UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Telluric profiles and location map for the Ennis Hot Springs Area, Montana

by

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

Two telluric profiles (E-field ratio telluric method) were done in the vicinity of Ennis Hot Springs, north of Ennis, Montana, to help assess the geothermal potential of the area. The method and equipment used is similar to that described by Beyer (1977). For this survey, the recording bandwidth was 0.025 Hz centered at 0.033 Hz (30 second period), and a dipole length of 500 meters was used.

The profiles were run across fairly flat terrain on Quaternary sediments with no obvious surficial expression of faulting. Their locations are given in figure 1.

The profiles of relative voltage (which reflect variations in apparent resistivity along the profiles) are shown in figure 2. Along traverse 1, the sharp drop in resistivity between stations 3 and 5 is probably the result of a major fault with its downthrown side to the east. The width of the low between stations 4 and 6 could be indicative of a broad alteration and thermal water zone (at least 250 m wide) bounded to the northeast by another possible fault (downthrown side to the west) which is responsible for the increase in resistivity between stations 6 and 8.

Along traverse 2, the data was noisy at stations 1, 2, and 3 and at stations 1 and 2 the direction of the major axis of the ellipse was 90^{o} to the usual position (that is, the voltage between stations 1 and 2 was 180^{o} out-of-phase with respect to the other dipoles) indicating a nearly three-dimensional subsurface structure. The profile (figure 2) shows a drop in resistivity centered at spread between stations 1 and 2, perhaps indicative of a fault trending close to N45W (responsible for the noisy signals?). The increase in voltage between stations 2 and 4 is probably

the result of a north-trending fault (upthrown side to the east).

Beyer, J. H., 1977, Telluric and D.C. resistivity techniques applied to the geophysical investigation of basin and range geothermal systems, Part I: The E-field ratio telluric method: Lawrence Berkeley Laboratory report LBL-6325 1/3.

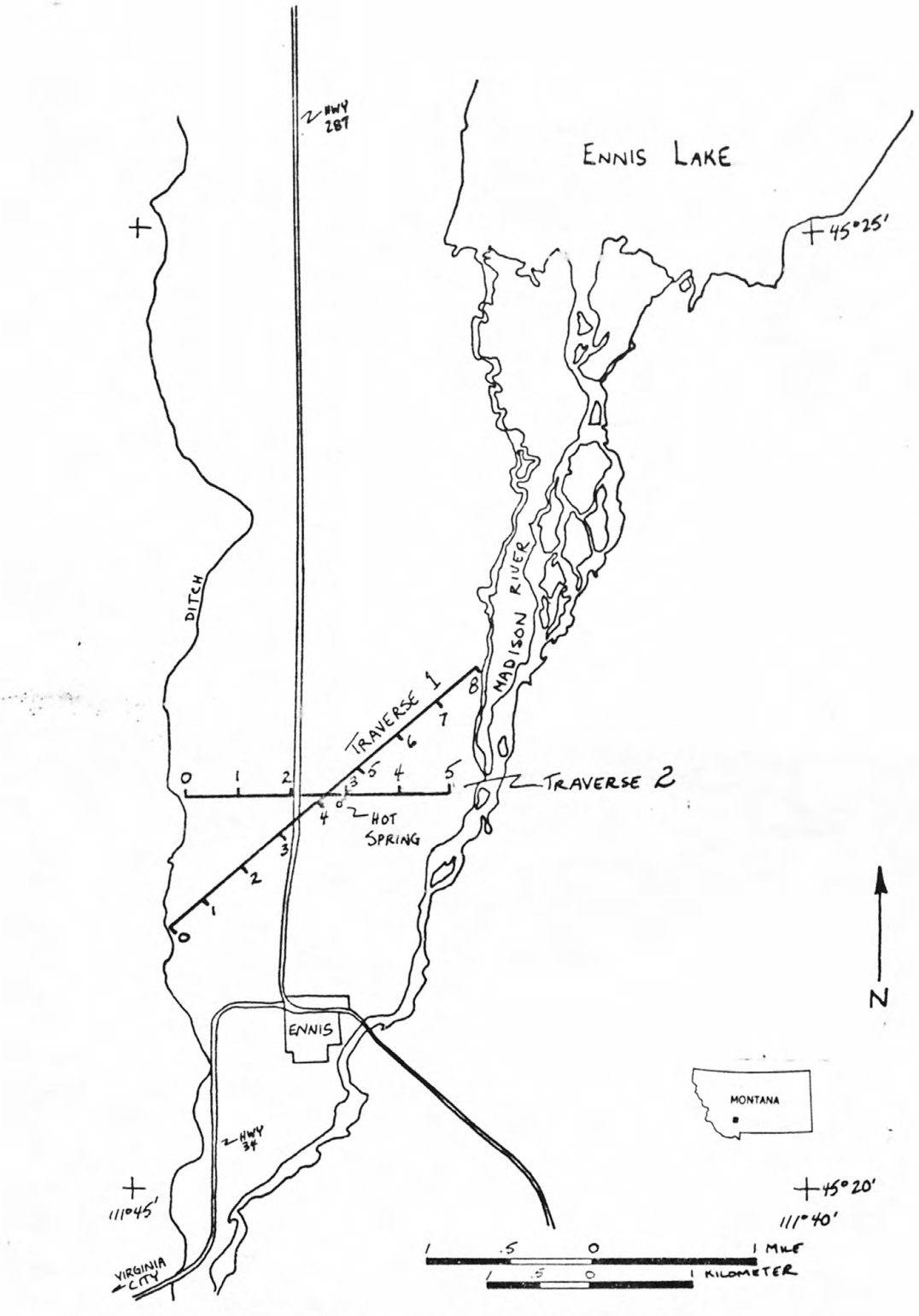

FIG. 1 – TELLURIC TRAVERSES LOCATION MAP – ENNIS HOT SPRINGS, MT

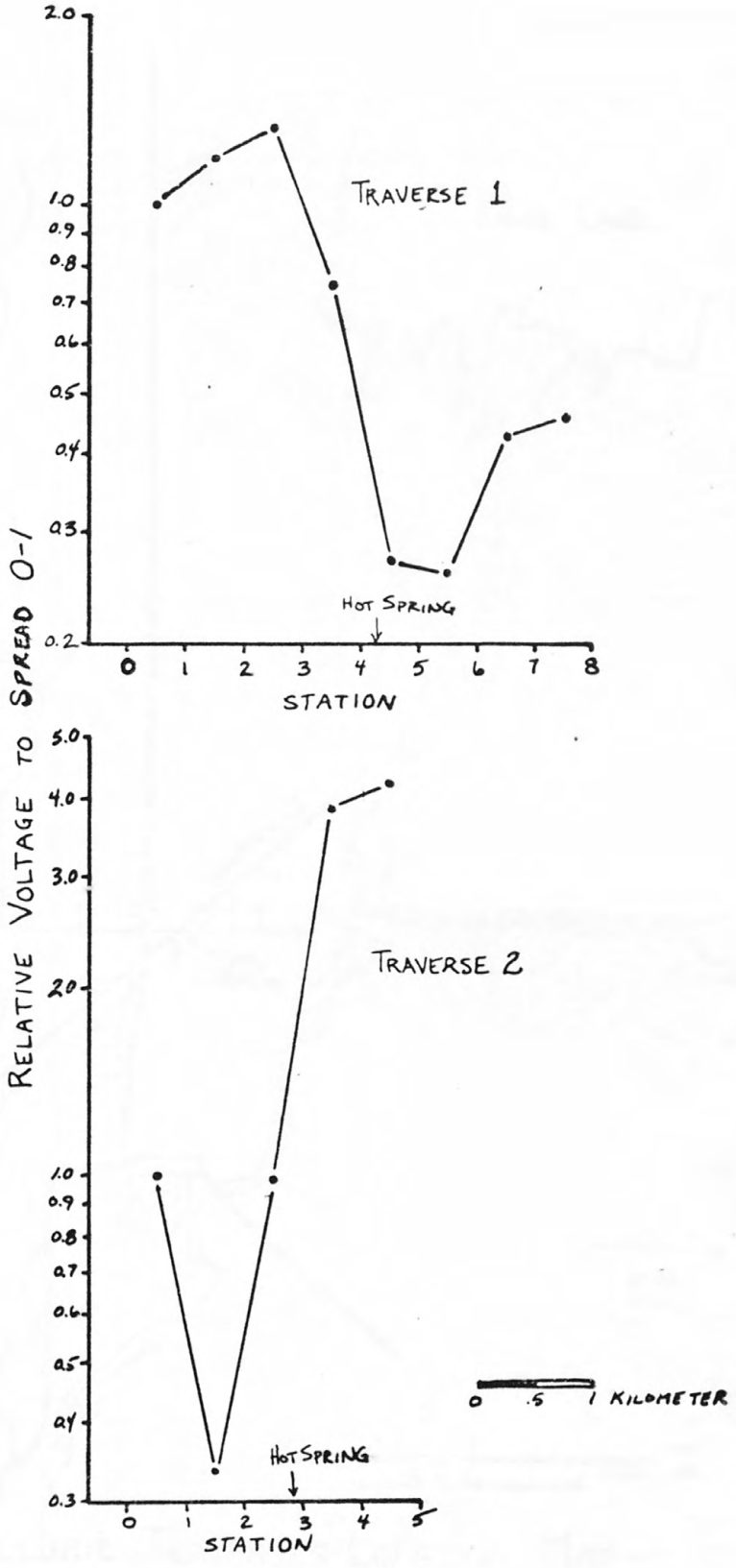

FIG. 2 - TELLURIC PROFILES — ENNIS HOT SPRINGS, MT