

(200)  
R290  
no. 79-1616

U.S. Geological Survey

Reports-Open file series

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY



3 1818 00074782 2

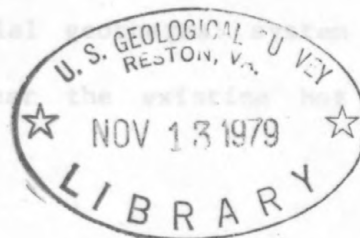
Audio-magnetotelluric data log and station-location map  
for Vulcan Hot Springs Known Geothermal Resource Area, Idaho

by

Carl L. Long and Vernon Lewis

Open-File Report 79-1616

1979.



This report is preliminary and has not been  
edited or reviewed for conformity with U.S.  
Geological Survey standards.

Access was limited therefore only six audiomagnetotelluric (AMT) soundings were made in the Vulcan Hot Springs Known Geothermal Resource Area, Idaho (fig. 1). These soundings were made to assess the geothermal potential in the hot-springs area. For a description of equipment, data acquisition, and reduction, see Hoover and others (1976, 1978).

Scalar resistivities from the data log (table 1) indicate that the thermal waters have not altered a large area around the hot springs. This is indicated by the relatively high resistivities (100 ohm-meters or greater) over the whole area of the survey. Thermal waters are probably leaking upward along a north-south fault on the west side of the valley; the scalar resistivities of sounding no. 5 & no. 2 (fig. 1) are indicative of such a fault. The large difference in the apparent resistivity of the two telluric-line orientations (NS and EW) is indicative of a laterally inhomogeneous earth. Separations between two soundings curves obtained with the two orientations could indicate a north-south fault in the Cretaceous quartz monzonite. Therefore any potential geothermal system would probably be along the north-south fault near the existing hot spring.

#### References

- Hoover, D. B., Frischknecht, F. C., and Tippens, C., 1976, Audiomagnetotelluric sounding as a reconnaissance exploration technique in Long Valley, Calif.: *Journal Geophysical Research* V81, p. 801-809.
- Hoover, D. B., Long, C. L., and Senterfit, R. M., 1978, Some results from audiomagnetotelluric investigations in geothermal areas: *Geophysics*, v. 43, no. 7, p. 1501-1514.

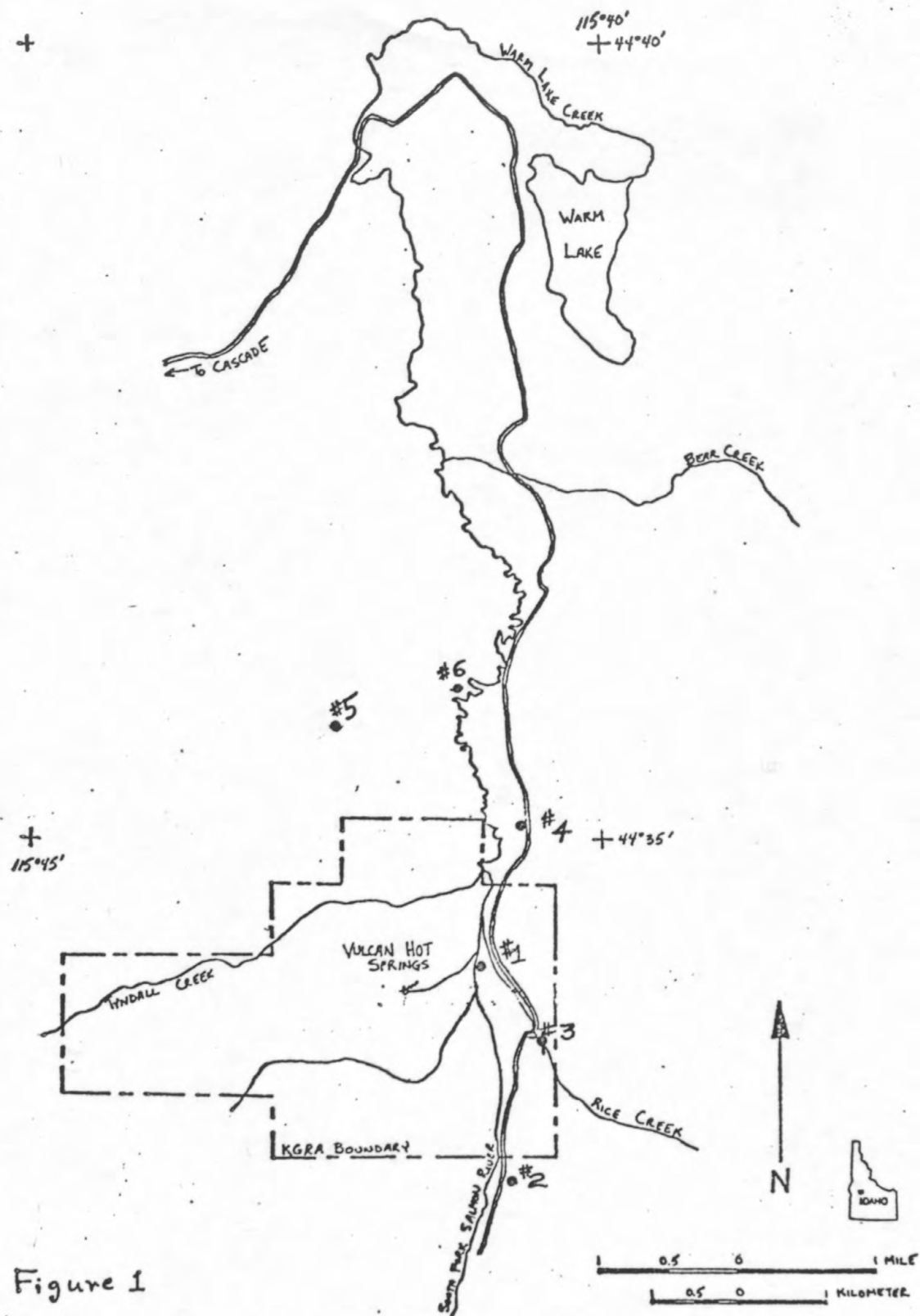


Figure 1

Audio-magnetotelluric Station Location map  
of Vulcan Hot springs, Idaho K.G.R.A.

# Vulcan, Idaho

## Table 1 - U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG

why, 1979  $\rho_a$  = observed apparent resistivity in ohm-meters  
 $N$  = number of observations

$Er$  = standard error in ohm-meters

- = no data

"NOTE" - Telluric-line orientation indicated with station numbers.

| FREQUENCY |    |       |       |       |       |       |       |     |      |      |      |       |       |
|-----------|----|-------|-------|-------|-------|-------|-------|-----|------|------|------|-------|-------|
| Sta. No.  |    | 7.5   | 10    | 14    | 27    | 76    | 285   | 685 | 1.2K | 3.3K | 6.7K | 10.2K | 18.6K |
| 1 N S     | pa | 916.  | 776.  | 590.  | 357.  | 186.  | 107.  | -   | -    | -    | -    | -     | 169.  |
|           | N  | 12    | 12    | 11    | 10    | 12    | 10    |     |      |      |      |       | 1     |
|           | Er | 66.0  | 59.8  | 10.9  | 15.6  | 8.20  | 8.15  |     |      |      |      |       | -     |
| 1 E W     | pa | 555.  | 371.  | 243.  | 198.  | 215.  | 206.  | -   | -    | -    | 130. | 217.  | 233.  |
|           | N  | 12    | 11    | 11    | 6     | 9     | 11    |     |      |      | 12   | 1     | 1     |
|           | Er | 47.6  | 41.1  | 34.6  | 57.1  | 36.9  | 18.7  |     |      |      | 5.23 | -     | -     |
| 2 N S     | pa | 1245. | 1090. | 719.  | 459.  | 283.  | 200.  | -   | -    | -    | -    | 298.  | 154.  |
|           | N  | 8     | 10    | 9     | 12    | 12    | 10    |     |      |      |      | 3     | 1     |
|           | Er | 96.2  | 144.  | 62.5  | 20.4  | 28.7  | 40.0  |     |      |      |      | 112.  | -     |
| 2 E W     | pa | 7744. | 5847. | 5383. | 2403. | 1679. | 1444. | -   | -    | -    | 397. | 770.  | 652.  |
|           | N  | 9     | 11    | 12    | 10    | 12    | 12    |     |      |      | 10   | 1     | 1     |
|           | Er | 594.  | 436.  | 276.  | 124.  | 173.  | 128.  |     |      |      | 37.0 | -     | -     |
| 3 N S     | pa | 1420. | 928.  | 847.  | 737.  | 395.  | 289.  | -   | -    | -    | 203. | 202.  | 741.  |
|           | N  | 11    | 9     | 8     | 10    | 12    | 11    |     |      |      | 11   | 7     | 1     |
|           | Er | 179.  | 176.  | 89.8  | 54.2  | 40.0  | 25.7  |     |      |      | 8.73 | 19.8  | -     |
| 3 E W     | pa | 2227. | 1590. | 1462. | 905.  | 834.  | 617.  | -   | -    | -    | 496. | 660.  | 448.  |
|           | N  | 12    | 9     | 11    | 11    | 11    | 13    |     |      |      | 11   | 1     | 1     |
|           | Er | 162.  | 202.  | 84.2  | 44.9  | 73.8  | 24.2  |     |      |      | 17.5 | -     | -     |
| 4 N S     | pa | 778.  | 512.  | 446.  | 281.  | 158.  | 94.9  | -   | -    | -    | 158. | 141.  | 580.  |
|           | N  | 12    | 14    | 15    | 11    | 11    | 12    |     |      |      | 13   | 8     | 1     |
|           | Er | 74.2  | 40.3  | 34.4  | 19.1  | 8.49  | 6.85  |     |      |      | 7.10 | 4.78  | -     |
| 4 E W     | pa | 447.  | 305.  | 265.  | 131.  | 165.  | 155.  | -   | -    | -    | 272. | 206.  | 393.  |
|           | N  | 12    | 9     | 8     | 7     | 12    | 11    |     |      |      | 11   | 1     | 1     |
|           | Er | 25.7  | 31.6  | 22.0  | 9.22  | 7.79  | 16.3  |     |      |      | 6.13 | -     | -     |

Volcan, Idaho Table 1 - U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG - continued

July, 1979  $\rho_a$  = observed apparent resistivity in ohm-meters  
N = number of observations

N = number of observations

$E_r$  = standard error in ohm-meters

- = no data

"NOTE" - Telluric-line orientation indicated with station numbers.

[illegible]

USGS LIBRARY-RESTON



3 1818 00074782 2