4328

GEOPHYSICAL REPORT

ON AN

INDUCED POLARIZATION SURVEY

ALAMO CLAIM GROUP

HIGHLAND VALLEY AREA, KAMLOOPS M. D., B. C.

AUGUST, 1972

92I/6E, 7W

ALAMO CLAIM GROUP:	19.5 miles N30W of the town of Merritt, B.C.
:	50° 121° SW
N.T.S. :	92 I/6E, 7W

Written for: San Jacinto Explorations Ltd
3513 West 31st Avenue,
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by: David G. Mark,
Geophysicist
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August 31, 1972

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SUMMARY

An induced polarization survey was completed over three survey lines on the Alamo claims in the Highland Valley area, B.C. during August 72. The objective was to delineate anomalous zones that would correlate with the VLF-EM and magnetic survey results and therefore would become possible zones of sulphide mineralization.

The chargeability results were quite low but some definite and possible anomalies were outlined. One definite anomaly was felt to be caused by magnetite within a shear zone. A possible anomaly was probably partly caused by magnetite and possibly also by sulphides. However, since all anomalies are found near or on outcroppings of quartz diorite, the cause could easily be only relatively thin or no overburden. The resistivity results were sporadic and correlated poorly with the IP results. The SP results were felt to be close to background.

CONCLUSIONS AND RECOMMENDATIONS

It is felt that the IP anomalies found on the three reconnaissance lines are too questionable as to their being indicative of sulphides and therefore do not warrant any diamond drilling.

The induced polarization survey should be continued further south onto the San Jose claims. The geology is favourable, and the results of the VLF-EM and magnetic surveys are encouraging. However, it is recommended that a more powerful induced polarization instrument be used. Though it is felt that the instrument measured to bedrock on the Alamo claims, possible deep overburden on the western part of the survey area may have masked the results.

It is also recommended to do depth profiles by the seismic method at spot locations over both the Alamo claims and the San Jose claims. This will give a good indication as to what to expect on any further IP results and therefore should be done previous to the IP survey.

Respectfully submitted,
GEOTRONICS SURVEYS LTD

David G. Mark
Geophysicist

August 31, 1972

GEOPHYSICAL REPORT

ON AN

INDUCED POLARIZATION SURVEY

HIGHLAND VALLEY AREA, KAMLOOPS M.D., B.C.

INTRODUCTION AND GENERAL REMARKS

This report discusses the procedure, compilation, and interpretation of an induced polarization survey carried out over the Alamo claim group during August, 1972.

The field work was carried out by Wilfred Krupp and three assistants and was carried out over three lines which were about 4,000 feet each.

The object of the survey was to locate IP anomalous zones that would correlate with the results of previous work and therefore would be possible zones of disseminated or fracture-filling copper mineralization.

Much of the physical description of the property, including geology, has been given in the writer's previous report dated May 12, 1972 on a magnetic and electromagnetic survey carried out over the Alamo group in May, and is therefore not repeated here. However, the locaion map and claim map are included at the end of this report.

SUMMARY OF SURVEY RESULTS - MAGNETICS AND VLF-EM:

The data from the magnetic survey on the Alamo claims was much quieter than that of the adjacent survey area on the San Jose claims to the south. Two anomalous highs correlated directly with two VLF-EM conductive zones, A and B. These two zones are a continuation from the VLF-EM zones A and B on the San Jose Survey. A new zone named F, was revealed. The VLF-EM zones are likely caused by shears and/or faults.

INSTRUMENTATION AND THEORY

The instrument used was a Geotronics Model A-2 portable time-domain pulse type manufactured by Geotronics Surveys Ltd. of

Vancouver, B.C. A 12-volt lead acid storage battery (rechargeable) was used as a power supply. This unit has a transmitter power output of 300 watts normal and up to 400 watts with fully charged battery. Output voltage is 400, 800 or 1,200 volts (400 used almost exclusively in this survey) with selection by a switch. The time of pulse length is 1 to 12 seconds, variable, delay time is 250 milliseconds and integration time is 1 second. The self-potential buckout is operated manually by a ten turn precision pot with a range of $\pm$ 1 volt.

There are basically two methods of IP surveying, frequency-domain and time domain. Both methods are dependent on a current flowing across an electrolyte-electrode interface or an electrolyte-clay particle interface, the former being called electrode polarization and the latter being called membrane polarization.

In time-domain electrode polarization, a current is caused to flow along electrolyte-filling capillaries within the rock. If the capillaries are blocked by certain mineral particles that transport current by electrons (most sulphides, some oxides, graphite), ionic charges build up at the particle electrolyte interface, positive ones where the current enters the particle, and negative ones where it leaves. This accumulation of charge creates a voltage that tends to oppose the current flow across the interface. When this current is stopped the created voltage slowly decreases as the accumulated ions diffuse back into the electrolyte. Thus is produced the induced polarization effect.

In membrane polarization a similar effect occurs. A charged clay particle attracts opposite charged ions from the electrolyte in the capillary around the particle. If a current is forced through the capillary, the charged ions are displaced. When the current is stopped, the ions slowly diffuse back to the same equalibrium state as before the current flow. This explains IP anomalies where no metallic-type minerals exist.

Frequency-domain IP is based on the fact that the resistance produced at the electrolyte-charged particle interface decreases with increasing frequency. Two parameters commonly used for measuring frequency-domain induced polarization are frequency effect and metal factor. The one used for time-domain measurements is chargeability (as in this survey).

In the process of carryin g out an IP survey, two other geophysical methods are used and measured. These are self-potential (SP) and resistivity. The SP, its phenomenon described in the following paragraph, must be nulled by the IP receiver in order to obtain accurate IP measurements. The resistivity value is calculated from the voltage and current readings obtained while measuring the IP effect and therefore can be utilized to determine how resistive (or conductive) the ground is.

Self-potentials are produced in the crust of the earth from a variety of processes that are chemical, physical and electromagnetic inductive. Sulphide bodies produce a potential from chemical processes that range in magnitude from a few tens of millivolts to several hundred millivolts and, in rare cases, above 1,000 millivolts. The causes of sulphide self-potentials is not fully understood or agreed upon by geophysicists. However, the more accepted theory is that this 'battery action' is caused by a difference in pH in the upper ground water electrolytes (more acidic) and the lower ground water electrolytes (less acidic) and is abetted by the oxidation of sulphides near the surface forming acids that, therefore, increase the contrast. The current caused by the potential flows from the apex of the sulphide body to some point at depth (terminus of deposit or point of minimum acidity), into the wall rock, back to the surface and back into the sulphide apex. A negative pole is thus created at ground surface and, therefore, except for a few rare cases, sulphide bodies are reflected by negative anomalies.

The gradient of the self-potential (millivolts/electrode spacing in feet) is what is measured in an IP survey.

SURVEY PROCEDURE

The IP survey was carried out over the pre-existing grid in which lines were cut out at 400-foot intervals, well-blazed, and picketed at 200-foot intervals. The cut-out survey lines run in an east-west direction and the base-line also cut-out, blazed, and picketed runs in a north-south direction. This was the same grid over which the VLF-EM and magnetic surveys were run.

To carry out the IP survey, the 3-electrode array was used. Here, three electrodes are moving and the fourth is stationary at an 'infinite' distance from the other three. The first two are potential electrodes followed by the two current electrodes.

Distance between the first and second potential electrode and the second potential electrode and the moving current electrode is equal and is called the 'a' spacing. The distance between the moving current and the stationary current electrode must be greater than 5a. In this survey, the 'a' spacing was 400 feet.

Non-polarizing, unglazed, porous pots with a copper electrode and a copper sulphate electrolyte were used for the potential electrodes. Aluminum foil was used for the current electrodes. Steel stakes could not be used since rocks in the overburden afforded only a little penetration and therefore prevented a good contact with the ground. The charge time for each reading throughout the survey was seven seconds and the voltage used to drive the current into the ground was 400 volts.

TREATMENT OF DATA

1. Induced Polarization

The IP results were normalized by dividing the integrated IP reading in millivolt second by the impressed emf (or primary voltage) in millivolts and multiplied by 1000 to get what is generally referred to as chargeability in millivolt seconds/volt or milliseconds. These results were then plotted on sheet 1 and profiled on sheet 4.

2. Resistivity

To get the resistivity value in ohm-meters, the primary voltage is divided by the current and multiplied by 1532 meters (which is a geometric factor peculiar to the 3-electrode array with an electrode spacing of 400 feet). The results were then plotted on sheet 2 and profiled on sheet 4 with the chargeability data.

3. Self-potential

SP readings from an IP survey are often erratic because of the residual voltage left in the ground from previous IP pulses and therefore do not reflect the true ground potential. For this reason, it is meaningless to calculate and plot the self-potential from the self-potential gradient readings and often, the gradient readings themselves add little to the geological picture.

However, since the SP readings have had a definite value on some previous surveys interpreted by the writer, they were plotted on sheet 3 and profiled with the chargeability and resistivity on sheet 4.

DISCUSSION OF RESULTS

It appears from studying the chargeability (IP) profiles, that the background is different for each line. It is difficult to say what this is caused by. It could be better soil conditions permitting a deeper penetration on L-32S, which has a higher background. However, the background was 'eyeballed' in on the profile for each line and from this the anomalies were taken and placed on sheet 1.

The chargeability (IP) results are fairly low but still appeared to show some anomalous conditions. Two more definite small anomalies are shown on L-32S, a possible anomaly on L-44S, and two small possible anomalies on L-56S.

The eastern anomaly on L-32S correlates directly with a small magnetic high as well as VLF-EM anomaly B. Therefore, the IP anomaly could well be caused by magnetite introduced into a shear, as was discussed in the writer's previous report.

On L-44S, the intensity of the possible anomaly is very low, reaching an intensity of only 0.3 milliseconds. It occurs on

VLF-EM anomaly B and magnetic anomaly 2 and up to the eastern edge of VLF-EM anomaly A and magnetic anomaly 1. At least part of the cause could be due to sulphide mineralization associated with the two shear zones (or faults) and magnetite mineralization with shear zone B.

There is no correlation between the other three IP anomalies and magnetic or VLF-EM results. All of the IP anomalies except the western one on L-32S are close to bedrock and therefore may largely be caused by relatively thin or no overburden. According to Ian Morton, small amount of molybdenite and tetrahedrite mineralization was seen in all of these rock outcrops which are quartz diorite. This does not mean that the bedrock was not reached by the IP instrument in other places. Rather the high resistivity values are indicative of a granitic-type intrusion which is what underlies the property. Much lower resistivity values would be expected if just glacial till was being measured.

The interpretation of the resistivity results in an induced polarization survey are usually only considered in how they relate to the chargeability (IP) results. Most often what one looks for is a chargeability high correlating with a resistivity low. Chargeability highs with resistivity highs are sometimes indicative of economic mineralization but are often caused by intrusive stocks within volcanics or sediments and therefore are not usually looked upon as a sulphide source. Chargeability highs with background resistivity values could be important since this is the pattern on the Brenda Mines property north of Peachland.

On this survey, the resistivity results are sporadic and are therefore difficult to correlate with the IP anomalies. The intensity of the resistivity values are no doubt at least partly a function of overburden depth with the lower values being indicative of a greater thickness of overburden.

The SP results are all considered to be close to the background level. However, a small SP crossover does occur on the western edge of the eastern IP anomaly on L-32S. Also there is good continuity between the crossovers on L-44S and L-56S. Some of these crossovers appear to correlate with the VLF-EM anomalies and therefore could well be caused by magnetite, sulphide, or a geological contact associated with the shear zones.

Respectfully submitted,
GEOTRONICS SURVEYS LTD

David G. Mark
Geophysicist

August 31, 1972

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RESUME OF TECHNICAL AND FIELD EXPERIENCE

of

WILFRED W. KRUPP

EDUCATION

1962 - graduate of De Vry Technical Institute, Ontario

1961 - graduate of Togo High School, Saskatchewan

EXPERIENCE

1972 - Present - geophysical operator and crew chief for Geotronics Surveys Ltd. of Vancouver, B.C.

1965 - 1972 - electronics technician for Research Industries Ltd., Burnaby, B.C.

1962-1965 - Electronics Technician for C.T.S. of Canada Ltd., Streetsville, Ontario

GEOPHYSICIST'S CERTIFICATE

I, DAVID G. MARK, of the City of Vancouver, in the Province of British Columbia, do hereby certify:

That I am a Consulting Geophysicist of GEOTRONICS SURVEYS LTD., with offices at 514-602 West Hastings Street, Vancouver 2, B.C.

I further certify that:

1. I am a graduate of the University of British Columbia (1968) and hold a B.Sc. degree in Geophysics.

2. I have been practising in my profession for the past four years and have been active in the mining industry for the past seven years.

3. I am an associate member of the Society of Exploration Geophysicists and a member of the European Association of Exploration Geophysicists.

4. This report is compiled from data obtained from an induced polarization survey carried out by Wilfred A. Krupp during August, 1972 on the Alamo Claim Group, and pertinent data from published maps and reports as listed under Selected Bibliography.

5. I have no direct or indirect interest in the properties or securities of San Jacinto Explorations Ltd., Vancouver, B.C. nor do I expect to receive any interest therein.

David G. Mark
Geophysicist

August 31, 1972

ENGINEER'S CERTIFICATE

I, Thomas R. Tough, of the City of Vancouver, in the Province of British Columbia, do hereby certify:

That I am a Consulting Geologist and an associate with T. R. Tough & Associates Ltd., with offices at 519-602 West Hastings Street, Vancouver 2, B. C.

I further certify that:

1. I am a graduate of the University of British Columbia (1965) and hold a B. Sc. degree in Geology.

2. I have been practising in my profession for the past six years and have been active in the mining industry for the past thirteen years.

3. I am registered with the Association of Professional Engineers of British Columbia.

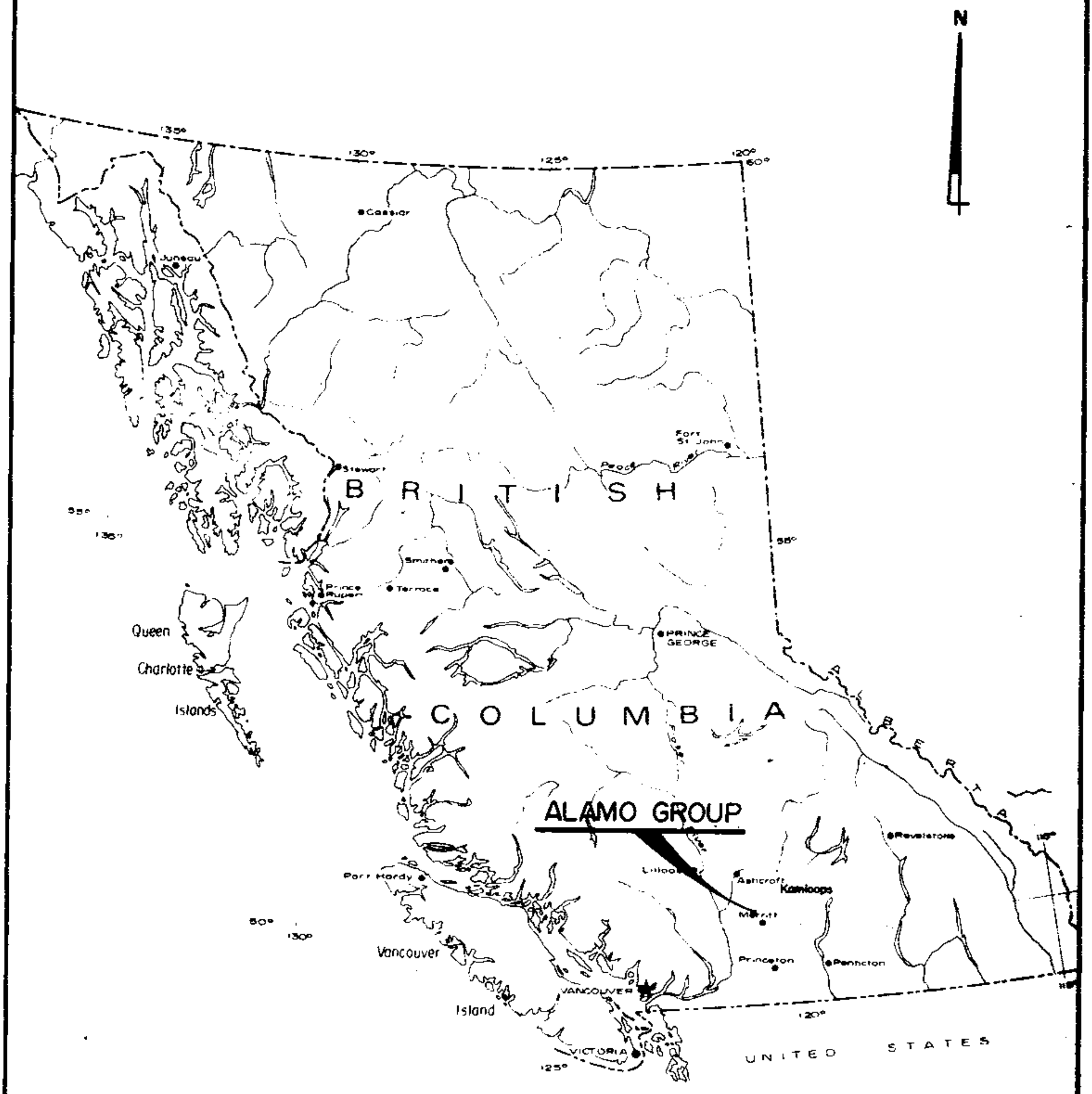
4. I have studied the accompanying report dated Aug., 1972 on an induced polarization survey submitted to Geotronics Surveys Ltd., written by David G. Mark, Geophysicist, and concur with findings therein.

5. I have no direct or indirect interest whatsoever in the property described herein, nor in the securities of San Jacinto Explorations Ltd., and do not expect to receive any interest therein.

PROVINCE OF BRITISH COLUMBIA ENGINEER

Thomas R. Tough, P. Eng.,
Consulting Geologist

August 31, 1972



4328

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PROVINCE OF
T. R. TOUGH
BRITISH COLUMBIA

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SAN JACINTO EXPLORATIONS LTD.

ALAMO CLAIM GROUP

Kamloops M.D., B.C.

LOCATION MAP

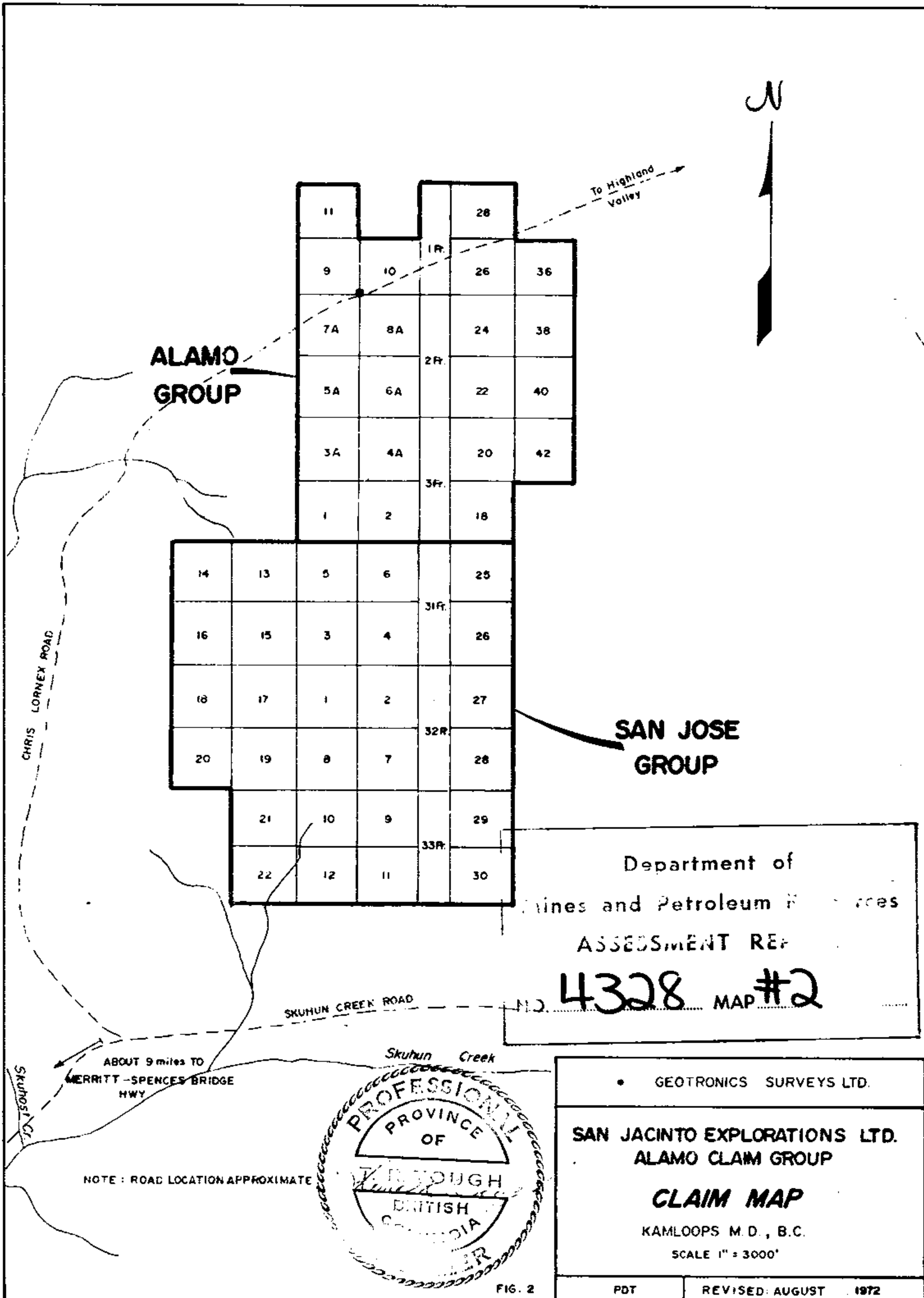
SCALE 1" = 134 mi

PDT

FIG. 1

DRAWN. PDT	CHECKED:	DATE: MAY '72

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 4328 MAP #1



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ASSESSMENT REPORT
NO. 4328 MAP #2

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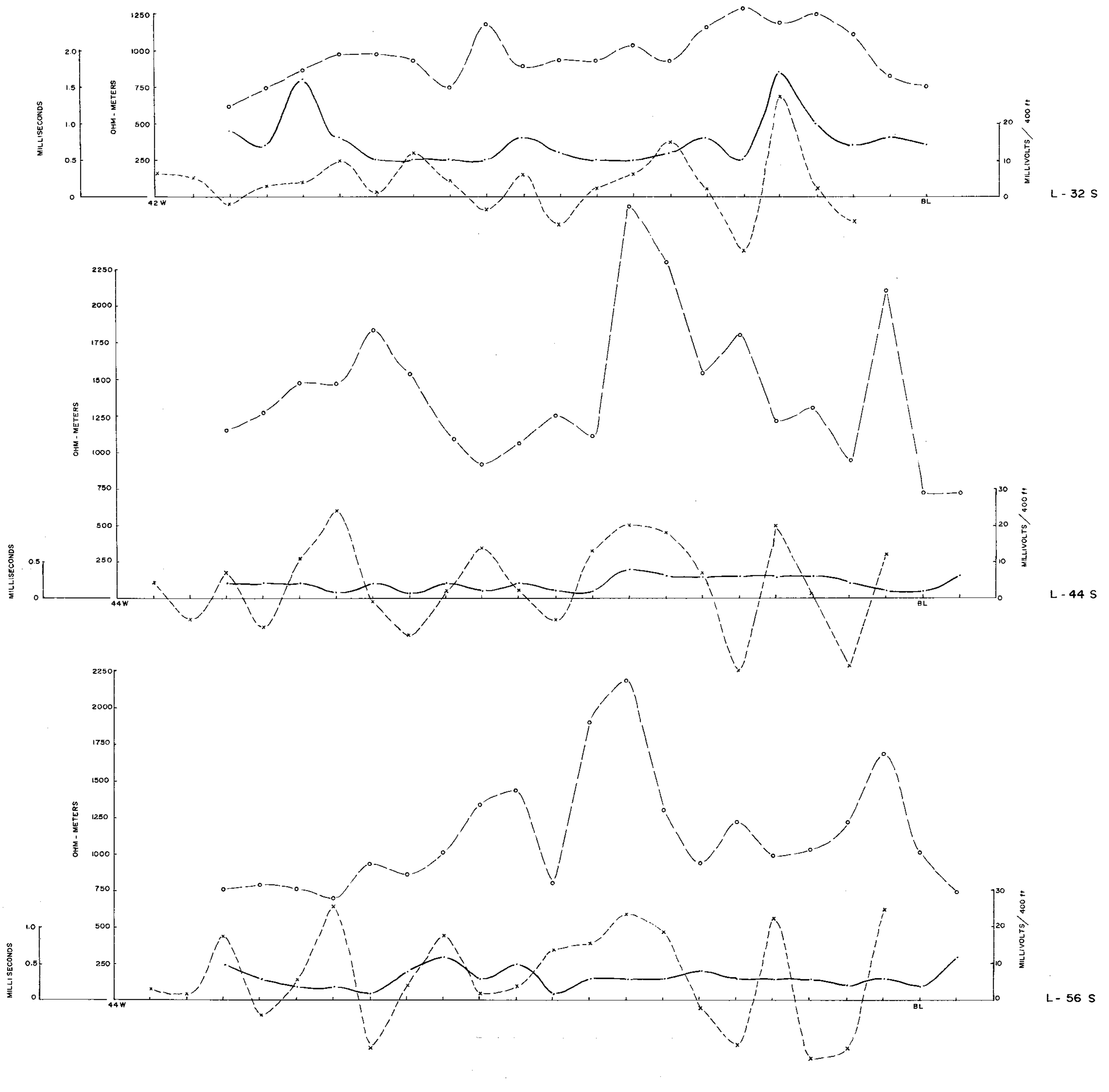
SAN JACINTO EXPLORATIONS LTD.
ALAMO CLAIM GROUP

CLAIM MAP

KAMLOOPS M.D., B.C.

SCALE 1" = 3000'

PDT	REVISED: AUGUST 1972



NOTE:

	SCALE	SYMBOLS
CHARGEABILITY	1" = 1 millisecond	
RESISTIVITY	1" = 500 ohm-meters	
SP—GRADIENT	1" = 20 millivolts / 400 ft	

ARRAY : 3 ELECTRODE

'A' SPACING : 400 FEET

TYPE : TIME DOMAIN

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Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 4328 MAP #6

TO ACCOMPANY GEOPHYSICAL REPORT BY D. MARK, GEOPHYSICIST

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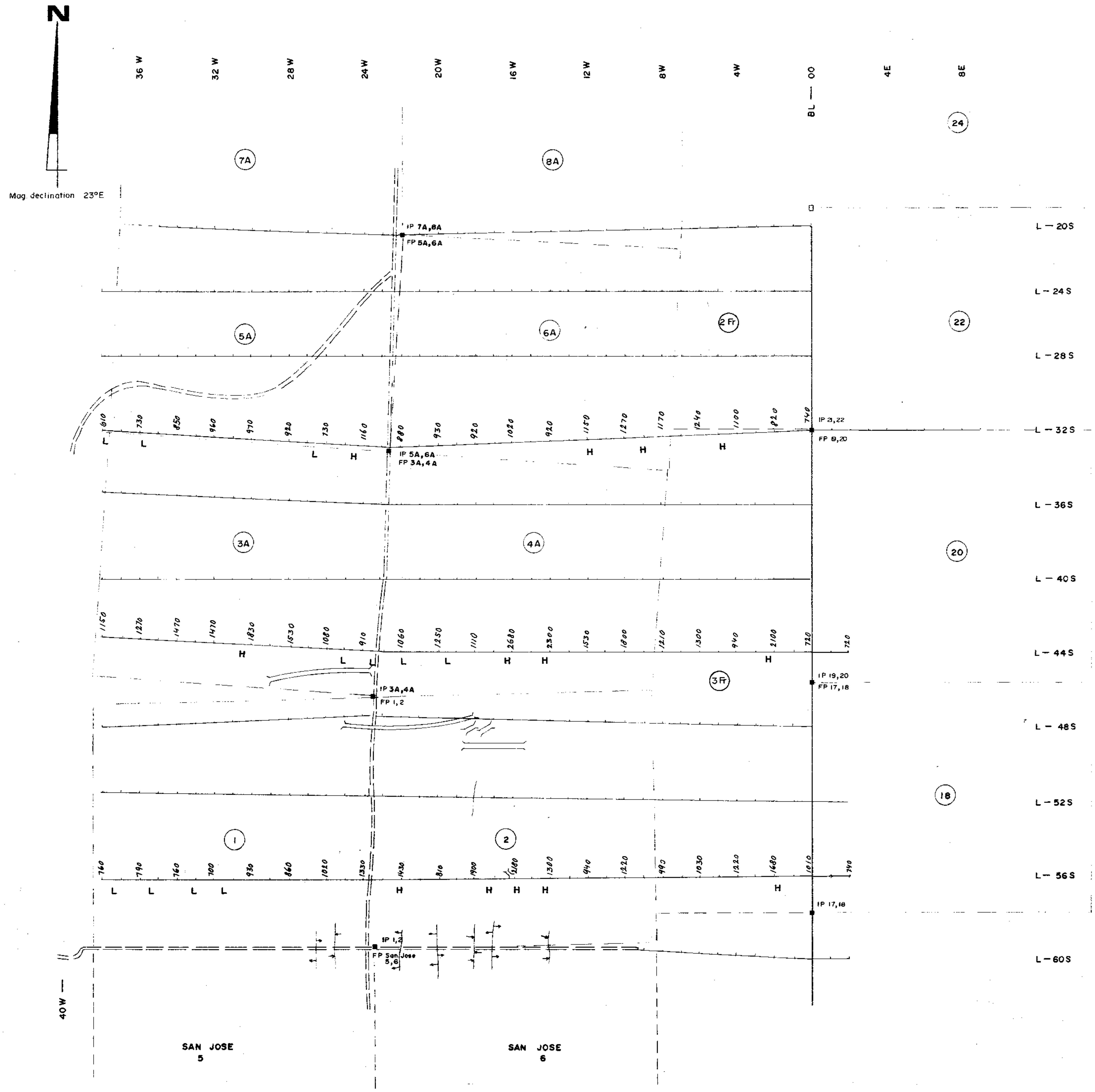
SAN JACINTO EXPLORATIONS LTD.
ALAMO CLAIM GROUP
HIGHLAND VALLEY, KAMLOOPS M.D.
B. C.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH

INDUCED POLARIZATION SURVEY
Chargeability, Resistivity, SP – Gradient — PROFILES

SCALE	DATE	JOB No.	SHEET	DRAWN BY
1" = 400'	AUGUST 1972	72–47	4	PDT DRAFTING Sv.



LEGEND

NOTE: Units of values are ohm–meters

ARRAY	: 3 ELECTRODE
'A' SPACING	: 400 FEET
TYPE	: TIME DOMAIN

	Survey line
	Dirt road
	Cat trench
	Hill top, gulley (arrow points downslope)
■ □	Claim post (located, assumed)
	Claim boundary
(2)	Alamo claim No.
L, H	Resistivity low, high

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ASSESSMENT REPORT
NO. 4328 MAP #4

TO ACCOMPANY GEOPHYSICAL REPORT BY D. MARK, GEOPHYSICIST

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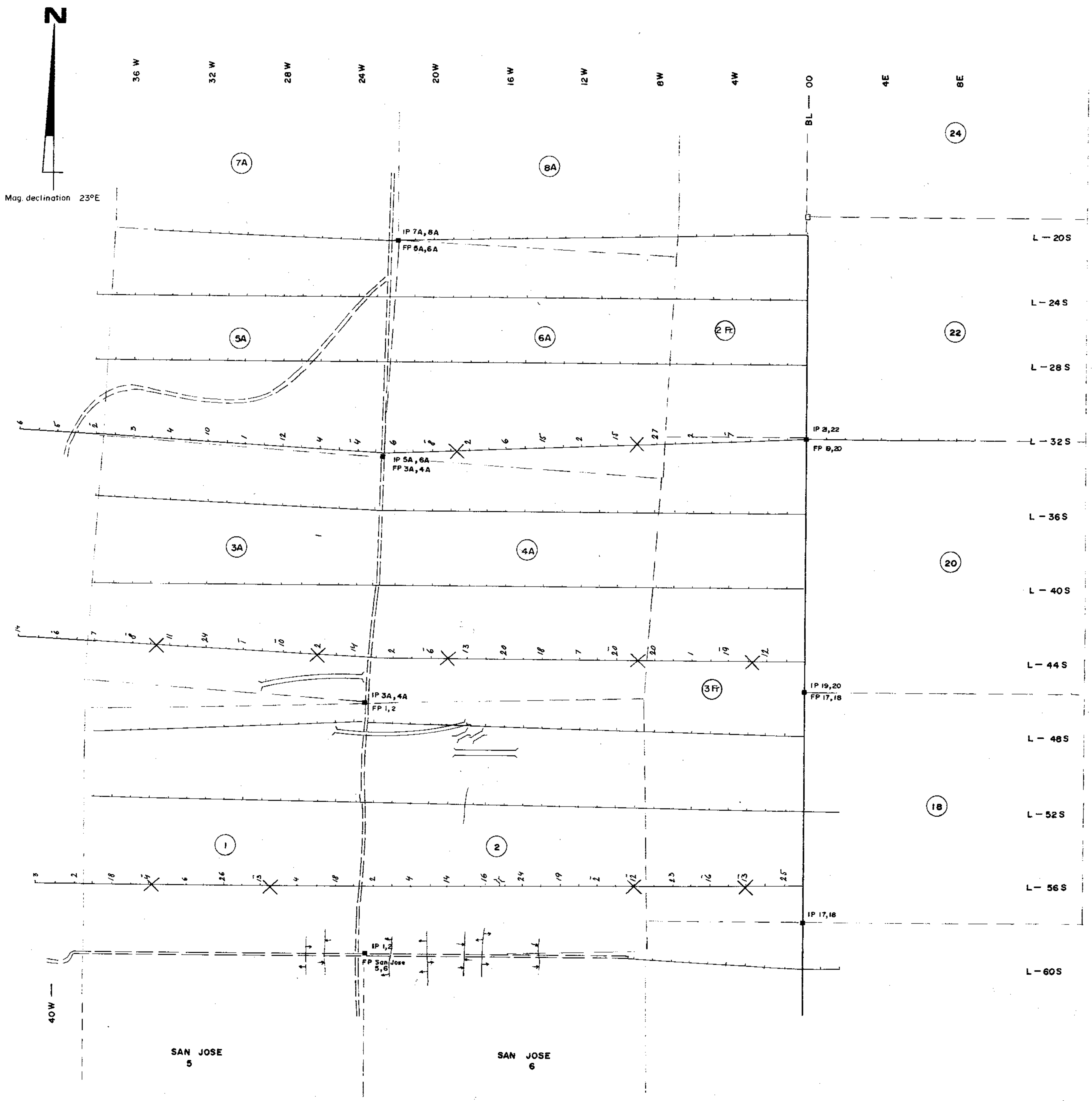
SAN JACINTO EXPLORATIONS LTD.
ALAMO CLAIM GROUP
Highland Valley area, Kamloops M.D., B.C.

INDUCED POLARIZATION SURVEY
Resistivity Data

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — T. R. TOUGH

SCALE	DATE	JOB No	SHEET	DRAWN BY
1" = 400'	AUG. 1972	72 – 47	2	PDT DRAFTING SERVICES



LEGEND

NOTE: Units of values are millivolts per 400 ft.

ARRAY : 3 ELECTRODE

'A' SPACING : 400 FEET

TYPE : TIME DOMAIN

- Survey line
- Dirt road
- Cat trench
- Hill top, gulley (arrow points downslope)
- ■ □ Claim post (located, assumed)
- Claim boundary
- (2) Alamo claim No.
- X SP - Gradient crossover

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NO. 4328 MAP #5

TO ACCOMPANY GEOPHYSICAL REPORT BY D. MARK, GEOPHYSICIST

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ALAMO CLAIM GROUP
Highland Valley area, Kamloops M.D., B.C.

INDUCED POLARIZATION SURVEY
Self Potencial – Gradient Data

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SCALE	DATE	JOB No.	SHEET	DRAWN BY
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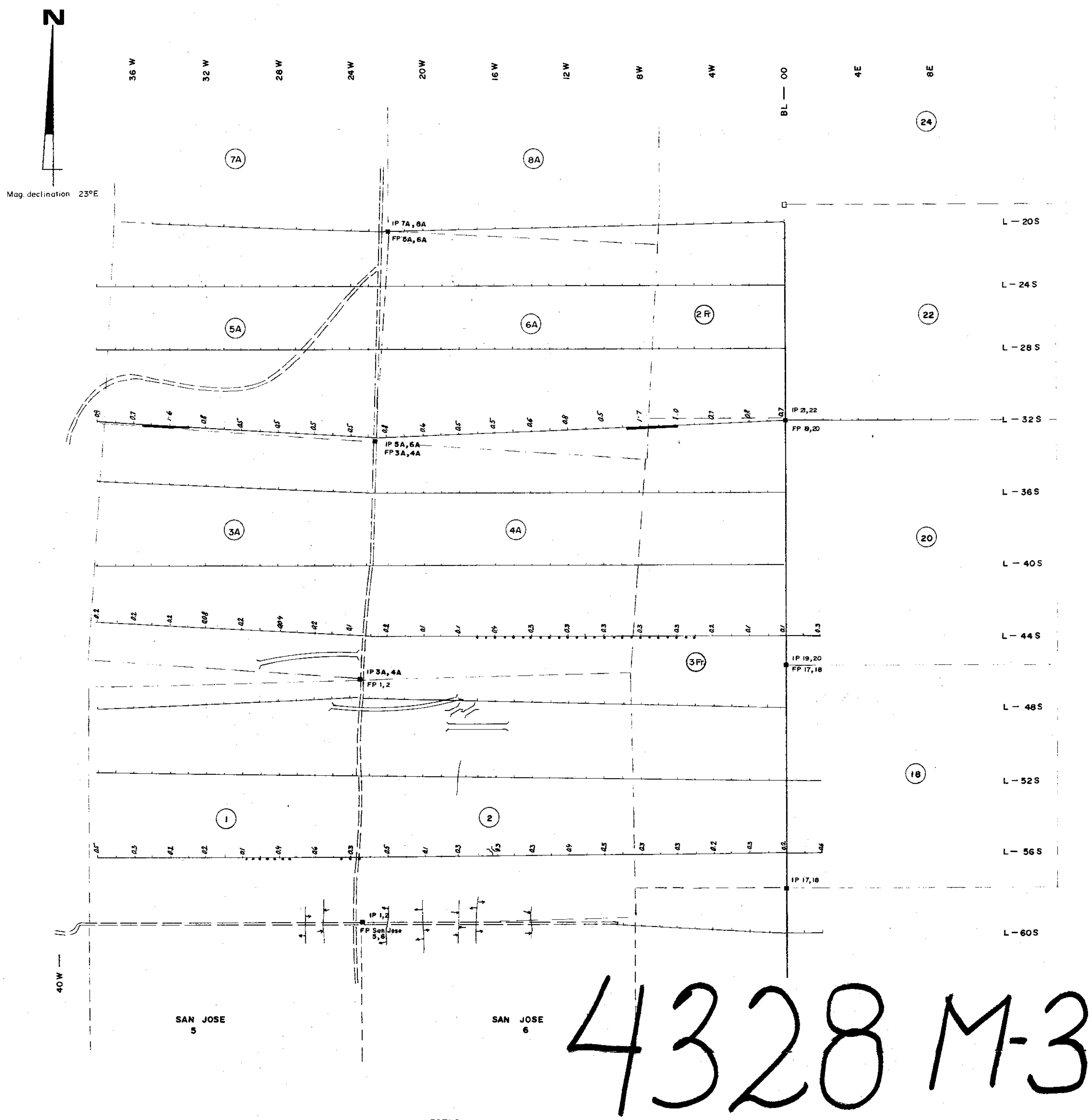

LEGEND

NOTE: Units of values are milliseconds

ARRAY : 3 ELECTRODE

'A' SPACING : 400 FEET

TYPE : TIME DOMAIN

- Survey line
- Dirt road
- Cat trench
- Hill top, gulley (arrow points downslope)
- Claim post (located, assumed)
- Claim boundary
- (2) Alamo claim No.
- Anomaly (definite, possible)

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 4328 MAP #3

TO ACCOMPANY GEOPHYSICAL REPORT BY D. MARK, GEOPHYSICIST

GEOTRONICS SURVEYS LTD.

SAN JACINTO EXPLORATIONS LTD.
ALAMO CLAIM GROUP
Highland Valley area, Kamloops M.D., B.C.

INDUCED POLARIZATION SURVEY
Chargeability Data

SCALE	DATE	JOB No.	SHEET	DRAWN BY
1" = 400'	AUG. 1972	72 – 47	1	PDT DRAFTING SERVICES

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T. R. TOUGH