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CHARACTERIZATION OF RESERVOIR ROCKS AND FLUIDS BY
SURFACE ELECTROMAGNETIC TRANSIENT METHODS

Quarterly Report for the Period
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QUARTERLY PROGRESS REPORTS

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Title: Characterization of Reservoir Rocks and Fluids by
Surface Electromagnetic Transient Methods

A thorough analysis of the high TDEM data set acquired over the Basin and Range structure near Elko, NV was nearly completed during this quarter. Two extended abstracts about the results and conclusions derived from an analysis were submitted for presentation at the 1991 Annual Meeting of the Society of Exploration Geophysicists in the fall.

Since the main objective of the R&D under this program are practical algorithms and interpretation procedures for analysis of TDEM data over strong 2-D structures, a detailed evaluation of the applications and limitations of 1-D interpretations must first be made to closely recognize which deficiencies must subsequently be corrected by 2-D and 3-D analysis. The conclusions from that analysis can be summarized as follows:

- (1) 1-D analysis of data over 2-D structures, using non-grounded loop sources as transmitters, shows that meaningful information about the structure can be derived. The location of the structure is approximately positioned correctly, and at distances from the structure comparable to the exploration depth, geoelectric sections are derived that match drill hole information. A "phantom" resistivity layer arises in 1-D inversions for which there is no physical evidence in drill holes.
- (2) 1-D analysis of data over the 2-D structure using grounded line sources as transmitters show that no meaningful information can be derived from such data sets.
- (3) It is not common in present practices to record horizontal magnetic fields. Horizontal fields were measured in this data set, and an analysis of these data show that they contain important information about the location and depth of occurrence of the structure.

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