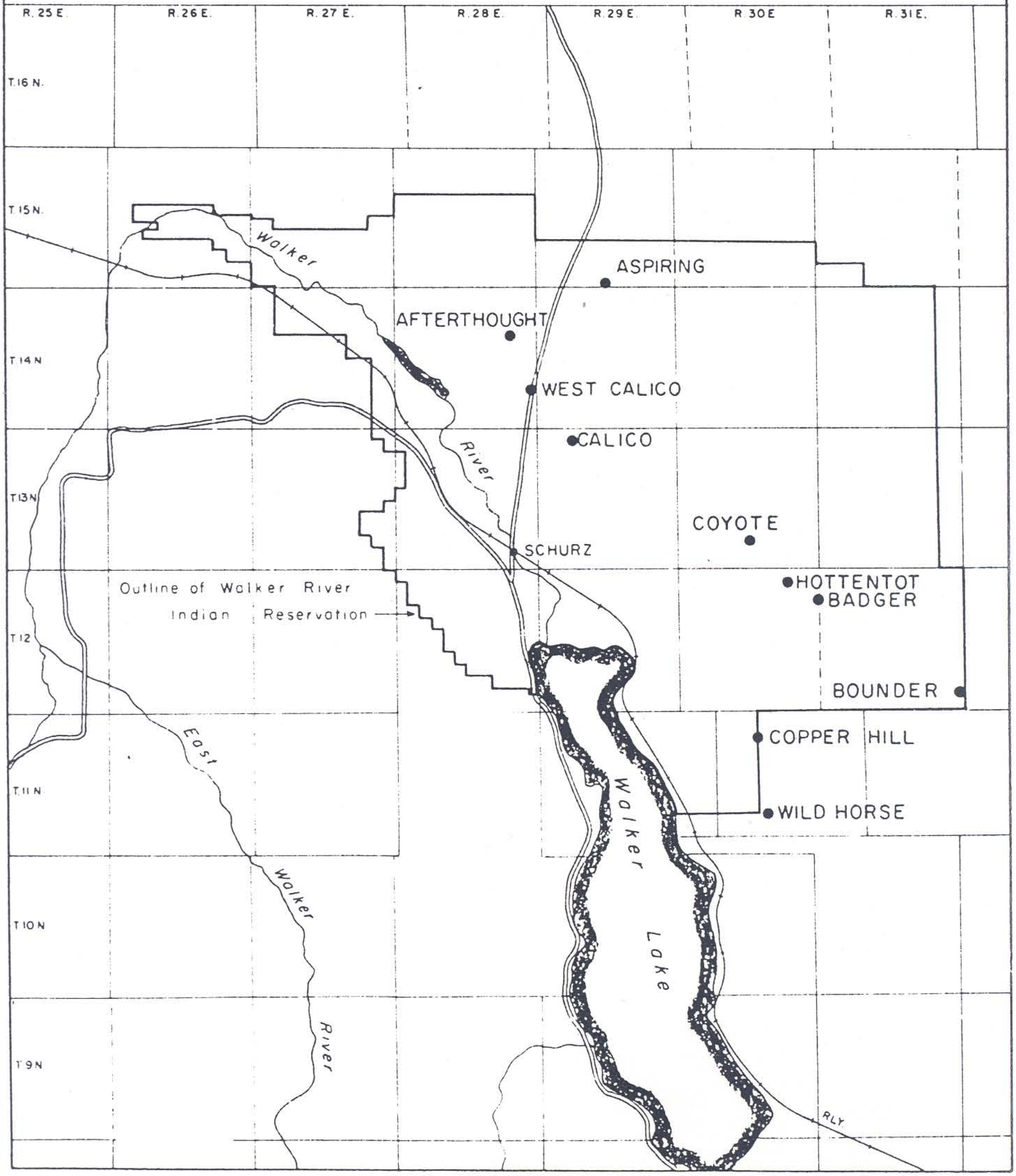
6000 0142 (0890)

WALKER-MARTEL MINING COMPANY

PROSPECT LOCATIONS FOR GEOPHYSICAL

SURVEY PROGRAMS

LOCATION MAP



6000 0142 (0890)

#14

MEMORANDUM ON THE
INDUCED POLARIZATION RESULTS
FROM
ASPIRING PROSPECT
WEST CALICO PROSPECT
BADGER PROSPECT
FOR
WALKER-MARTEL MINING CO.

5

FOR GOVERNMENT USE ONLY

#14

McPHAR GEOPHYSICS LIMITED

MEMORANDUM ON THE

INDUCED POLARIZATION RESULTS

FROM

ASPIRING PROSPECT

WEST CALICO PROSPECT

BADGER PROSPECT

FOR

WALKER-MARTEL MINING CO.

At the end of the program of geophysical exploration recently carried out in Mineral County, Nevada for Walker-Martel Mining Company, reconnaissance test lines were surveyed in three areas. The results from these three lines have been drafted into final form, but a formal report has not been prepared; the results will be described here.

Aspiring Prospect

The apparent resistivities on this line are moderately low, but the IP results are quite reliable. Two weak anomalies are indicated, and parallel lines should be surveyed.

West Calico Prospect

The surface resistivities are low at the center of this line, There are some definite IP effects measured at depth at the eastern end of the line. These results should be extended, and parallel lines should be covered.

Badger Prospect

The apparent resistivities are very low in this area. The anomalous value at 0+00 should be checked with 100 foot spreads.

None of the anomalous effects located on the three lines above are as important as those at the Afterthought, Wildhorse Canyon or Copper Hill. However, some detail is warranted.

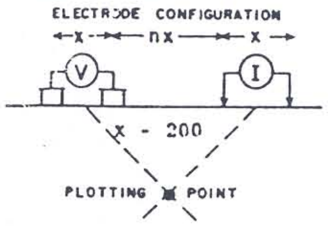
McPHAR GEOPHYSICS LIMITED

Philip G. Hallof (per RAB)

Philip G. Hallof,
Geophysicist.

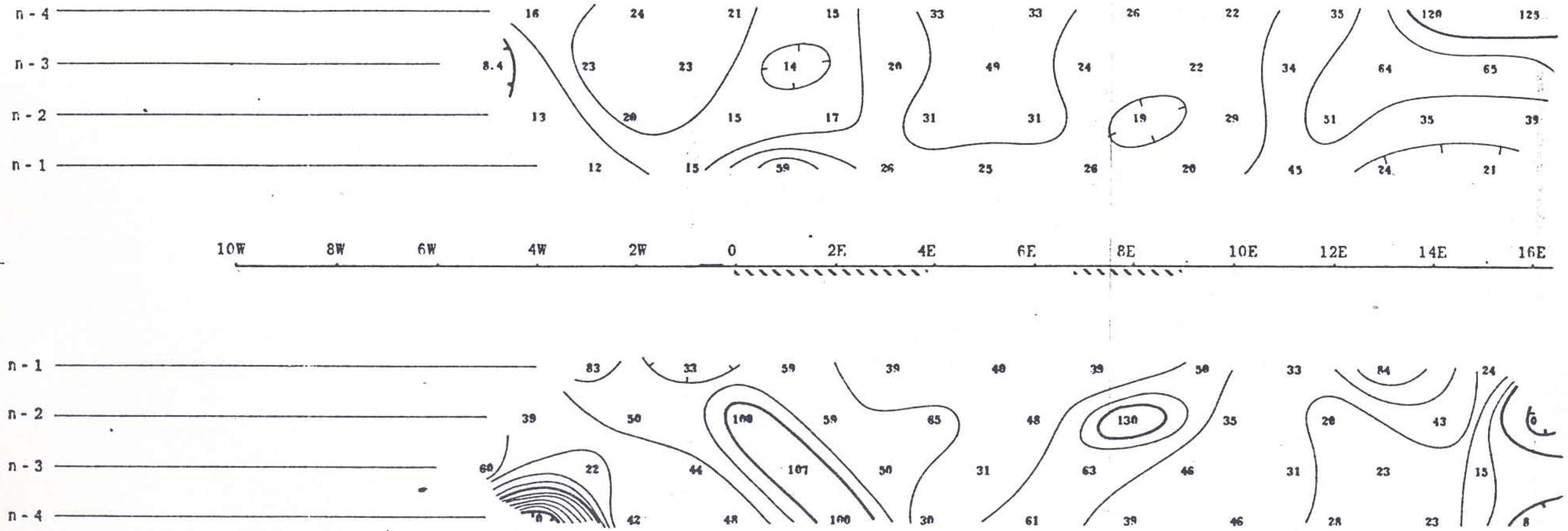
Dated: February 23, 1966

6000 0142 (0890)



McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY



WALKER-MARTEL MINING COMPANY

ASPIRING PROSPECT, MINERAL CTY., NEVADA - U. S. A.

Scale – One inch = 200 Feet

NOTE LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

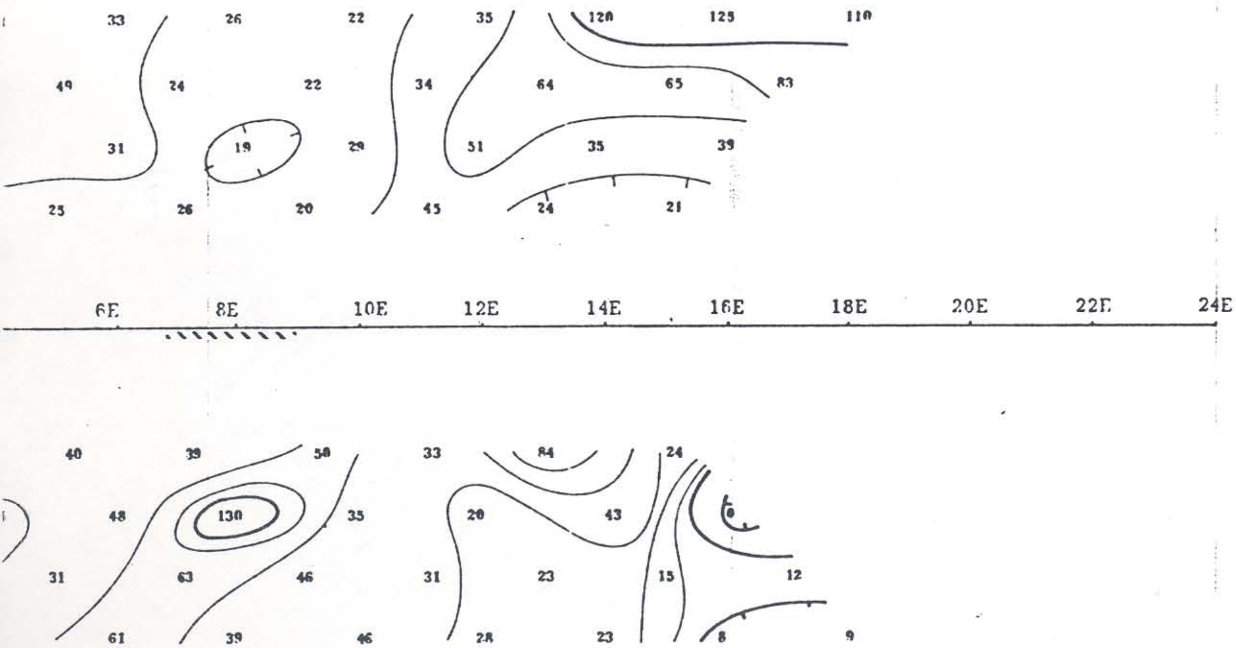
6000 0142 (0890)

DWG. NO.- I.P.-

? GEOPHYSICS LIMITED

-ARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100



$\rho a/2\pi$
(OHM FEET)

(M.F.) a

LINE NO.-O

-MARTEL MINING COMPANY

OSPECT, MINERAL CTY., NEVADA - U. S. A.

Scale - One inch = 200 Feet

NOTE LOGARITHMIC CONTOUR INTERVAL

FREQUENCY 0.05 - 1.25 CPS

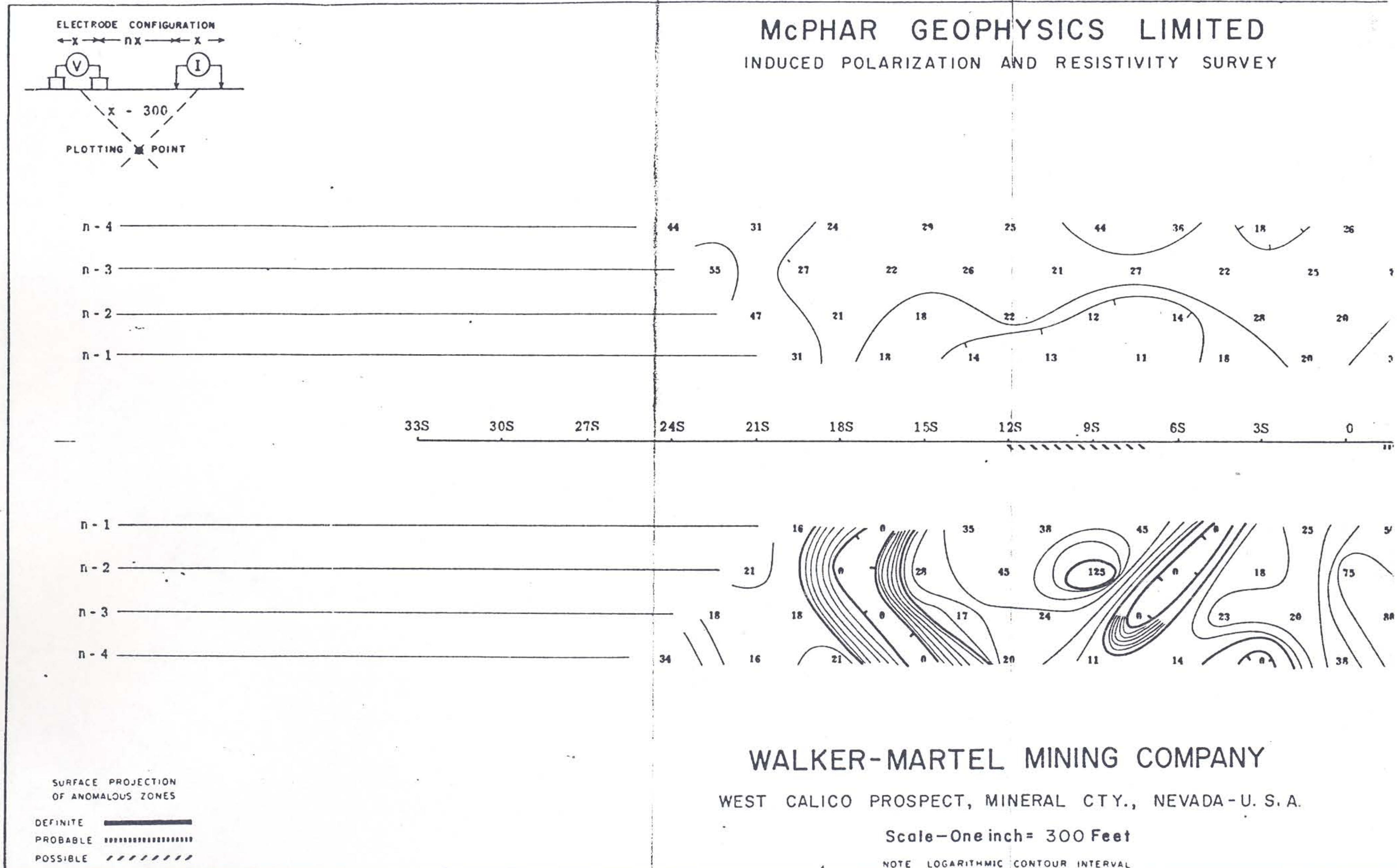
DATE SURVEYED JAN. 1966

APPROVED J. M. B.

DATE Feb. 23, 1966

GEOPHYSICS

6000 0142 (0890)



McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

WALKER-MARTEL MINING COMPANY

WEST CALICO PROSPECT, MINERAL CTY., NEVADA - U. S. A.

Scale—One inch= 300 Feet

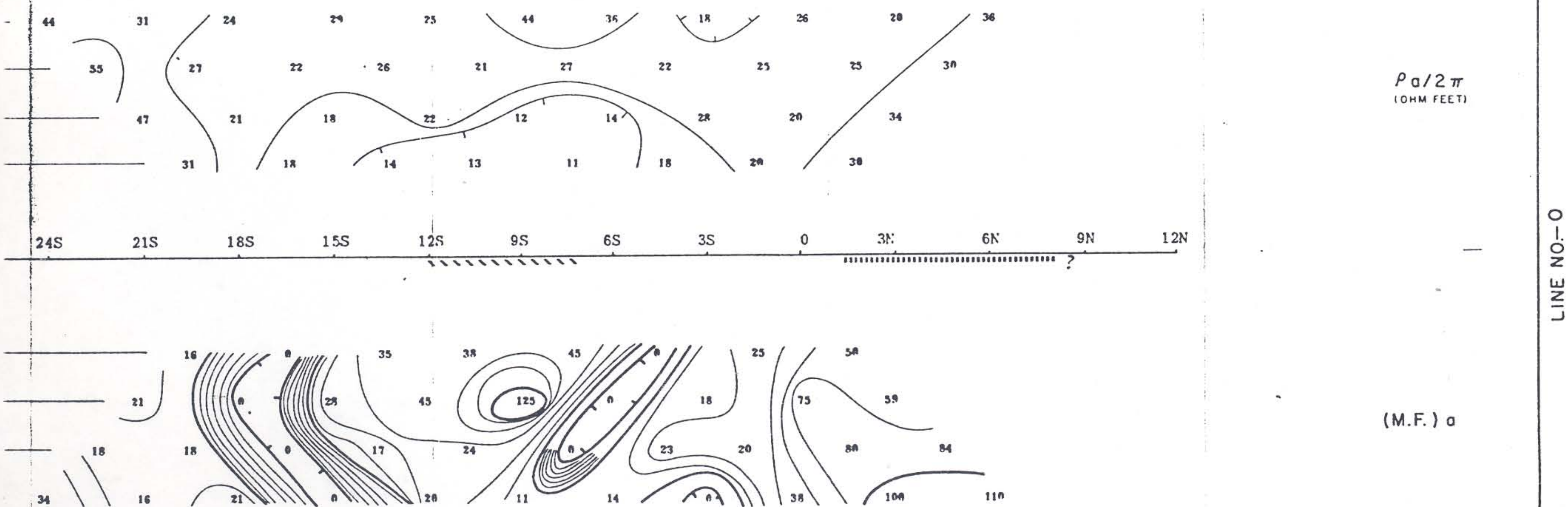
NOTE LOGARITHMIC CONTOUR INTERVAL

6000 0142 (0E90)

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100



WALKER-MARTEL MINING COMPANY

WEST CALICO PROSPECT, MINERAL CTY., NEVADA-U. S. A.

Scale–One inch= 300 Feet

NOTE LOGARITHMIC CONTOUR INTERVAL

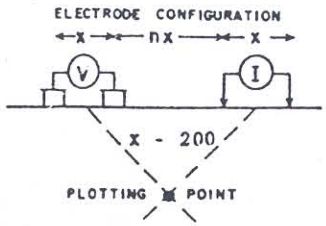
FREQUENCY 0.05–1.25 CPS
DATE SURVEYED JAN. 1966
APPROVED J.M.B.
DATE Feb. 23, 1966

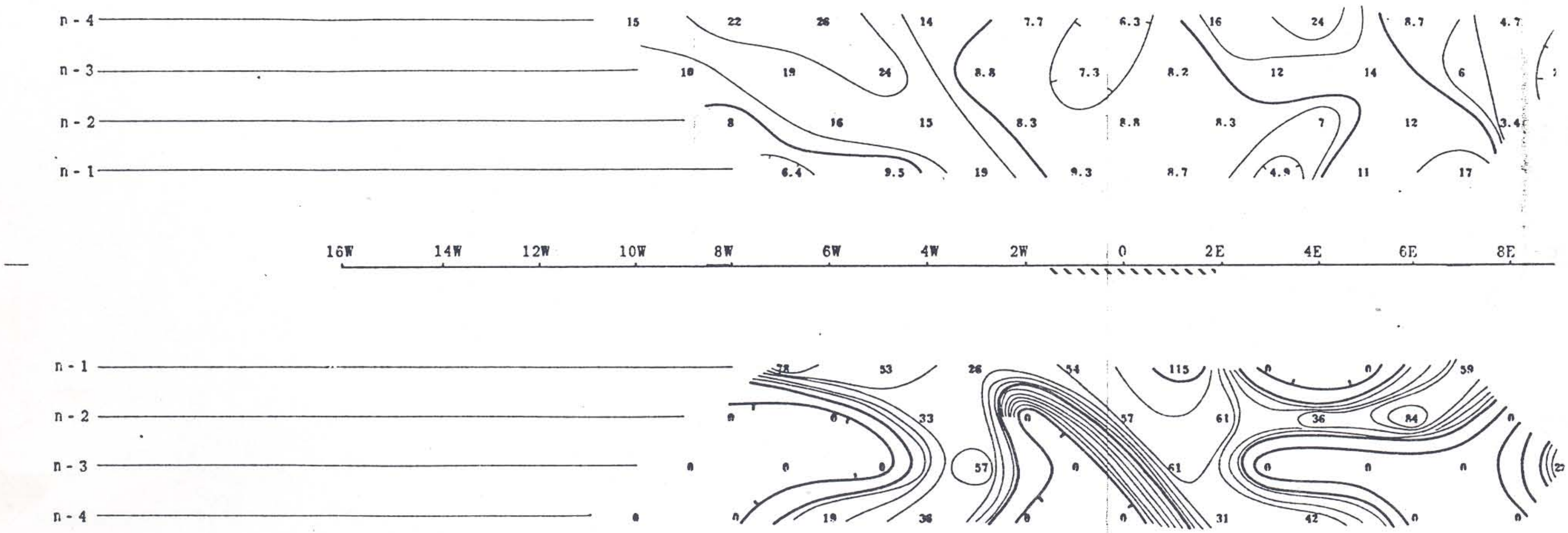
McPHAR GEOPHYSICS

6000 0142 (0890)

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY





WALKER-MARTEL MINING COMPANY

BADGER PROSPECT, MINERAL CTY., NEVADA - U. S. A.

Scale—One inch = 200 Feet

NOTE LOGARITHMIC CONTOUR INTERVAL

SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

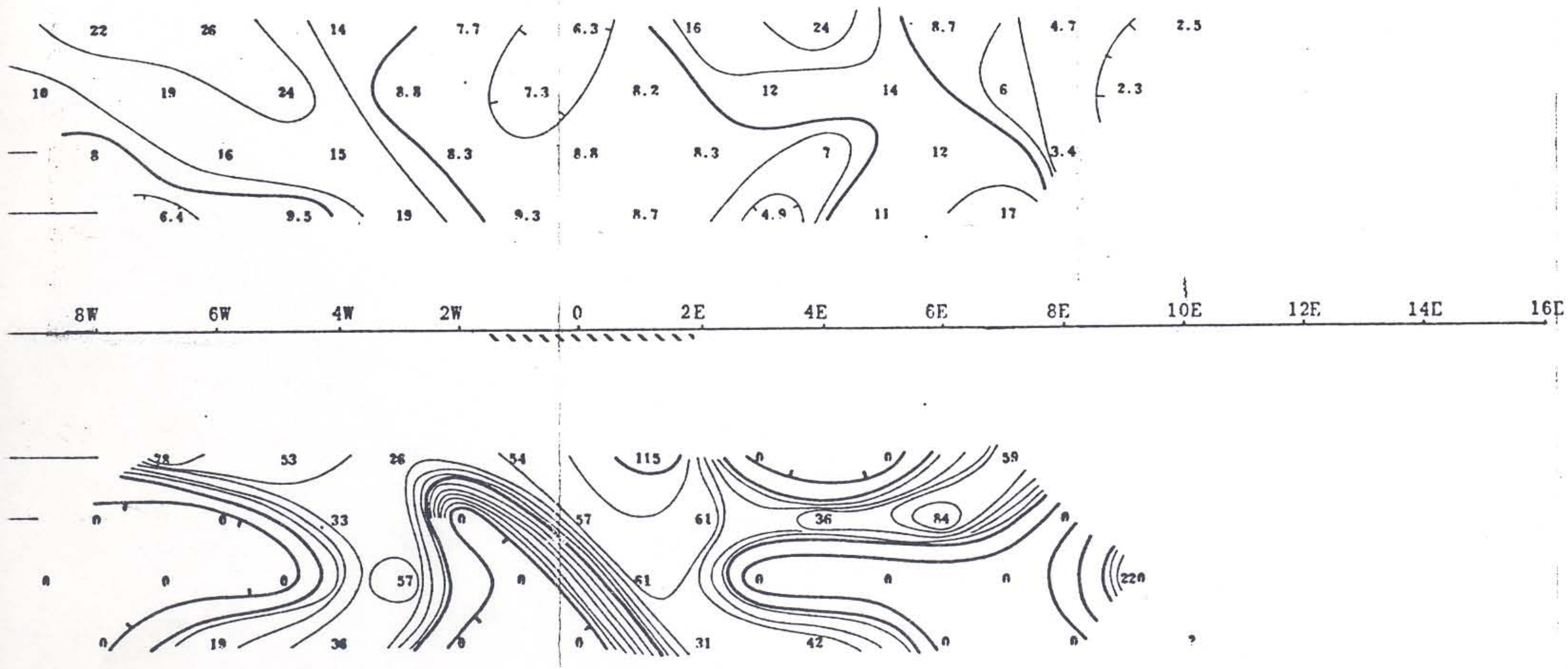
6000 0142 (0890)

DWG. NO.-I.P.-

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100



$\rho a/2\pi$
(OHM FEET)

(M.F.) a

LINE NO.-0

WALKER-MARTEL MINING COMPANY

BADGER PROSPECT, MINERAL CTY., NEVADA - U. S. A.

Scale-One inch = 200 Feet

NOTE LOGARITHMIC CONTOUR INTERVAL

FREQUENCY 0.05-1.25 CPS

DATE SURVEYED JAN. 1966

APPROVED J.M.B.

DATE Feb. 23, 1966

SPEED MESSAGE

6000 0142 (0890)

MR. William L. Wilson
2685 Thomas Jefferson Dr.
Reno Nevada

DEC 1965 through JAN 1966 McPhar I.P SURVEY. WALKER INDIAN RESERVATION

DATE MAR 9 19 66

Attached you will find copies of the following reports:

1. Supplementary Report, I.P. & Res. Results Afterthought Prospect.
2. I.P. and Res. Survey Copper Hill & Wildhorse prospects.
3. Memorandum on the I.P. results; Aspiring, West Calico, Badger Prospects.

After examining the data I would appreciate your recommendations for further I.P. programs.

SIGNED R. L. Redmond

3 copies (attach to each report)

#17
6000 0142 (0890)

Report on

ANALYSIS OF GEOPHYSICAL DATA FROM THE WALKER RIVER INDIAN RESERVATION, MINERAL COUNTY, NEVADA

PROPRIETARY

By

John S. Sumner

For

OCCIDENTAL INTERNATIONAL CORPORATION

November, 1966

728 N. Sawtelle
Tucson, Arizona 85716

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Analysis of Geophysics on the Walker River Reservation, Mineral County, Nevada

Introduction

The purpose of this examination is to give an independent opinion on geophysical aspects of exploration that has been done on this property. Also, to interpret the results of past programs and to suggest further geophysical work, if necessary. Of course the final goal of exploration is to develop and exploit the economic mineral potential of a region. The role of geophysics is to assist the exploration process, in both direct and indirect applications of surveying methods to subsurface problems.

Practically all of the current geophysical maps, reports, and pertinent exploration information seem to be available for this review.

The data are generally in good order, and most of the preliminary geophysical maps and profiles have been done in a professional manner. Reputable contractors such as Aero Service Corporation and McPhar Geophysics Limited have been called upon for their specialized services. Reliable geophysical instruments such as the Jalander magnetometer appear to have been used for surveys. This reviewer has confidence that if original field data sheets were examined, they would also be in rather good order. Many of the maps and profiles produced in this effort do not have a finished appearance; however they are adequate for field planning purposes.

Broadly speaking, geophysical methods are effective in two categories of mineral exploration; for regional studies of large areas, or to supply local and detailed information about specific areas of interest. This procedure corresponds to similar geological approaches, and the geophysical results of each must be integrated into the whole exploration picture.

Regional Geophysics

The principal purpose of regional geophysical exploration is to extend geologic mapping into covered areas, and into the subsurface. Direct discovery of economic deposits only very rarely results from regional geophysical surveying. Both geologic structures and lithology, on a large scale, can be inferred from regional geophysical mapping. Patterns must be carefully analysed and correlated to interpret linear features, structural intersections, and intrusive contacts.

On a per-square-mile cost comparison basis, regional geophysics compares quite favorably with geologic mapping.

The total intensity aeromagnetic coverage (1/3 mile spacing, 500 feet altitude) is adequate for preliminary examination of the Walker Reservation. Besides obvious value in direct location of magnetic iron deposits, it can also be used for:

A. Close comparison with regional geologic maps, to provide geologic information about covered and deeper zones.

B. Profile interpretation over specific mineralized areas of interest, to give depth and perhaps dimensions of magnetic bodies.

In order to accomplish (A) above, the regional aeromagnetic and geologic maps must be on the same scale, and preferably on the same base. It would be worthwhile to check on the accuracy of positioning of the aeromagnetic data. Consideration should be given to the remapping of all of this data by the original contractor on to a controlled base map.

Gravity exploration should be conducted over this entire reservation, on a regional basis, with from 1 to 4 stations per square mile. Additional surveying may be stimulated by this preliminary program. Existing topographic maps will suffice for elevation control; terrain corrections need not be made for the first review of these results. The previous gravity work near the Calico area is interesting, but is not really extensive enough to be useful. The magnitude of anomalies is indicated, however. Rock densities over the region should be heeded, for interpretation purposes. Volcanic rocks and the other earth materials in this region have a wide variety of density contrasts. Table 1 of this report is a compilation of laboratory measurements on drill core and hand specimens.

Physical Properties of Rocks

Geophysical instruments measure the physical properties of rocks and earth materials, and especially the contrasting difference in properties. Thus in evaluating or predicting geophysical results, one must know rock properties either by estimation, by in situ measurements, or by laboratory determinations.

Sixteen Calico area core specimens and eight surface samples submitted by Mr. R. L. Haxby were studied in the laboratory, results of which are shown in Table 1. IP measurements were made with a very low current density and frequencies of 0.3 and 3.0 cycles per second. The volume-percent amount of metallic mineral present was estimated visually, using a binocular microscope.

It can be noted that the rocks containing considerable magnetite give a large IP effect. This condition is not always the situation; magnetite sometimes gives only a minor IP effect. Laboratory resistivities are not as low as observed in the field.

TABLE 1

PHYSICAL PROPERTIES OF CALICO AREA ROCKS

Drill Core	Sp. Gr.	Resist.	PFE	Metal Factor	Est. Vol % Mag.	Est. Vol. % Sulf.
CA-1 1641'	3.91	198	143	720	50	5
2628'	4.64	163	125	770	90	2
3200'(a)	2.91	1,500	11	7	4	2
3200'(b)	2.80	15,100	4.8	0	1	—
CA-2 1440'	2.55	736	1.6	2	—	1
2061'	2.63	47,300	7.3	0	—	2
CA-3 1941'	2.40	628	4.0	6	½	½
2875'	2.71	28,900	1.3	0	—	1
3055'	2.80	9,110	8.2	1	—	3
3085'	Shattered				—	10
3414'	2.67	1,150	178	155	75	5
?	3.90	305	112	368	60	15
CA-4 1423'	2.57	2,820	2.5	1	—	1
2114'	3.44	190	58	305	40	1
CA-5 1330'	3.70	500	205	410	50	6
2150'	3.66	634	67	106	50	2

Hand Specimens	Sp. Gr.	Resist.	PFE	Metal Factor	Est. Vol % Mag.	Est. Vol. % Sulf.
A by CA-2	2.6	424	1.2	3	1	
B by CA-1	2.5	1,700	1.3	1	1	
C on CA-1	1.8	521	1.7	3	—	
D N of CA (?)	1.9	71	4.8	68	2	
D_2 or 20?	1.8	169	2.0	12	—	
E ridge	2.7	10,400	1.4	0	—	

Calico Area Ground Magnetics

Magnetic surveying here has provoked discovery and guided drilling, and can be further interpreted to some advantage. The magnetic anomaly is largely due to deeper, near-ore grade magnetite, but this occurrence is partially masked by quantities of magnetite in the nearer surface volcanics. The near surface magnetite gives rise to short wave-length anomalies which can be smoothed or filtered out to leave the residual field, which has a deeper origin.

This writer has smoothed the vertical intensity ground magnetic data, using a line-integral technique of a two-dimensional magnetic field in profile. Then the anomaly curve can be analyzed by the method of S. Parker Gay, Jr., which has been published in Geophysics, v. 28, n. 2, p. 161-200, titled "Standard Curves for Interpretation of Magnetic Anomalies Over Long Tabular Bodies".

Study of the corrected profiles indicates that the magnetite body encountered by drill holes CA-1, 3, 4, and 5 is probably caused by a steeply dipping irregular tabular body. The actual width of the body at the basement surface is less than the depth of burial, which makes true shape prediction difficult. Even after filtering it is evident that the subsurface form of the body is not regular.

Any remanent magnetism of the body is an important but presently unknown factor in the complete interpretation of this problem.

The variation in iron assay of drill core gives a measure of the inhomogeneity of the body. Hole CA-2 was drilled too far southwest to encounter the magnetite. However, the magnetic material should be fairly continuous between CA-3 and CA-4, a distance of 5700 feet. There probably is a short offset, or northeast trending intrusive dike, located about 1000 feet northwest of CA-1 and CA-5, which is the only apparent interruption in the deposit.

Only a crude estimate of tonnage and grade can be made on this body at the present time. It appears that this deposit potentially contains about 200,000 tons of 30 percent iron per vertical foot, within the basement, based on drilling results and the magnetic anomaly. This estimate assumes the deposit to be 5700 feet long and 400 feet wide, using a density of 3.2 gm/cc (10 cu. ft./ton) for the ore.

Copper Values in Drill Hole CA-3

Between depths of 2775 and 2905 feet in CA-3, a distance of 130 feet, the copper content averages almost 0.8 percent, which is impressively high. Unfortunately, geophysical methods are usually not practical in exploration for low sulfide rocks at this depth.

Further drilling on the Calico prospect, after the gravity survey, should be done first on this end of the deposit, to expand information about trends of this interesting discovery. Possibly later drill hole geophysics will be useful in holes in this area.

The laboratory IP measurement on a core specimen from 2875 feet gave a rather small (1.3 percent) frequency effect with a high resistivity (28,900 ohm-ft), and the metal factor is neglibibly small. However this sample may not be typical of this section with the fairly good copper assay.

Calico Induced Polarization Results

The Calico deposit is too deep to be explored in detail by IP surveying. The surface volcanic rocks have a high background IP response. Inductive coupling, caused by large electrode intervals, low resistivities, and higher frequencies, also limits the method. Resolution of detail is lost in the necessarily wide electrode spreads.

No further IP work is suggested here at this time.

Calico Seismic Studies

The reflection and refraction seismic results provided by J. W. Cooksley, Jr. are interesting, and give some structural information about the geologic setting. However this is rather expensive exploration for routine work, and will not directly locate mineralization.

No further seismic studies are suggested on the Walker Reservation properties.

Calico Gravity Surveying

Gravity surveying, consisting of several profiles coinciding with the ground magnetic traverses, should be done over this deposit. Readings can be taken at about 200 foot intervals on profiles about 800 feet apart. For initial expediency, elevations can be taken from USGS topographic maps, but station locations should be marked. Surveyed elevation control would be desirable later.

The gravity data will considerably aid interpretation of the structural geology of the deposit, giving a better idea of dip of the body, presence of faulting, and lithologic contrasts.

It is suggested that gravity surveying be completed and analyzed into the exploration plan before further drilling be done on the Calico prospect.

Afterthought Surveys

Most of the geophysical effort on this prospect has been in induced polarization surveying, consisting of a number of line miles of traverse. The observed IP anomaly length is about 1½ miles and the width is about 500 feet, becoming broader to the southwest. This feature looks interesting, from the standpoint of its IP response, and was certainly worth drilling.

The Afmag, self potential, magnetometer, resistivity, and IP surveys on the Afterthought zero line make a worthwhile study in the characteristics of these exploration techniques. Geochemical results near the drilled section are also noteworthy.

Diamond drill and detailed geological data are not readily available to the writer at this time, but apparently initial results are not too favorable. Additional drilling may be warranted, which will eliminate the possibility of a missed ore zone between existing holes.

Hottentot Surveys

This geologically complex group of small iron deposits apparently does not have a simple, straightforward exploration solution. Except in the Main Hottentot area, outcrops are fairly numerous and detailed geological mapping has been done.

The magnetic surveying over the whole area does not seem to have picked out any obvious additional drill targets. The erratic correlation of drill results and magnetic anomalies indicates the complexity of the problem here. Remanent magnetism probably causes some difficulty in interpretation of magnetic results.

IP surveying cannot be predicted to be uniquely successful near any of these known iron occurrences.

Coverage of the entire area, in the search for copper sulfides, would be rather expensive. However, if there are thought to be geologically favorable sulfide areas, away from magnetic anomalies, IP traverses should be run on them.

Gravity prospecting over the Hottentot area may possibly assist in exploration here, in an indirect manner, by adding information to the geological map. Otherwise, further development of the ore zones can best be carried out by geological analysis and further drilling.

Bounder, Copper Hill, Wildhorse Canyon, and Coyote Areas

Partially complete maps of these areas show that several line miles of IP surveys were evidently run on the first three of these prospects. A magnetic survey showing a strong gradient striking east-west, indicating a near surface contrast in magnetic properties. There is not enough information at hand for this writer to comment further on these explorations.

Conclusions and Recommendations

Geophysical data from the Walker River Indian Reservation have been reviewed and found in good order.

Regional gravity surveying would contribute quite a bit of additional information, which when correlated with the geologic and aeromagnetic maps may point out economic deposits. The aeromagnetic data could be recompiled by the contractor, on to a controlled base with the same scale as the gravity and geologic maps.

The Calico deposit has a large potential in terms of iron units, and gravity surveying will assist its further evaluation. Additional IP and seismic work need not be considered here, at the present time.

Gravity may also be useful on the Hottentot prospect, although this is more a problem area for geological development than geophysical exploration. IP would be effective if there are targets in alluvial covered areas away from magnetite bodies.

John S. Sumner

John S. Sumner

November 25, 1966