

McPHAR GEOPHYSICS

REPORT ON THE
RECONNAISSANCE RESISTIVITY SURVEY
IN THE
SURPRISE VALLEY AREA
MODOC AND LASSEN COUNTIES, CALIFORNIA
FOR
AMERICAN THERMAL RESOURCES INC.

I. INTRODUCTION

At the request of Mr. William L. D'Olier, Exploration Manager of American Thermal Resources Inc., McPhar Geophysics has completed a Reconnaissance Resistivity Survey in the Surprise Valley Area, Modoc and Lassen Counties, California. The survey area is located in T.38N to T.42N and R.16E, R.17E of Modoc and Lassen Counties.

The Surprise Valley Area appears to be a down-dropped enclosed basin containing alkaline lakes. The topography of the enclosing mountains suggest that the valley is bound on the east and west by major north striking faults and numerous cross faults exist. Several hot springs are located within the survey area which has been designed a KGRA by the U.S. Geological Survey.

The purpose of the Reconnaissance Survey was to locate and

delineate low-resistivity zones that might indicate areas of concentrated thermal activity. Measurements were made with 2000 foot dipoles at one-through-four dipole separations along reconnaissance lines designated by American Thermal Resources. Frequencies of .125 Hz and .3Hz were used during this survey. Normally, .125 Hz is used in order to minimize attenuation of the electric field due to eddy current dissipation of energy and at the same time avoid telluric noise, however, during portions of this survey, strong telluric noise occurring at approximately .125 Hz made it necessary for the field crew to operate at .3 Hz.

The survey was conducted by Mr. Robert Anderson, geophysicist.

2. PRESENTATION OF RESULTS

The resistivity survey results are shown on the following data plots in the manner described in the notes which accompany this report.

<u>Line</u>	<u>Electrode Intervals</u>	<u>Dwg. No.</u>
A-1	2000 feet	IP 6166-1
A-2	2000 feet	IP 6166-1
A-3	2000 feet	IP 6166-1
B	2000 feet	IP 6166-2
C	2000 feet	IP 6166-2
D	2000 feet	IP 6166-2
E	2000 feet	IP 6166-3

Also enclosed with this report are Dwg. No. RP 4977-1 North Part and Dwg. No. RP 4977-2 South Part, plan maps of the survey area showing

the location of the survey lines and Dwg. No. RI 4978, a plan of the interpreted true resistivities along each survey line, at a scale of 1" = 2000'. The definite, probable and possible Resistivity low anomalies are indicated by bars, in a manner shown in the legend, on the plan maps as well as on the data plots. These bars represent the surface projection of the anomalous responses as interpreted from the location of the transmitter and receiver electrodes when the anomalous values were measured. The interpreted true resistivity sections along each survey line have been compiled with the aid of two-dimensional-theoretical curves and three dimensional model studies.

3. DISCUSSION OF RESULTS

The Reconnaissance Resistivity Survey of the Surprise Valley Area was conducted during a period of high magnetic storm activity which resulted in extremely high noise levels at .125 Hz. It was therefore, necessary for the field crew to operate at .3 Hz to obtain data during these periods.

There is no significant difference in apparent resistivities greater than 5 ohm meters when measured at .3 Hz or .125 Hz. However, apparent resistivities less than 5 ohm meters are subject to inductive coupling, which is frequency dependent, and resistivity measurements at .3 Hz will have a maximum variation of 20% to 30% in comparison to measurements at .125 Hz.

The data plots included in this report have not been corrected for inductive coupling effects. The interpretation of results is based on

the true resistivity sections along each survey line as shown on Dwg. No. RI 4978.

4. INTERPRETATION OF RESULTS

The Resistivity Survey has located some anomalous responses in the north part of the survey area which, in part, form an anomalous zone. The southern half of the survey area exhibits a comparatively high, uniform resistivity and no anomalous response has been detected in this area within the depth-penetration limits of the survey.

A discussion of results along each survey line follows:

Line A-1

This is the north portion of a three-segment survey line along the west side of Surprise Valley. It was necessary to segment this line when the directional change of the proposed survey line was greater than the critical angle for this in-line resistivity method.

The definite anomaly occurring between 40S and 160S forms the western edge of the anomalous zone detected during this survey. The resistivity section approximates a uniform earth as shown on the generalized cross section, and it appears that the best response of this anomaly is at depth beneath 80S.

The possible anomaly between 280S and 460S has been selected due to a resistivity of less than 10 ohm-meters in this area.

The resistivity response around the town of Eagleville, between 640S and 720S is extremely strange. Mr. Anderson, geophysicist-crew

chief suggests these results are due to culture effects around the town. An attempt was made to re-survey this portion of the line, but extremely wet conditions prohibited access across fields on either side of the town. This portion of the line will be re-surveyed at a latter date.

Line A-2

A possible anomaly with a resistivity of less than ten ohm meters occurs between 120S and 190S in the vicinity of Menlo Park. This anomaly is open to the south.

Line A-3

The possible open-ended anomaly occurring between 50S and 90S is probably the southern extension of the weak anomaly located on Line A-2.

Line E

This entire line is anomalous. The generalized resistivity cross-section suggests a relatively uniform surface layer having a resistivity greater than 20 ohm meters and underlain by a zone of resistivity less than 5 ohm meters. The definite anomalies occurring at 10N to 90S, 210S to 230S and 280S to 370S appear to have decreased resistivities at depth.

Line C

No anomalous response has been located on this line.

Line D

The entire line is definitely anomalous and is open to the north and south.

Line F

A shallow probable anomaly occurs between 160N and 220N.

A possible anomaly exists between 40N and 160N.

5. CONCLUSIONS AND RECOMMENDATIONS

The Reconnaissance Resistivity survey of the Surprise Valley area has located an anomalous zone across the extreme north end of the survey area. Only the southern edge of this zone has been defined, and it appears to approximately parallel the suggested fault along the west side of the valley. This zone could represent a fault controlled geothermal reservoir. Further investigations in this area are definitely warranted.

In general, the south part of the survey area does not appear to have any geothermal potential. The possible weak anomaly in the vicinity of Menlo Bath Hot Springs has an apparent resistivity four to five times higher than the zone discussed above. Any continued investigations in this area must be based on other geological, geochemical or geophysical information.

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