientifica y de Educación Superior de Enseñada (CICESE) network. The resulting data allowed good locations for epicenters and some focal solutions for events occurring within the Cerro Prieto geothermal area.

During a one-month period beginning January 15 and ending February 15, 1988, 42 events with coda magnitudes between 0.9 and 2.95, and location errors of less than two kilometers occurred within the Cerro Prieto geothermal area. These epicenters follow a trend northward (N3°W ± 4°), connecting the Cerro Prieto and Imperial faults. Well-constrained single-event focal solutions were produced from

the first motions of fourteen events. Five of these solutions, obtained from events occurring within the production zone of the Cerro Prieto geothermal area, exhibited a combination of strike-slip motion on northwest and northeast-trending focal planes with normal motion on steeply dipping northward-trending focal planes. Solutions illustrating events which took place outside of the production zone were obtained from the first motions of nine events. These solutions demonstrate predominantly strike-slip motion on northwest and northeast trending focal planes with a small component of normal motion.

The seismicity of the Cerro Prieto area has previously been compared to the Brawley seismic zone, which connects the Imperial and San Andreas faults. Both seismic areas are defined by a pod-shaped distribution of epicenters elongated in a north-south orientation. This distribution of epicenters, as well as the focal solution data, suggests a model of "leaky" transform faulting. The leaky transform model, first proposed by Hill (1977), suggests northward-trending dike emplacement at lower crustal levels, and that these dikes are interconnected by strike-slip faulting.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES