ALUM, NEVADA

SELF-POTENTIAL SURVEY

for: AMAX GEOTHERMAL

ALUM, NEVADA

AMAX SELF-POTENTIAL SURVEY

SUMMARY

The SP survey at Alum was begun 12 November 1982 by Robert Spurgeon and David Gragg. After 24 November, Walter Avramenko replaced Robert Spurgeon for the completion of field work 13 December. I supervised the work on site during 2 days of each of these crews.

Extremely dry ground in the southwestern portion of the survey area produced erratic readings in that region, particularly along the tie line, leading to serious drift values. Scheduling constraints prevented repetition of the problem segments during the latter position of the survey after the area had received moisture; however, intermediate partial tie lines were added to help isolate the errors. The data have been processed with this problem in mind, so that most of the loop corrections were allocated to the southwest tie-line. The "herring-bone" patterns in the contoured maps suggests that some residual error between lines may remain, particularly between lines B, C and D; thus, I would not attempt to read into the contoured data any significant geologic changes <u>between</u> those lines. Within each line, however, the data seem fairly reliable. Closure errors computed around successive loops are listed in Table 1.

After distributing the closure errors, an examination of the possible correlation of SP response with elevation was made, utilizing the three southeastern lines along which elevation was an appreciable factor. Coefficients obtained were: Line E: -0.0263; F: -0.2463; and

G: -0.0732 mv/ft. The extreme value of the last is attributed in part to mineralization or volcanics and was rejected as being anomalous; hence, the coefficient was derived from the average of that from Lines E and F; viz., -0.2363 mv/ft. This factor was applied to the entire map, using a reference elevation of 4700 ft, to produce an "elevation-corrected" data set. The resulting contour map appeared particularly erratic and warranted treatment by a three-point moving average process. The final contour maps and profiles were produced using this smoothing procedure.

I have prepared an interpreted overlay map emphasizing those features that appear most evident on the elevation-corrected map. Despite the removal of an appreciable elevation or groundwater effect, substantial broad negatives remain around the southern and eastern corners of the survey. These probably express near-surface volcanics, that in places outcrop. One extreme negative on Line E was noted on-site to accompany evident sulfide mineralization, and it is likely that some of the other grey zones may result from mineralization, as borne out by the prevalence of prospects shown on the topographic map in this vicinity. Outcropping basalts in the southern corner are associated with negative SP anomalies, leading us to conclude that the negative block in that area is mapping buried basalts possibly derived from The Crater of Section 27. The broad negative of Line A can be attributed to recharge through infiltration (along a line of sinks fed by local drainage). The topography suggests that similar collecting zones occur along Line C.

The southwestern portion of the map is occupied by a major positive feature extending parallel to topography. Its nature suggests the existence of either a large fault block or a zone of underground discharge of groundwater from the range to the southwest. Note the presence of springs along the rangefront, southwest of the survey. The sharp division between this positive regime and the negative area to the east (attributed above to volcanics) is indicative of some major transverse break. The positive zone is bounded on the north by a shelf-like intermediate response aligned along the highway, or valley axis, and may be expressing step-faulting. Its chevron-like appearance may not be realistic, since this is a region of serious drift, with its possible "herring-bone" effect. Quite possibly the underlying structure could be a linear fault block.

The SP response betrays the presence of these fault structures but not their displacement up or down: this would be better determined from a series of gravity profiles.

Localized positives and dipolar features occur near the center of the known thermal anomaly and divulge possible ascending hot fluids. Their dimensions indicate sources within 0.5 km of the surface. The up-and-down nature of the data along the lines here is reminiscent of the SP response over Roosevelt Hot Springs dome fault. No doubt the local mineralization and alteration are also playing a role here.

An overview of the profile map of elevation-corrected SP, reveals the presence of a broad, subtle low occupying the area of the known thermal anomaly (lows to the northwest and southeast are attributed to other mechanisms, as discussed above). This is reminiscent of the negative zone over Roosevelt Hot Springs and Animas thermal anomalies. The half-width of this Alum feature is between 3 and 4 km.-- an indication of the maximum depth to the source. This is not to say that a shallower, but broader source might explain the response.

AMAX ALUM PROJECT:

TABLE 1

Loop Closure Errors

LOOP	CLOSURE ERROR	LENGTH	mv/km
AB	36 mv	27	1.33
BC	-35 mv	29	-1.21
CD	-18 mv	29	- .62
DE	41 mv	28	1.46
EF	6 mv	27	.22
FG	14 mv	25	.56
EH	8 mv	10	.8