WYOMING STATE GEOLOGICAL SURVEY

GEOPHYSICAL RECONNAISSANCE OF THE LONETREE CIRCULAR TOPOGRAPHIC ANOMALIES IN THE SOUTHERN GREEN RIVER BASIN, UINTA COUNTY, WYOMING

by

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Introduction

In June, 1996, the Wyoming State Geological Survey initiated geophysical reconnaissance studies of the Lonetree anomalies at the request of Primus Resources, L.C., based out of Etna, California. The Lonetree anomalies are of interest due to the recent discovery of several ultramafic breccia pipes containing mantle xenoliths that were discovered along the flank of Cedar Mountain, a short distance from the Lonetree anomalies (Richard Kucera, personal communication, 1995; Hausel and others, 1996).

Location and Geology

The Lonetree anomalies are located 2 to 4 miles southwest of Lonetree between the Poison Creek and Stag Hollow drainages on the Lonetree 1:24,000 scale USGS topographic map. The anomalies were initially identified by Gordon Marlatt, a consultant from Laramie, during remote sensing studies of the area in search for kimberlite. The area is accessible from Highway 414. From the Lonetree turnoff, the anomalies lie near good, graded, roads.

Six anomalies were identified by Gordon Marlatt in section 7, T12N, R113W, and in sections 12, 13, and 24, T12N, R114W (Figure 1). Soil samples recovered from the topographic depressions contained kimberlitic indicator minerals (Gordon Marlatt, personal communication, 1996). According to the State Geological Map (Love and Christiansen, 1985) much of the area is underlain by Quaternary alluvium, glacial outwash, and Bridger Formation (Tertiary) sediments. These units possibly overlie several thousand feet of Phanerozoic sedimentary rocks which, in turn, lie on top of Wyoming Archon basement rocks. The Wyoming Archon is part of a Archean craton, that is also known as the Wyoming Province.

The Lonetree anomalies lie along a linear trend between the Leucite Hills lamproites to the northeast, and the Whites Creek and Moon Canyon lamproites to the southwest (i.e. see Hausel, 1996). The State Line diamond district is located approximately 250 miles east of the Lonetree anomalies.

Geophysics

Two of the six anomalies were examined. The two that were examined exhibited the most distinct topographic expressions. These were identified as LT#1 and LT#2 (Figure 1).

Both anomalies have subtle, circular, topographic expressions with depressions at their centers. LT#1 in particular, reminded the authors of the Winkler kimberlite pipe in northeastern Kansas, where a similar circular topographic anomaly was identified several years ago and was initially thought to be an impact structure; but later proven to be a kimberlite pipe.

Two profile lines (W-E and N-S) were run through both anomalies using a Geonics EM31 and a Geometrics proton precession magnetometer. Both the EM and magnetics showed distinct anomalies in the depression associated with LT#1 (Figures 2 and 3). The EM identified a weak conductor (40 to 50 mmho/m above background) over the depression as well as a weak magnetic anomaly (as much as 125 gammas) similar to those reported for some kimberlites in the Colorado-Wyoming Kimberlite Province 250 miles to the east (Hausel and others, 1979, 1981). The geophysical anomalies detected in LT#2 (Figure 4 and 5) were subtle. A weak conductor (30 mmho/m above background maximum) was detected in the depression in LT#2. However, the N-S profile showed a distinct (145 gamma) magnetic anomaly.

Conclusions

Weak EM and magnetic anomalies were detected over two topographic anomalies in the southern Green River Basin of Wyoming. These anomalies lie near the Cedar Mountain diamondiferous breccia pipes (Hausel and others, 1996), and within the Cedar Mountain 'kimberlitic' indicator mineral anomaly previously identified by McCandless and others (1995).

Although the origin of these topographic anomalies are unknown, their presence over a Archon, and near the Cedar Mountain pipes suggests that the structures (particularly LT#1) should be studied in greater detail. We recommend detailed geophysical and geochemical surveys followed by drilling.

As a final note, the authors wish to thank Jim Marin and Tim Neal of Primus Resources L.C. for allowing the Survey to examine the structures.

References Cited

Hausel, W.D., 1996, Diamond exploration potential of the Wyoming craton, western United States: SME Preprint 96-27, 10 p.

Hausel, W.D., Glahn, P.R., and Woodzick, T.L., 1981, Geological and geophysical investigations of kimberlite in the Laramie Range of southeastern Wyoming: Wyoming State Geological Survey Preliminary Report 18, 13 p.

Hausel, W.D., Kucera, R.E., McCandless, T.E., and Gregory, R.W., 1996, Diamondiferous breccia pipes in the southern Green River Basin, Wyoming: 32nd Annual Forum on the Geology of Industrial Minerals Programs w/Abstracts, p. 23-25.

Hausel, W.D., McCallum, M.E., and Woodzick, T.L., 1979, Exploration for diamond-bearing kimberlite in Colorado and Wyoming: an evaluation of exploration techniques: Wyoming State Geological Survey Report of Investigations 19, 29 p.

Love, J.D., and Christiansen, A.C., 1985, Geologic map of Wyoming: U.S. Geological Survey (1:500,000).

McCandless, T.E., Nash, W.P., and Hausel, W.D., 1995, Mantle indicator minerals in ant mounds and conglomerates of the southern Green River Basin, Wyoming: Wyoming Geological Association, Resources of Southwestern Wyoming Field Conference Guidebook p. 153-163.

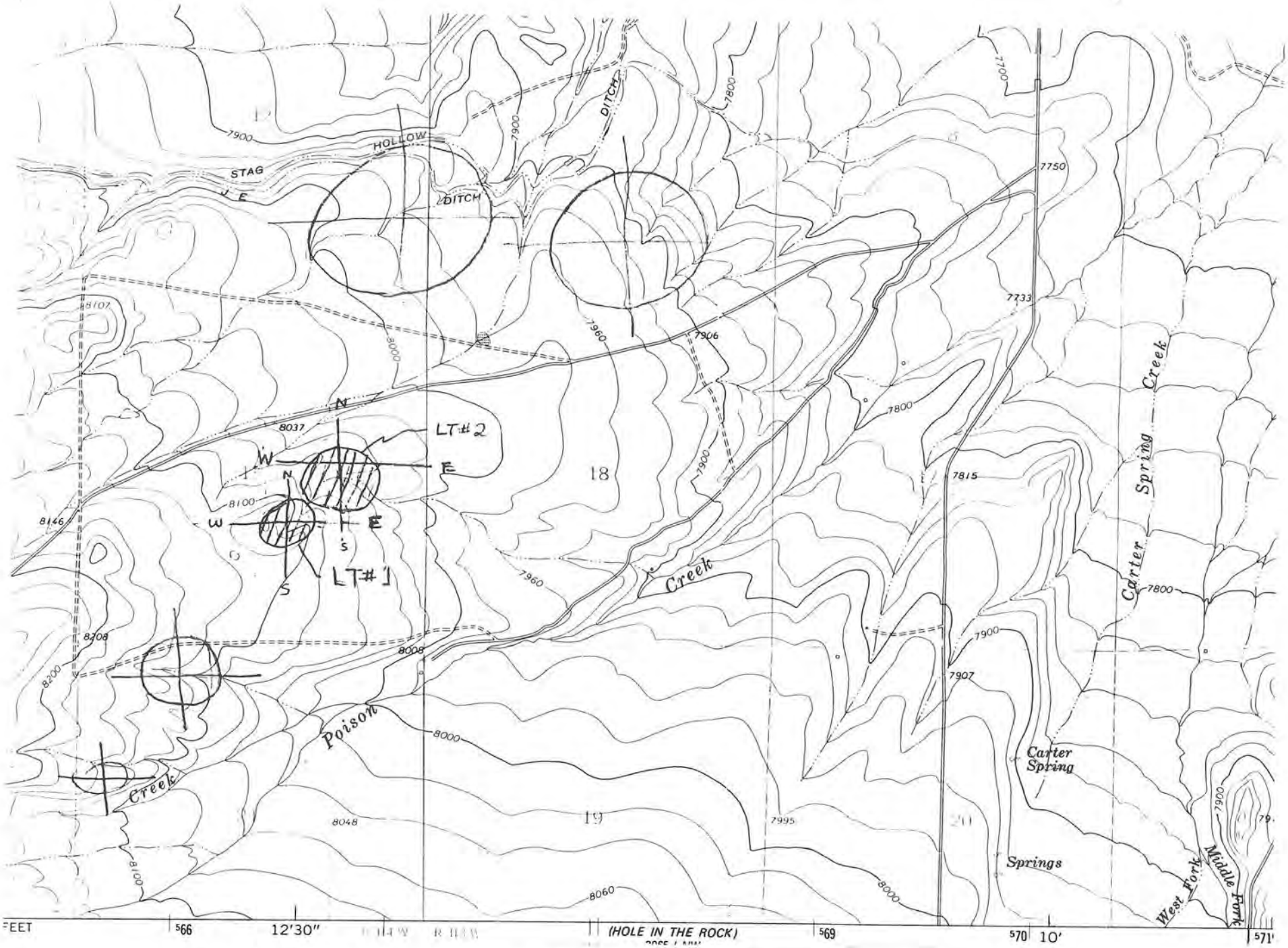

Figure 1. Location map of the Lonetree topographic anomalies (Lonetree, Wyoming, 1:24,000 scale USGS topographic map).

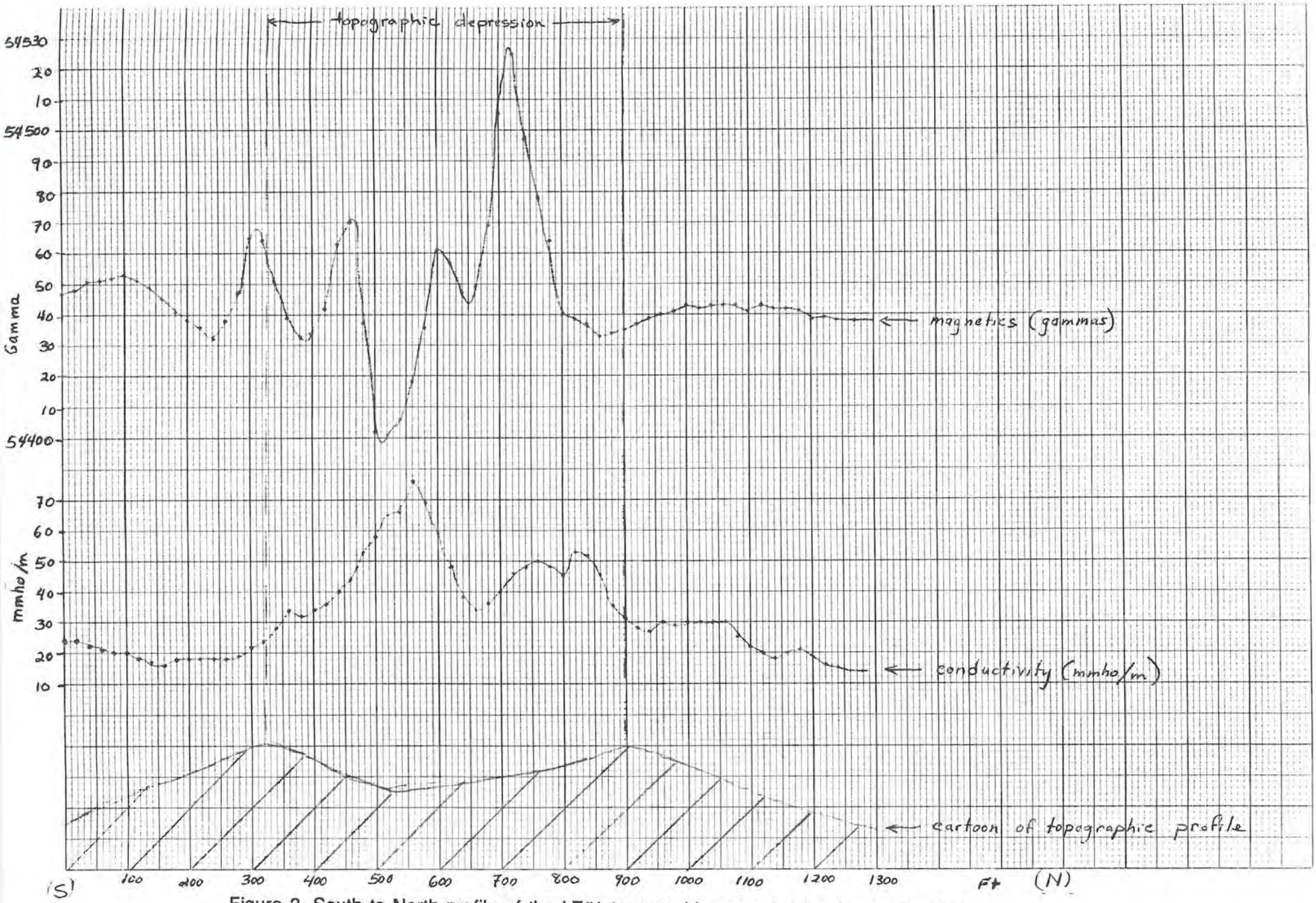

Figure 2. South to North profile of the LT#1 topographic anomaly showing profile sketch of the topographic anomaly, EM (mmho/m) and magnetics (gammas).

Figure 3. West to East profile of the LT#1 topographic anomaly showing profile sketch of the topographic anomaly, EM (mmho/m) and magnetics (gammas).

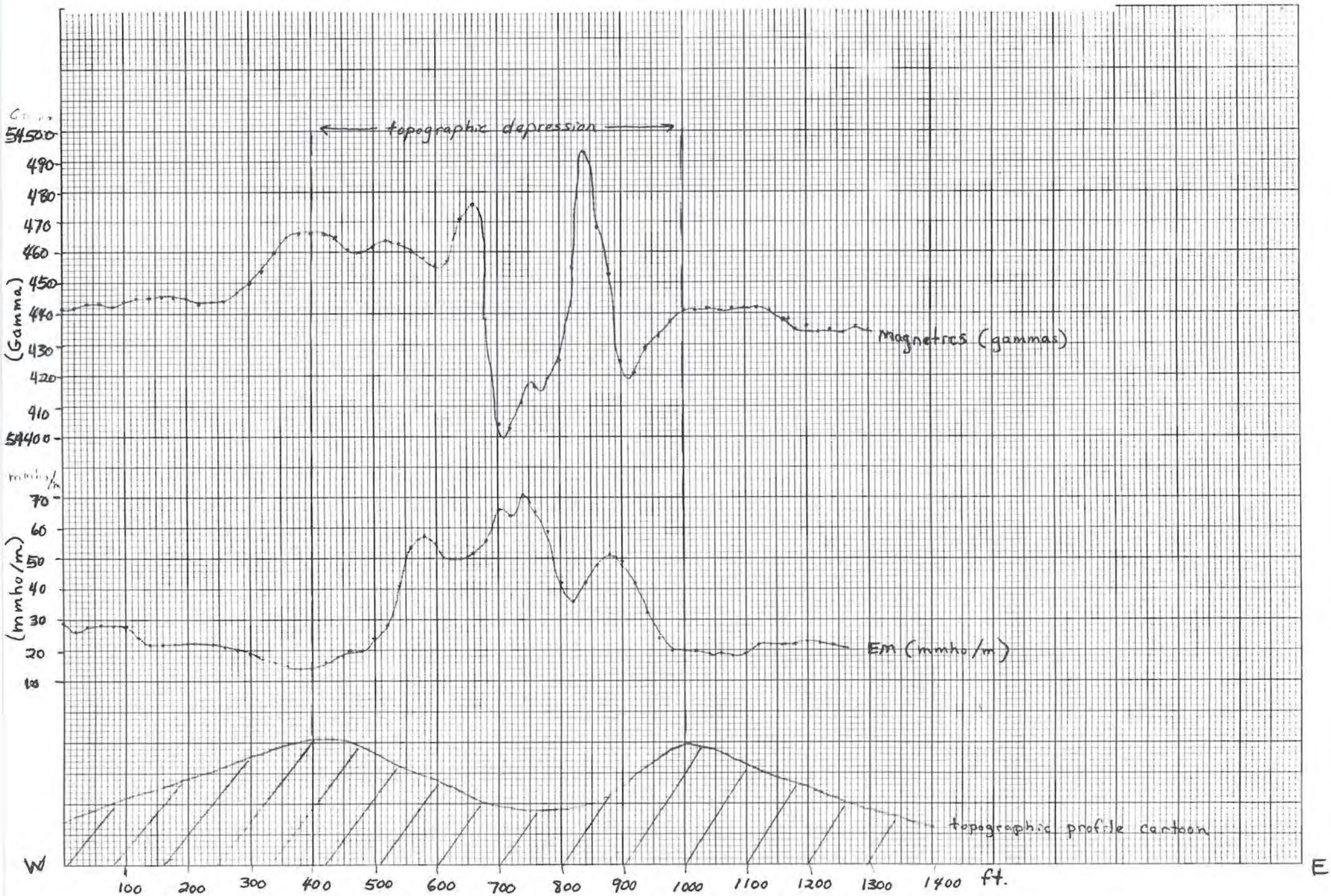

Figure 4. North to South profile of the L1#2 topographic anomaly showing profile sketch of the topographic anomaly, EM (mmho/m) and magnetics (gammas).

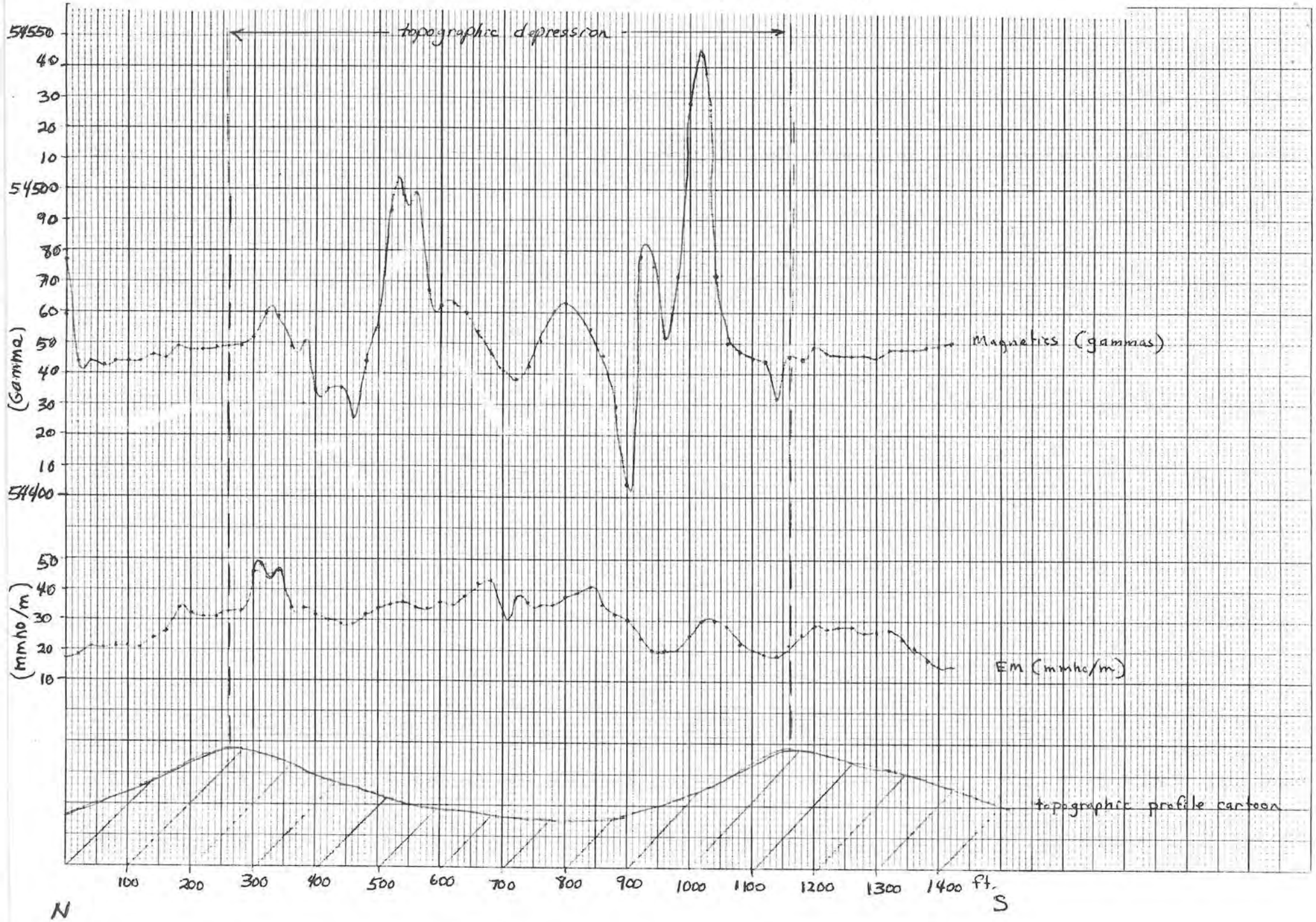

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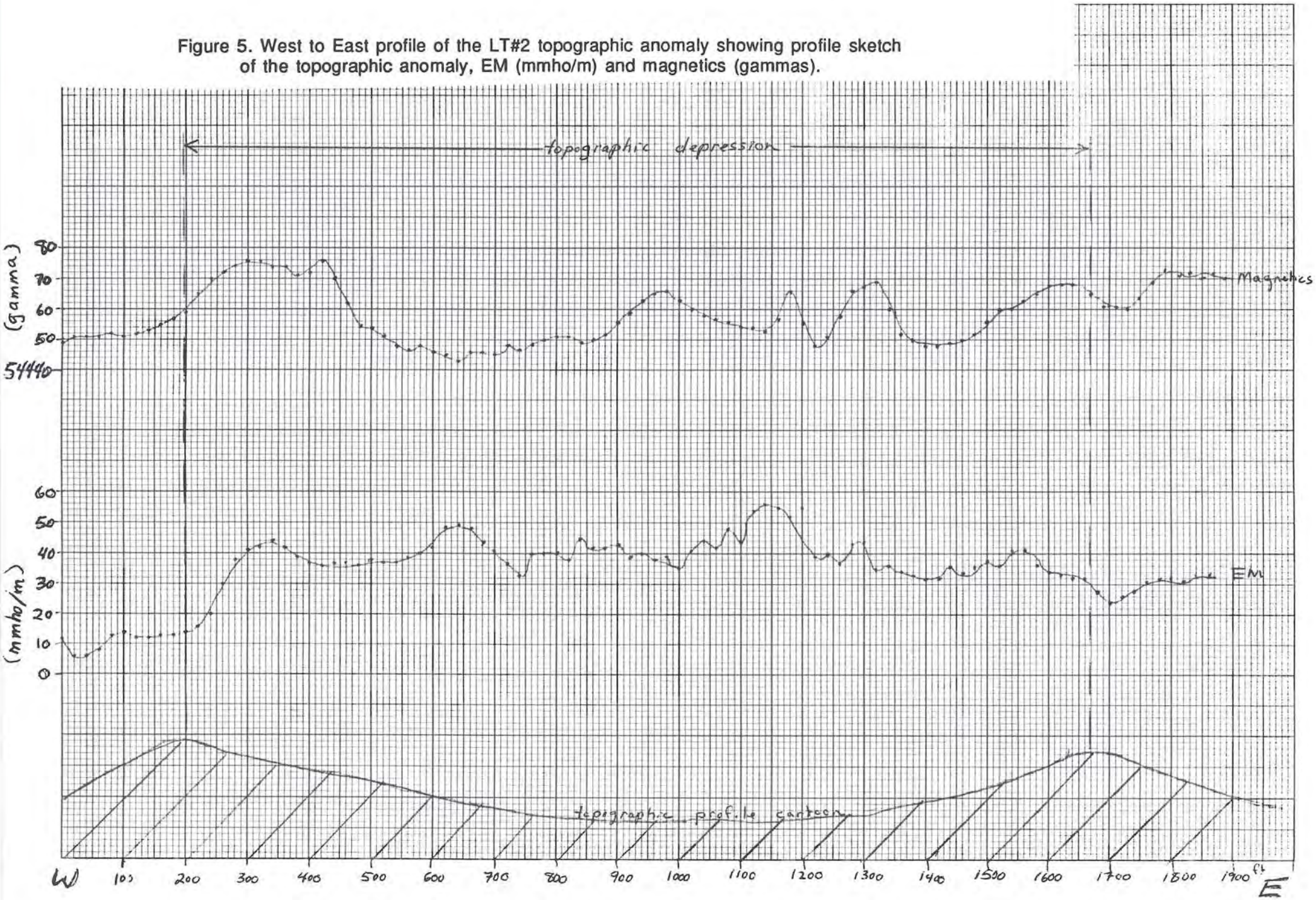
Figure 5. West to East profile of the LT#2 topographic anomaly showing profile sketch of the topographic anomaly, EM (mmho/m) and magnetics (gammas).



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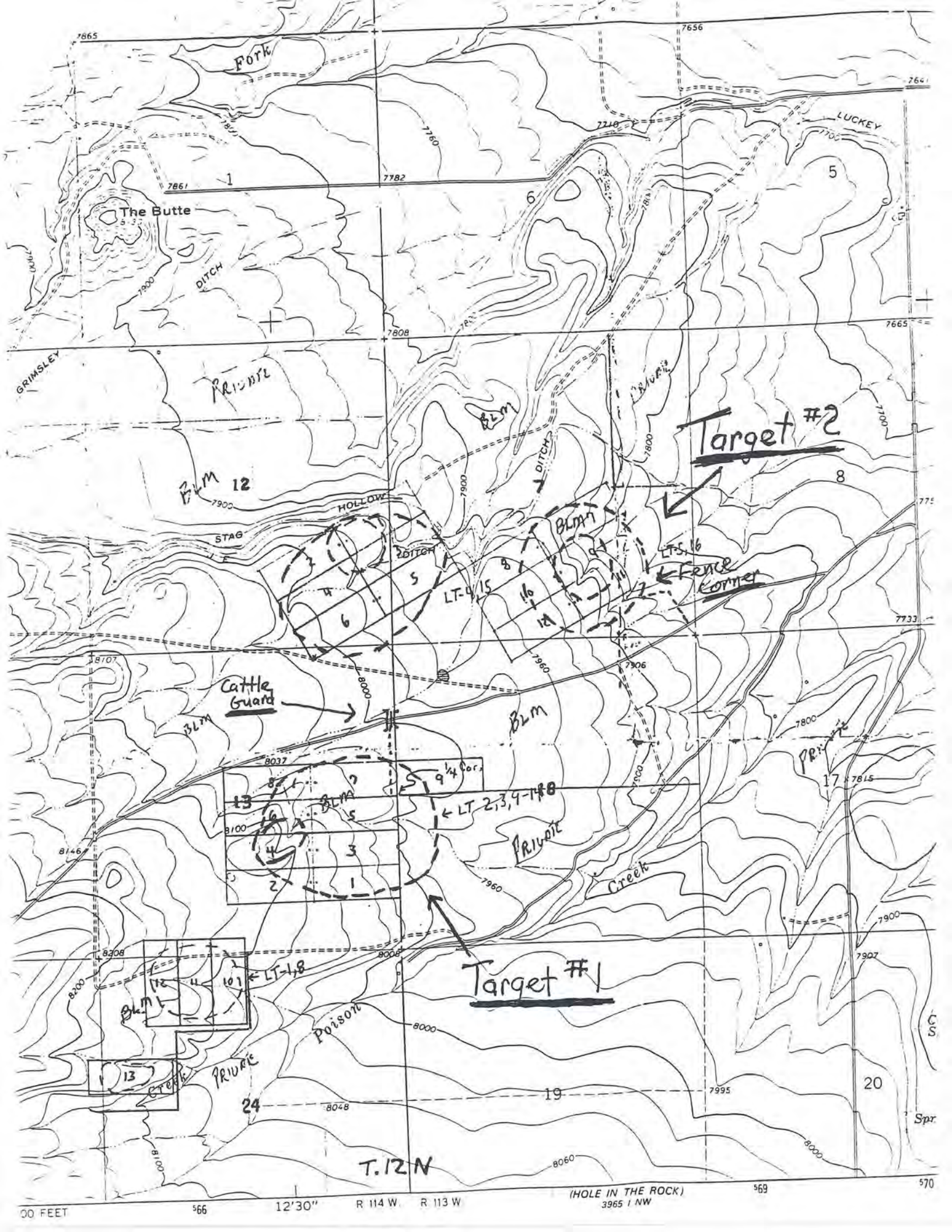
Fork
LUCKEY
The Butte
DITCH
GRIMSLEY
PRIVATE
BLM
Target #2
HOLLOW
STAG
LT-9,15
LT-5,16
Fence Corner
Cattle Guard
9 1/4 Cor.
LT 2,3,4-1,8
Creek
Target #1
LT-1,8
Poison
T.12N
(HOLE IN THE ROCK)
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R 113 W