60001933

Mining District File Summary Sheet

DISTRICT	Rosebud
DIST_NO	4010
COUNTY If different from written on document	Pershing
TITLE If not obvious	Rosebud URBD S0216 Geophys IP and resistivity results, Hallof, 1/89
AUTHOR	Nelson C; Bennett B; Hallof, P
DATE OF DOC(S)	1989
MULTI_DIST Y / (N?) Additional Dist_Nos:	
QUAD_NAME	Sulphur 7½'
P_M_C_NAME (mine, claim & company names)	Rosebud Mine; Lac Minerals Ltd
COMMODITY If not obvious	gold; silver
NOTES	Correspondence about results of IP and resistivity survey; handwritten notes; CD noted but not in file; contour maps. 17 p.

Keep docs at about 250 pages if no oversized maps attached
(for every 1 oversized page (>11x17) with text reduce
the amount of pages by ~25)

SS: DP 9/10/08
Initials Date

DB: _____
Initials Date

SCANNED: _____
Initials Date

Revised: 1/22/08

URBD 50216 GEOPHYS
DISC OF IP & RESISTIVITY RESULTS, HALLOF
5/89

60001933 4010

Geo physics
26-30
50216

6000 1933 4010

Reno FILE

PHILIP G. HALLOF CONSULTING GEOPHYSICIST INC.
457 Sackville Street
TORONTO, Ontario M4X 1T5

MEMORANDUM TO: Craig Nelsen and Bob Bennett --Lac Expl. RENO
FROM: Philip G. Hallof Consulting Geophysicist
DATE: August 1,1989
SUBJECT: Discussion of the Plan Maps of the Filtered Values from the IP and Resistivity Psuedosections at ROSEBUD GRID

The induced polarization and resistivity results from the large ROSEBUD GRID have been discussed in several previous Memos. The geophysical contractors who performed the field work have shown the Fraser Filter profiles on the data plots. These profiles represent the result of applying a particular mathematical filter to the two-dimensional psuedosection plots. The filter applied to the ROSEBUD data was chosen to emphasize the anomalous pattern of a near-vertical, tabular source that has a width that is a significant portion of the electode interval used for the survey.

The profile values from the various parameters plotted for the ROSEBUD survey have now been plotted on a plan map, at a scale of one inch equals 500 feet. The measurements were made with 200 foot electrode intervals on lines that are 400 feet apart. These values have now been contoured on the plan maps. These values are not potential field values, such as is the case with gravity or magnetic data. The values measured will be strongly affected by the line direction, and the electrode interval used. At the ROSEBUD GRID, all of the lines surveyed are parrallel, at equal intervals and the measurements were made with one electrode interval; in this situation, the contoured plan maps would be as useful as could be

expected. The results should be correllated with the results from the interpretation of the psuedosections.

i)**APPARENT RESISTIVITY CONTOUR PLANS**

The gross aspects of the apparent resistivity zoning are shown by the contoured plan map. The large, high resistvity outcrop areas of the Dozer Tuff, the Chocolate Formation and some of the cemented breccias can be correllated with the high contoured values as well as the high resistivity zones interpreted from the psuedosections. At some locations, the location of the 100 ohm-meter contour does not agree exactly with the contact intepreted from the data plots; however, this is to be expected considering the different methods of interpretation used.

The large regions of lower resistivity rocks are also shown by the contoured plans. These include the basin of the younger Badger Formation rocks, and the valley filled with Quaternary Alluvium.

Some of the smaller areas of high resistivity outcrop do not show as clearly on the contoured plan. The high resistivity zone inerpreted at 8+00S to 4+00s on LINE 22E correllates with a small outcrop area of non-porous, Dozer Tuff. The filtered profile for this line does show a high level, but the contour plan does not show a definite contoured high.

The presence of the intrusive latite that can be seen in several outcrops, is indicated by somewhat indefinite zones of high apparent resistivity on the psuedosection for LINE 24E and LINE 25E.

The presence of these high resistivty rocks is not clearly evident on the profiled data, or the contoured plan. This is probably due to the fact that the mathematical filter chosen is not as responsive to this type of weakly anomalous pattern, as the patterns that can be interpreted on the apparent resistivity pseudosections.

Numerous narrow zones of lower apparent resistivity have been interpreted on the pseudosections,and shown on the plan map. As shown on the plan map it is possible to corellate many of the narrow conductors from line to line, to form zones. Many of these narrow, conducting zones are not evident on the contoured plan map. The narrow conductor at LINE 18E,30+00S is shown clearly by the filtered profile on LINE 18; however, there is no obvious indication of the conducting zone on the contoured plan map. The narrow conductor on LINE 18E at 45+00N also shows on the filtered profile. In this case there is some indication of the conducting zone on the contoured plan map. The conductor at 67+00N on LINE 18E does not show on the contoured plan.

2)THE CONTOURED PHASE VALUE PLAN MAPS

The contoured values of the filtered profiles of the measured phase values agree fairly closely with the zones of equal measured phase as interpreted from the pseudosections. There are high phase values within the valley; these values lead to the high background IP values within the valley. At several locations, the values are high enough in magnitude, to be considered anomalous.

As would be expected, there are also large areas of high phase values that corellate with the several regions of non-porous,

high resistivity rocks. Within the high resistivity environment, even small concentrations of metallic minerals will result in high background IP effects. This is the same effect that creates the large area of low phase values within the basin of Badger formation rocks. There is almost no polarization present within the porous, low resistivity rocks.

3)CONTOURED METAL FACTOR PLAN MAPS

In the broad valley along the southern portion of the grid, the low resistivity values and the high background phase values create the high background Metal factor values that were interpreted on the psuedosections and are also present on the contoured plan map of the filtered profile values. The Metal factor anomalous zones that were interpreted within the valley are also shown on some of the profiles for the lines surveyed in that area. The contoured values also show show patterns that corellate with at least a portion of the anomalous zones. The interpreted anomalous zones are usually of greater extent than those that are shown by the contoured values on the plan map.

The same description would apply to those anomalous zones that have been interpreted from the psuedosections within the higher resistivity rocks that lie to the north of the valley. The profiles of the filtered values show an anomaly on one, or two lines; however, the anomalous zones indicated by the contoured values are not as extensive as those that were interpreted from the psuedosections. The deep sources interpreted on LINE 23E are reflected on the profiles, and the plan map; the similar, but less definite anomalies interpreted on the

adjacent line, LINE 24E, were not emphasized by the mathematical filter used. The definite anomaly interpreted at LINE 22E, 26+00S is not evident in the filtered data either.

The several very narrow, shallow anomalous zones that were interpreted from the pseudosections are not very evident in the filtered data. The mathematical filter is not really designed to emphasize this type of anomalous source. The anomaly at LINE 18E,45+00N is quite definite on the contoured plan, but the continuation of the source to the east and west is not shown by the contoured plan values.

The contoured plan maps of the filtered values from the pseudosections have the advantage of being completely independent of the personal prejudice of the interpreter. Once the form of the mathematical filter is chosen, the process is automatic; however, to be certain than all types of anomalous patterns are reflected in the contoured plan maps, it would be necessary to apply several different forms of the mathematical filter to the pseudosection data plots.

It would be worthwhile to carefully corellate the contoured plan maps with the detailed geologic and alteration maps that have been prepared for the ROSEBUD GRID. There may be subtle patterns on the contoured plans that could be used to extrapolate the available geologic information into covered areas.

Toronto Office
Suite 485,
146 Front Street West
Toronto, Ontario
M5J 2L7
(416) 598-2538

LAC

Lac Minerals Ltd.
Exploration Division

TELECOPIER COVER SHEET

TO: CRAIG ~~NELSEN~~ NELSEN

COMPANY: LAC EXPLORATION

CITY: RENO

TELECOPIER NO: (702) 356-2727

FROM: P.G. HALLOF TORONTO

DATE: NOVEMBER 14, 1988

WE ARE TRANSMITTING FROM TELECOPIER NUMBER 416 598-0641

TOTAL NO. OF PAGES (INCLUDING COVER SHEET) 3

* IF YOU DO NOT RECEIVE ALL PAGES CLEARLY, PLEASE CALL (416) 598-2538 AND ASK FOR _____

MESSAGE/SPECIAL INSTRUCTIONS:

PLEASE CONFIRM RECEIPT OF THIS MESSAGE!

PHILIP G. HALLOF PH.D. P.ENG.
CONSULTING GEOPHYSICIST
457 Sackville Street
TORONTO M4X 1T5

Memorandum To: Alex Perron Perrex Explorations
From: Philip G. Hallof Consulting Geophysicist
Date: October 29, 1987
Subject: Correction of Apparent Resistivity Values Plotted by Belanger on Data Plots

When I was in Kirkland Lake, you gave me the recon IP results from the "41"Grid that had been completed by Walcer Geophysics. You also gave me the recent results from Line 88E and also from Line 96E, by Remy Belanger.

When I had a chance to reveiw the data, I noticed that Walcer had plotted the apparent resistivity values in units of [ohm-meters]. Belanger has shown on the data plots that he has plotted his apparent resistivity values in units of [ohm-feet]. However, when I tried to put both sets of data into the same units, they did not agree. When I returned to Toronto, I went to Walcer Geophysics, and checked a few of the values that have been plotted on the psuedosections. His calculations are in fact correct, with the units of the apparent resistivities in [ohm-meters].

While I was making these calculations, it became obvious to me that there was an error in the units that Belanger has shown on the apparent resistivity psuedosections. What he has calculated, and plotted, are the values of:

$\rho a/2\pi$ in [ohm-feet]

As the attached page of calculations shows, the values plotted by Belanger must be mutiplied by a factor of (1.93) to obtain the [ohm-meter] values that have been plotted by Walcer Geophysics.

The contour patterns will, of course, remain the same, but the apparent resistivity level will be changed.

UNITS FOR APPARENT RESISTIVITY CALCULATIONS

for Potential from point source $V = \rho I/2\pi r$

for Measured Potential Difference in dipole-dipole configuration,

$$V(\text{measured}) = \rho I/2\pi \times [\text{Geometric Constant}]$$

therefore,

$$\rho a = [V_M/I] \times [2\pi X] \times [1/G]$$

If V is in volts; I is in amperes; X in meters, then ρa units will be in [ohm-meters].

If V is in volts; I is in amperes; X in feet, then ρa units will be in [ohm-feet].

therefore,

[ρa in ohm-feet] = 3.25 x [ρa in ohm-meters]

[$\rho a/2\pi$ in ohm-feet] = 3.25/6.283 x [ρa in ohm-meters]

= 1/1.93 x [ρ a in ohm-meters]

PHILIP G. HALLOF CONSULTING GEOPHYSICIST INC.
457 Sackville Street
TORONTO, Ontario M4X 1T5
Telephone (416) 323-1588

MEMORANDUM TO: Craig Nelsen Exploration Manager-RENO
FROM: Philip G. Hallof Consulting Geophysicist
DATE: January 4, 1989
SUBJECT: Preliminary Interpretation on the Phase IP Results from LINE 13E to LINE 23E at the ROSEBUD GRID

The Mertens-McNeil IP Crew completed approximately one-half of the reconnaissance Phase IP survey at the ROSEBUD GRID, before they took the Christmas break. I have Phase IP and resistivity results that extend from LINE 13E to LINE 23E. The Crew will be in Nevada soon to complete the reconnaissance survey, but this seemed like a good time to make a few comments concerning the results we have to date.

There are several features on the apparent resdistivity and apparent PHASE IP psuedosections that appear to be of interest. I have prepared a preliminary plan map that shows many of these features:

a) Zones of High Apparent Resistivity

There are several locations on the ROSEBUD GRID where regions of high apparent resistivity are shown on the data plots. When these locations are transferred to the plan map, and correlated from line to line, they indicate those portions of the grid on which the basement rocks are dense, and non-porous. These zones of high-resistivity rocks are shown in blue, on the preliminary plan map.

At many locations, these zones of high-resistivity include topographic "highs", as indicated on the plan map. There may be some slight distortions due to the effect of the topographic feature itself; however, it is probable that the high resistivities measured and the topographic "highs" that are present are both a result of the

hard, dense, non-porous character of the bedrock at these locations.

b) Zones of Low Apparent Resistivity

On the northern portions of the easternmost lines surveyed, there is a broad region on the apparent resistivity psuedosections within which lower than normal apparent resistivities were measured. There positions correlate into a zone that is shown in green on the preliminary plan map. On the lines to the west, this zone of low apparent resistivities becomes quite narrow, as shown on the plan map. To the east, where the zone is broad, it apparently corellates well with a younger, tuffaceous volcanic rock unit. This young rock unit is presumably more porous, and this accounts for the uniformly low apparent resistivity values measured.

c) Region of Moderate Apparent Resistivity and High Metal Factor

At the southern portion of the ROSEBUD GRID, between two zones of High Apparent Resistivity, there lies a broad zone of moderate apparent resistivities. The bedrock in this area also has a moderate to high Metal Factor value. This moderately high true IP effect within the rock type must reflect the widespread presence of a small concentration of metallic mineralization. This zone is shown in yellow on the preliminary plan map.

Throughout most of this region, the IP effects measured are fairly uniform. However, there are a few location at which the PHASE IP effects measured increase in value. These positions have been interpreted as being anomalous on the preliminary plan map.

d) PHASE IP Anomalies With Depth Indicated to the Top

On the easternmost edge of the grid, beneath the broad zone of low apparent resistivities, there are deep IP sources indicated on

several of the lines surveyed. The deep anomalies, which perhaps indicate a source beneath the younger volcanics, can clearly be seen on the data plot for LINE 23E. In order to better evaluate the source of these anomalous effects, the measurements should be repeated with a larger value of (X). However, if too large a value of (X) is used for the detailed measurements, the anomalous patterns from the sources at depth will become merged.

e) Narrow, Shallow PHASE IP Anomalies

Most of the PHASE IP anomalies that have been interpreted on the data plots, and shown on the preliminary plan map, indicate a weak, narrow, shallow source. The sources of these anomalies can be better located, and more fully evaluated, by making detailed measurements using shorter electrode intervals. Several of these anomalies have been indicated by stars, on the data plots and the preliminary plan map.

The remainder of the reconnaissance PHASE IP survey will undoubtedly locate further anomalies. However, based on the data available from LINE 13E to LINE 23E, the following anomalies would warrant further investigation. If the source of the anomalous IP effects is not known, the detail listed would be warranted.

LINE 23E-40+00N to 80+00N; X=250 or X=300 feet

LINE 21E-10+00S; X=150 feet

LINE 20E-36+00S to 34+00S; X=100 feet

LINE 20E-76+00N to 96+00N; X=250 feet

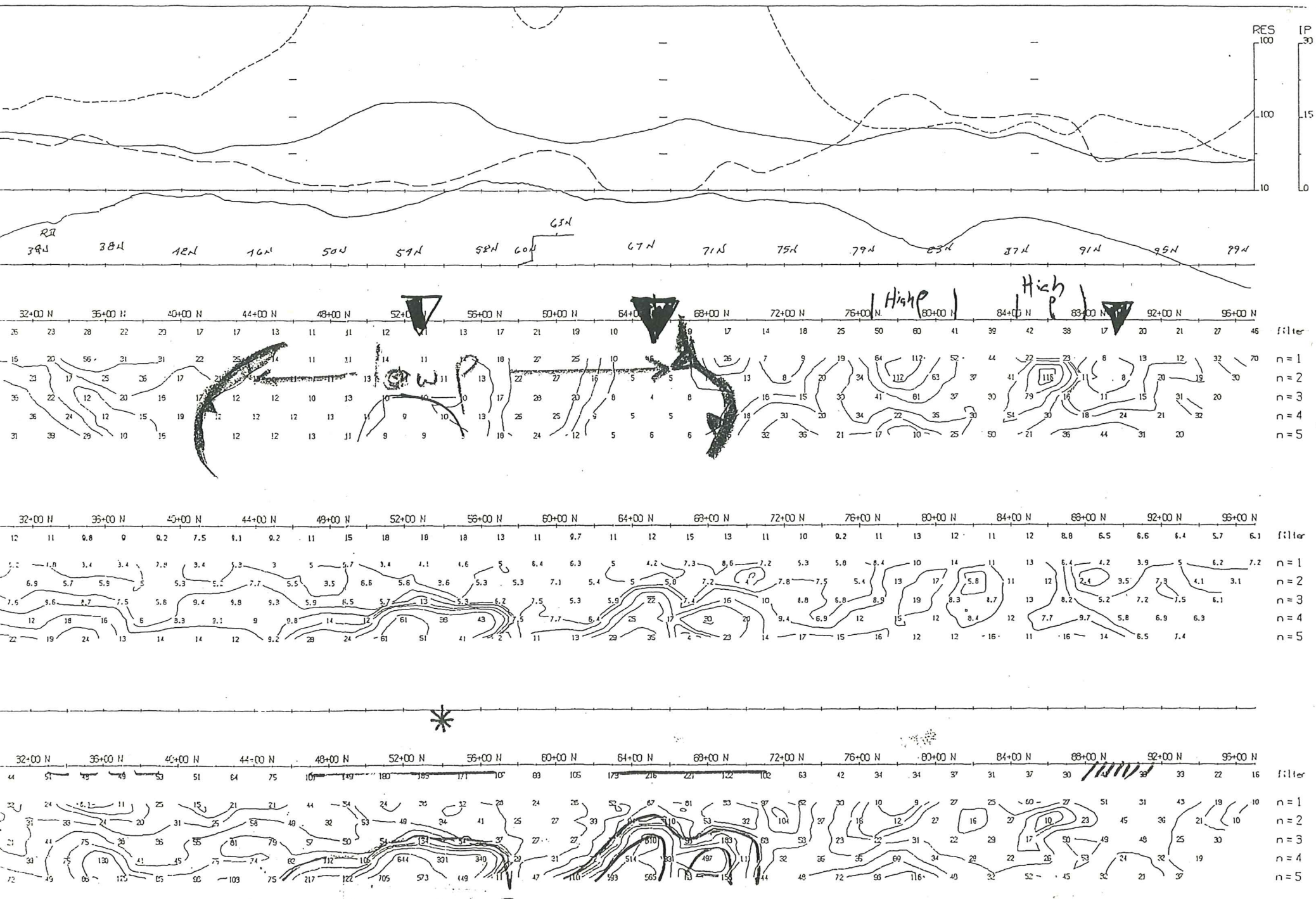
LINE 18E-44+00N to 46+00N; X=100 feet

LINE 16E-0+00 to 2+00N; X=150 feet

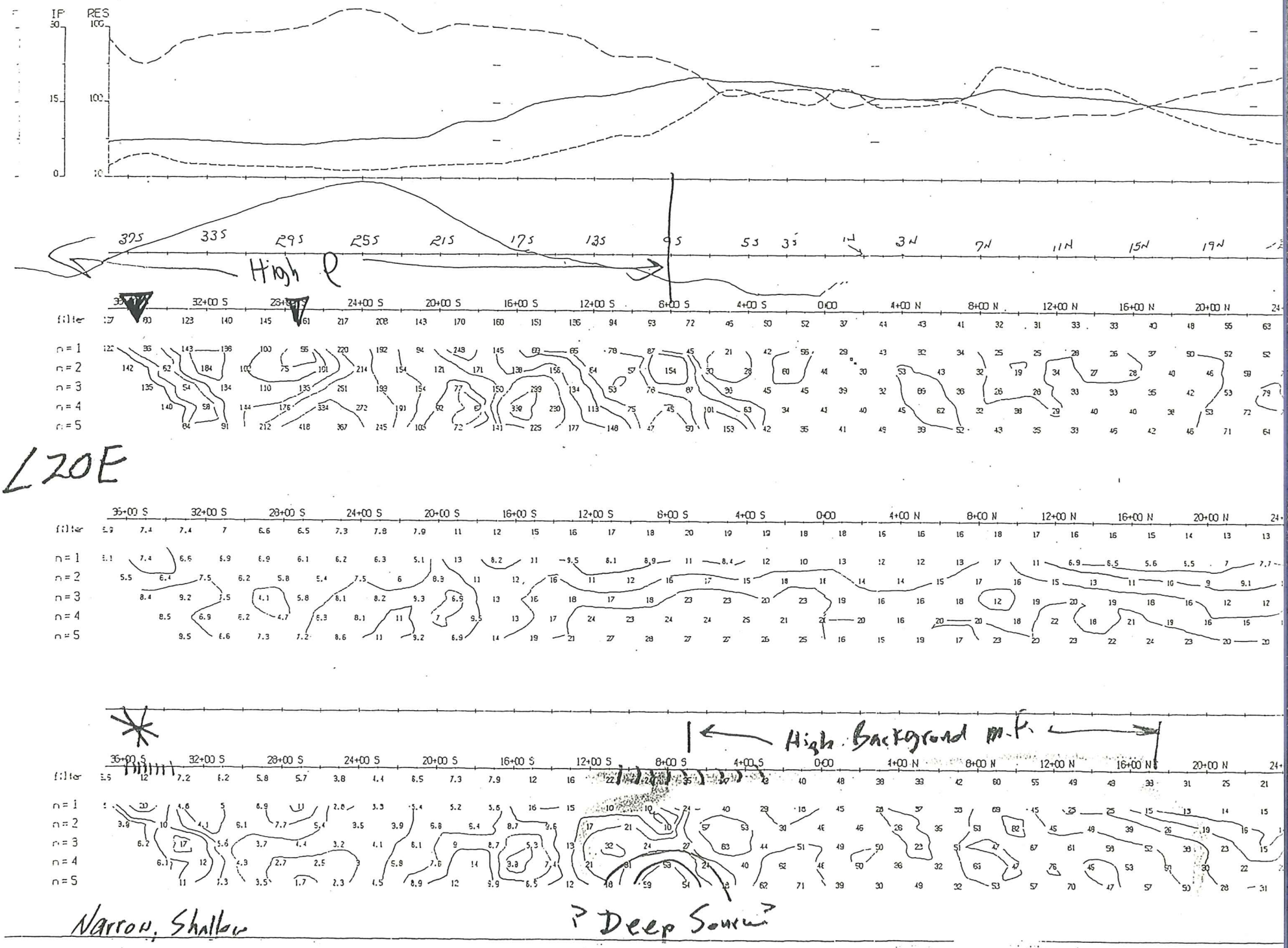
As we have discussed, I will be in RENO in the first part of February. This will give you, and I, and Bob Bennett an opportunity to reveiw all of the apparent resistivity and PHASE IP data and to correlate them with the available geological information. I'll send along the dates for my trip when they are finalized.

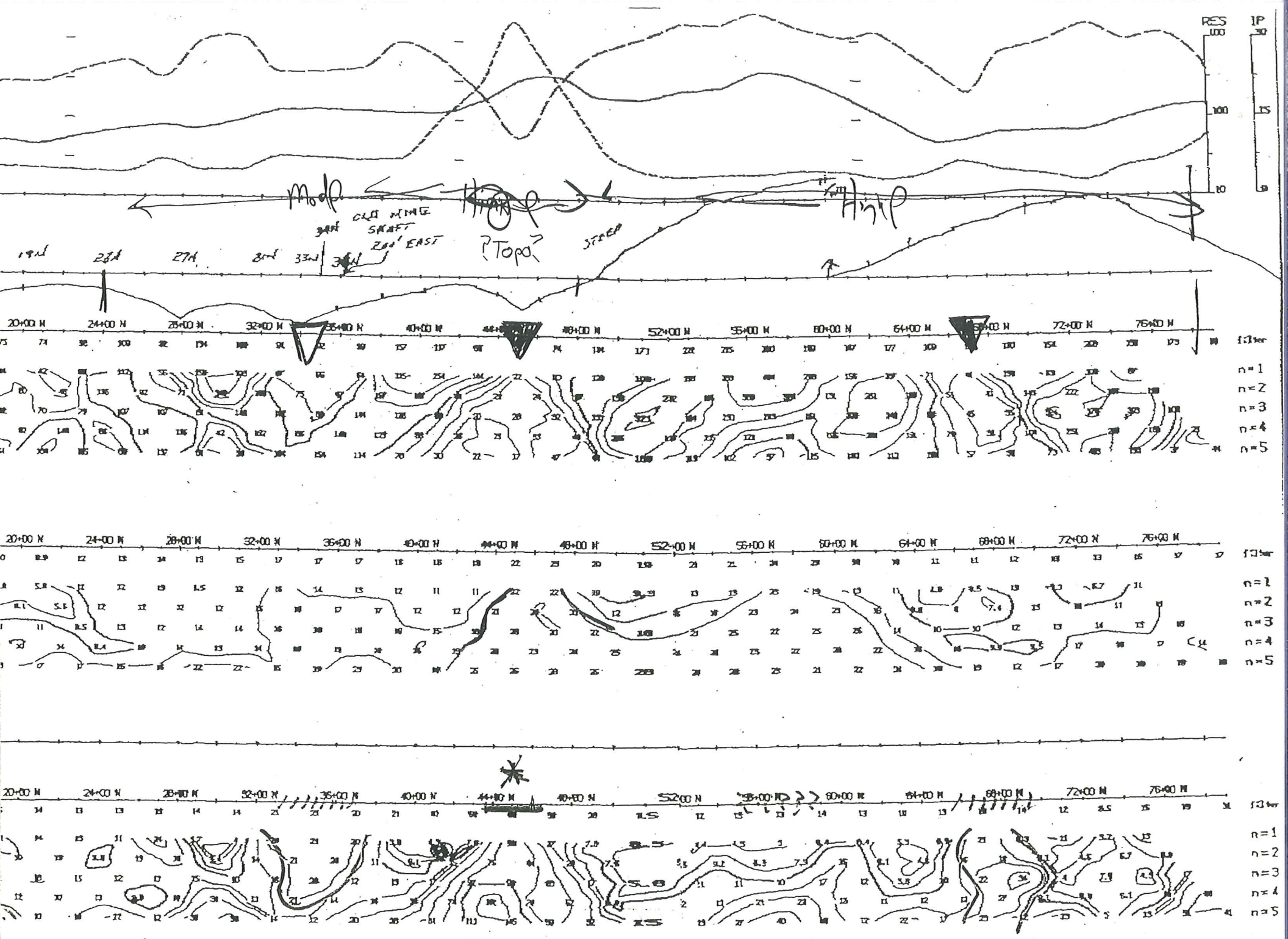
PI

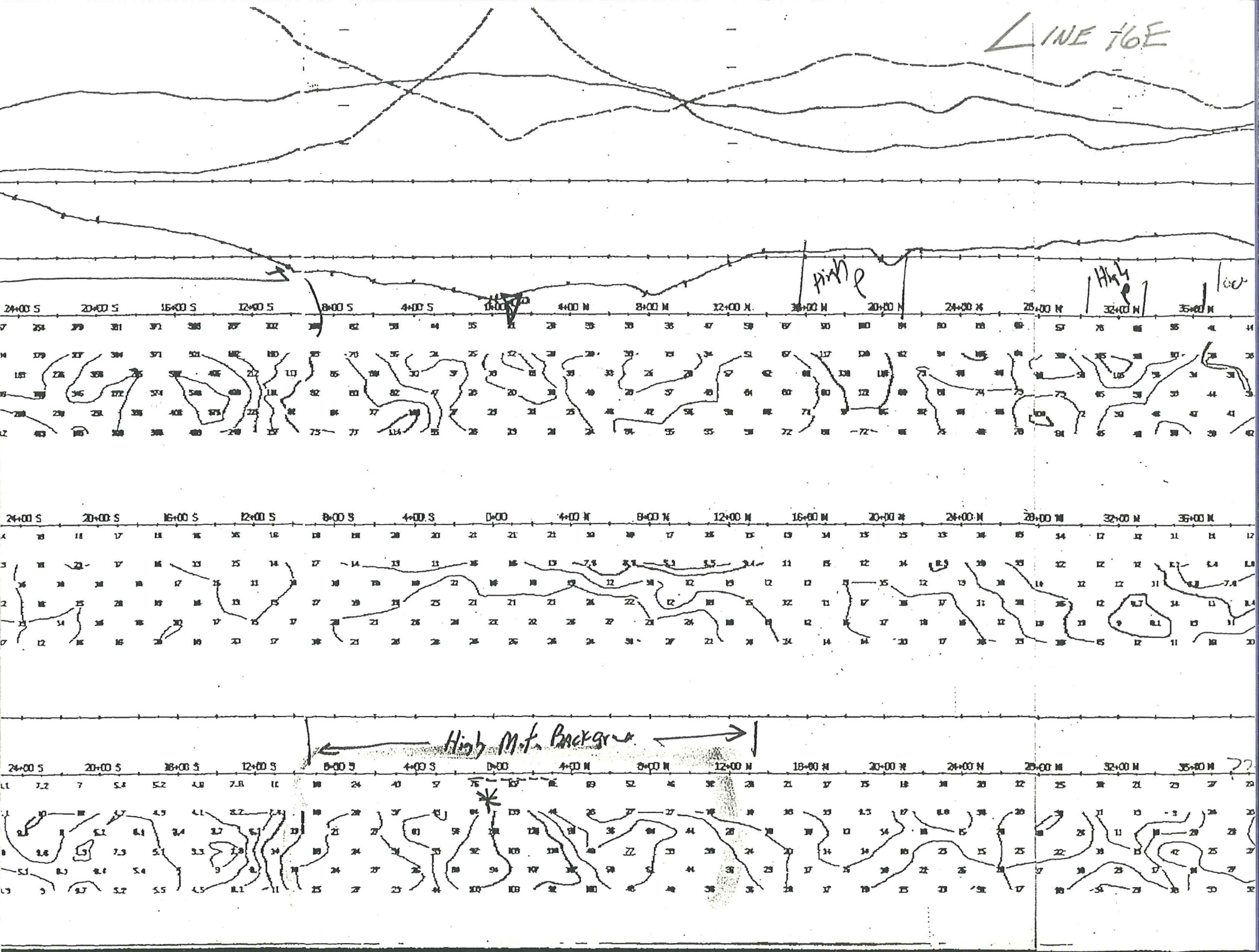
LINE 73E



POLE SOURCE?


IP
RES
High ρ
L20E
filter
n = 1
n = 2
n = 3
n = 4
n = 5
High Background m.f.
Narrow, Shallow
? Deep Source


RES
IP
Mod
High
High
OLD MINE
MAIN SHAFT
200' EAST
?Topo?
STEEP
19N
28N
27N
3rd
33W
34W
20+00 N
24+00 N
28+00 N
32+00 N
36+00 N
40+00 N
44+00 N
48+00 N
52+00 N
56+00 N
60+00 N
64+00 N
68+00 N
72+00 N
76+00 N
n=1
n=2
n=3
n=4
n=5
Deep, Weak
Source
LINE 18E


LINE 16E
24+00 S
20+00 S
16+00 S
12+00 S
8+00 S
4+00 S
0+00
4+00 N
8+00 N
12+00 N
16+00 N
20+00 N
24+00 N
28+00 N
32+00 N
36+00 N
High
High
High M.t. Background

PHIL,

HERE IS A SYNOPSIS OF THE RESISTIVITY CALCULATION BEING USED BY MERTENS & MACNEIL. WE HAVE BEEN RECEIVING PRELIMINARY COPIES TO DATE AND FINALS ARE BEING TRANSMITTED. THIS WAS A CONVENIENCE FROM THEM WHICH THEY REGRET DOING. OBVIOUSLY, THINGS HAVE CHANGED BUT DONT PANIC — THIS DOES NOT MEAN THAT ALL THE DATA IS BAD.

FROM NOW ON, WHEN A PLOT IS FINAL, IT WILL BE NOTED AS SUCH. THE FOLLOWING PLOTTING CONVENTIONS WILL BE USED.

1. RESISTIVITIES IN OHM-M.
2. SCALE 1:6000, 1"=500'
3. TOPO PROFILES TO AID IN RESISTIVITY INTERP.
4. STANDARD 1K WEIGHT, PANT-LEG FILTER WILL BE APPLIED - OTHERS CALCULATED LATER - UPON OUR ADVICE

NOTE - ANOMALY ON LINE 22 WAS DOUBLE CHECKED AND FOUND TO BE SPURIOUS. ~~SINCE WE WON'T BE CHAN~~

SINCE WE WON'T BE CHANGING ANY ~~SURVEY~~ SURVEY SPECIFICATIONS, JUST WAIT UNTIL YOU HAVE FIVE-SIX FINAL PROFILES BEFOR YOU GET TO INVOLVED IN INTERP.

CRAIG