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Telluric profile and location map for the Broadwater 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.

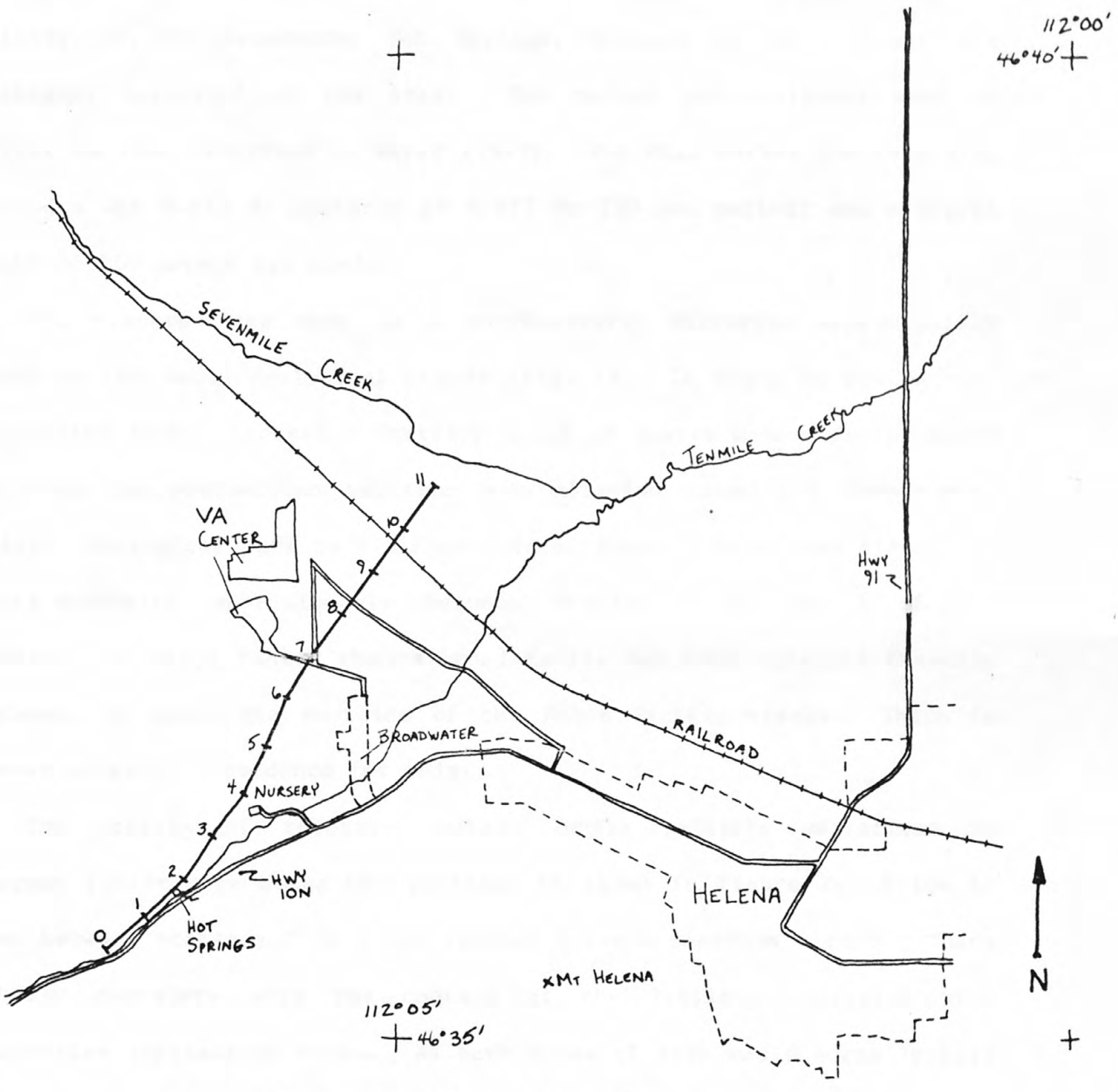

FIG. 1 – TELLURIC TRAVERSE LOCATION MAP
BROADWATER HOT SPRINGS, MT

A telluric profile (E-field ratio telluric method) was made in the vicinity of the Broadwater Hot Springs, 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 sec period) and a dipole length of 500 meters was used.

The traverse was made in a northeasterly direction approximately normal to the known geological trends (fig. 1). It began on preCambrian crystalline rocks, crossed a Tertiary stock of quartz monzonite, probably back onto the preCambrian and then onto alluvium covering a downdropped valley. Geological work by R. Leonard (oral communication) has placed the quartz monzonite approximately between station 1 through 4 of the traverse. A major fault, the railroad fault, has been inferred trending northwest at about the position of the Union Pacific tracks. There is however no surface evidence for this.

The profile of relative voltage (which reflects variations in apparent resistivity along the profile) is shown in figure 2. A low is shown between stations 1 to 2 and another between stations 4 to 5. These probably correlate with the contact of the Tertiary intrusive with preCambrian crystalline rocks. As both types of rock would normally have high resistivities, the low observed at the contacts is inferred to be the result of alteration and thermal waters along faults or fractures at the contacts. The location of the Broadwater Hot Spring is consistent with this. The data also suggest that thermal waters may be present at the northeasterly contact of the intrusive between stations 4 to 5 where no surface evidence exists.

A broad low is present between stations 6 and 10. This supports the inference of a graben filled with lower resistivity alluvium in the area. The major boundary faults for the graben would be approximately at stations 6 and 10. The railroad fault would be identified with the inferred fault near station 10.

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.

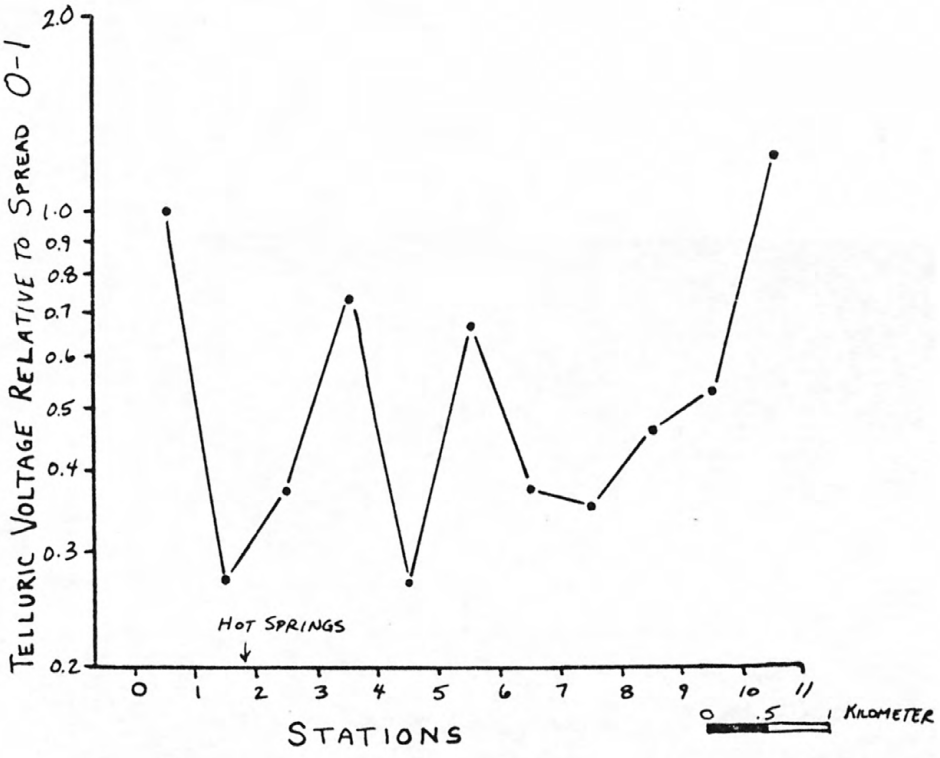

FIG. 2 - TELLURIC PROFILE -
BROADWATER HOT SPRINGS, MT