3193

GEOPHYSICAL REPORT
ON
MAGNETIC - ELECTROMAGNETIC SURVEYS
FOR 92I/6E,7W
SAN JACINTO EXPLORATIONS LTD.
SAN JOSE CLAIM GROUP
HIGHLAND VALLEY AREA, KAMLOOPS M.D., B.C.
JULY, 1971

San Jose Claim Group: 18.2 miles N30W of the town of Merritt, B.C.

50° 121° SW

NTS: 92 I/6E and 92 I/7W

Report by: David G. Mark
Geophysicist
GEOTRONICS SURVEYS LTD.
514 - 602 W. Hastings St.
Vancouver 2, B.C.

Written for: SAN JACINTO EXPLORATIONS LTD.
3513 West 31st Avenue
Vancouver 8, B.C.

Magnetic & VLF-EM Surveys
San Jacinto Explorations Ltd.

TABLE OF CONTENTS

Magnetic & VLF-EM Surveys
San Jacinto Explorations Ltd.

S U M M A R Y

A combined magnetic and VLF-EM survey was completed over a portion of the San Jose claims in the Highland Valley area, B.C. during mid-July, 1971. The purpose of the surveys was to delineate any structural zones that could possibly be traps for any sulphide mineralization.

The claims are located about 18.2 miles N30W of Merritt. Access is by a series of gravel and dirt roads from Lower Nicola northwards. The terrain is quite gentle except for a few 100-foot deep gorges and the trees are fairly open throughout most of the area.

The property is found within the Guichon Creek Batholith. According to Morton, the main rock-type is a quartz diorite with some dacite porphyries and aplite diking. The faults strike mainly in a north to northwest direction and sets of fractures found throughout the property strike in various directions. Mineralization is limited to traces of copper minerals.

The VLF-EM survey produced five main anomalies which are likely due to faults or shear zones. Two

SUMMARY (Cont'd.)

of these anomalies have a greater possibility than the others of being caused by sulphides. Magnetic lows located by the magnetic survey correlate with the EM anomalies and therefore strengthen the postulation of these being caused by shear zones. An induced polarization survey is recommended.

GEOPHYSICAL REPORT
ON
MAGNETIC & VLF-EM SURVEYS
ON THE
SAN JOSE CLAIM GROUP
HIGHLAND VALLEY AREA, B.C.

Submitted to: San Jacinto Explorations Ltd.

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

INTRODUCTION

This report primarily discusses the procedure and results of a combined magnetic and electromagnetic survey completed over a portion of the San Jose Claim Group in the Highland Valley area of British Columbia during mid-July. A crew of 3 men was used: Kelvin McCulloch, Chief Instrument Operator, Michael Scholz, Instrument Operator and the writer, Supervisor.

The San Jacinto property consists of 2 groups of claims: the Alamo Claim Group containing 24 claims and the San Jose Claim Group containing

33 claims plus 3 fractions. The surveys were done over all the San Jose claims, in part or in full.

The object of the magnetic survey was to pin-point an aeromagnetic high and nearby low in addition to outlining structure. That of the VLF-EM was principally to outline structure and also possibly to pick up mineralized zones.

LOCATION AND ACCESS (50° 20.5' 121° 00')

The San Jose claims are found within the Highland Valley Mining Camp of the Kamloops Mining Division and are located 18.2 miles N30W of Merritt in a straight line and approximately 5 miles S25W of the Chattaway and Dot Lakes.

To get to the property one takes the Craigmont Mines road from Lower Nicola, which is about 5 miles west of Merritt, and travels towards Chattaway Lake, location of a fishing camp. Just before Chattaway Lake, the Skuhun Creek road goes off southwesterly towards Spences Bridge. One travels down this road approximately 4.5 miles and then turns onto a road northwards, just before the crossing of Skuhun Creek. This road is about 5 miles long and meets an east-west running road. One turns westwards and travels

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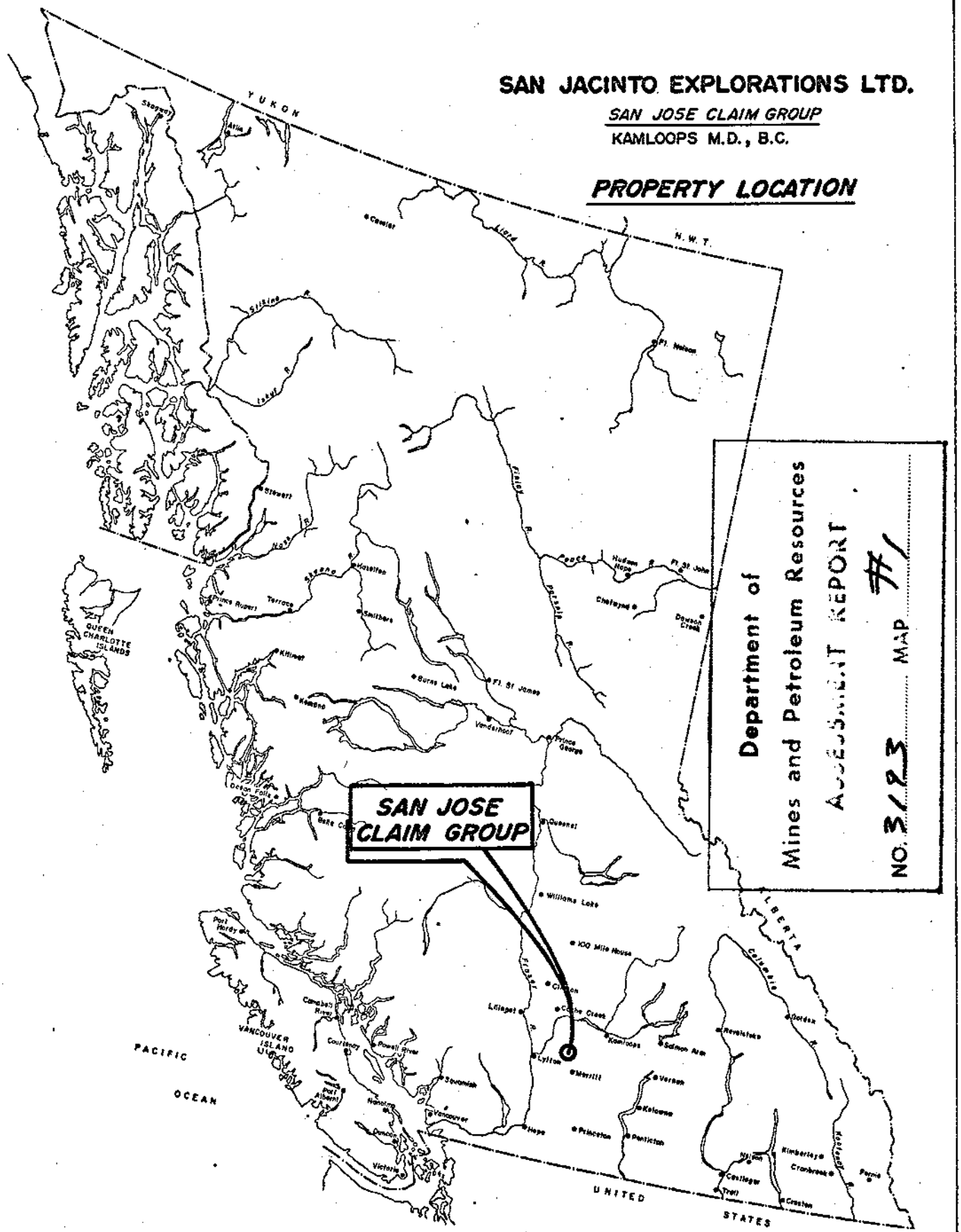
SAN JOSE CLAIM GROUP

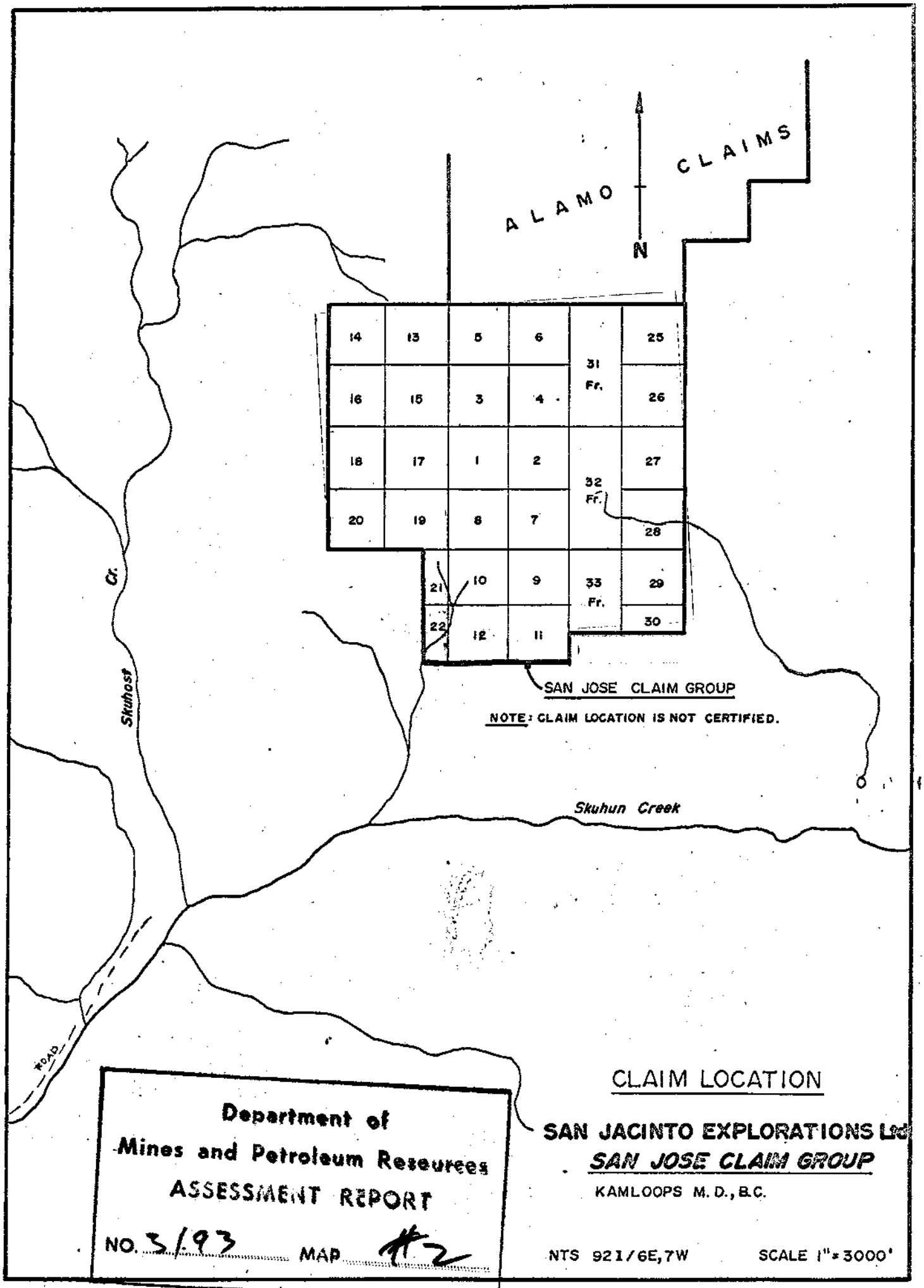
KAMLOOPS M.D., B.C.

PROPERTY LOCATION



Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3123 MAP #1

SCALE 1" = 110 miles


ALAMO CLAIMS
N
14
13
5
6
31
Fr.
25
16
15
3
4
26
18
17
1
2
27
32
Fr.
20
19
8
7
28
21
10
9
33
Fr.
29
22
12
11
30
SAN JOSE CLAIM GROUP
NOTE: CLAIM LOCATION IS NOT CERTIFIED.
Cr.
Skuhost
Skuhun Creek
ROAD
Department of
Mines and Petroleum Reseurees
ASSESSMENT REPORT
NO. 3193 MAP #2
CLAIM LOCATION
SAN JACINTO EXPLORATIONS Ltd
SAN JOSE CLAIM GROUP
KAMLOOPS M. D., B.C.
NTS 92I/6E,7W
SCALE 1"=3000'

for 3/4 mile and then turns northwards on another road. This road follows the Alamo and San Jose claim lines. The crew's camp was at the end of this road. A 2-wheel drive vehicle is quite adequate up to Chattaway Lake after which a 4-wheel drive is required. Apparently, a better way is to go north on a road that leaves the Skuhun Creek road at 9-mile hill just east of Skuhost Creek.

TOPOGRAPHY AND FLORA

The property is found in the physiographic division known as the Thompson Plateau, most southern part of the Interior Plateau. It has a gently rolling upland of low relief, elevation varying largely between 4,000 and 5,000 feet. The property itself is at approximately 5,000 feet elevation except the southern part which starts dropping towards Skuhun Creek. Parts of the property are cut by north-south trending gorges that are up to 2,000 feet long and 100 feet deep. There are also a number of small swamps throughout the area frequently less than 200 feet in diameter and small intermittent streams that drain into and out of these swamps.

The prevalent tree type is jackpine, which ranges up to 10 inches in diameter, and some balsam.

The tree density is less than moderate with some dense tracts of small trees over previously burned areas. Most of the undergrowth is grass.

HISTORY OF WORK

Over both the Alamo Claim Group and the San Jose Claim Group, an aeromagnetic survey was flown, and a geological survey was undertaken. Over the Alamo claims, random soil sampling has been done as well as an induced polarization survey and a ground magnetic survey. On the San Jose claims, a limited amount of soil sampling was undertaken over a grid. The writer also noticed some trenches on the property and 1 or 2 places that appeared to be diamond drill sites.

Only the geological map, the soil sample map and a map showing the location of an aeromagnetic high and low was available to the writer.

GEOLOGY

The property is found within the Guichon Creek Batholith, host of porphyry copper orebodies, such as that of Bethlehem, Lornex and Highmont, and a

massive type copper orebody owned by Alwin. The batholith, according to Northcote (see ref.), was emplaced between Upper Triassic to Middle Jurassic Time and is composed of several different phases varying in rock-type from quartz monzonite to quartz diorite.

The San Jose claims are located, as per Northcote's geology map, within the Bethsaida phase which he says is a quartz monzonite-granodiorite. Mr. Ian Morton did a geological survey over the claims and he has labelled the prevailing rock-type a quartz diorite. Other rock-types Morton noted were aplite dikes and dacite porphyries. He has also shown faults striking in a north to northwest direction and sets of fractures and cross-fractures striking in various directions throughout the property. Mineralization has been limited to traces of copper minerals in a few locations.

INSTRUMENTATION AND THEORY

A VLF-EM receiver, Model G-28, manufactured by Geotronics Surveys Ltd. of Vancouver, B.C. was used for the VLF-EM survey. This instrument is designed to measure the electromagnetic component of the very low frequency field (VLF), transmitted at

18.6 KHz from Seattle, Washington. The direction of this field, in particular the dip angle, is distorted by the presence of a conductor within the earth. Thus, by measuring the dip angle, the presence of a conductor can be detected and its location determined. Those conductors in the same direction as to the transmitter are most easily picked up and those at right angles will not be picked up at all. The VLF-type EM, because of its high frequency in relation to other EM's, is susceptible to conductors of much lower conductivity and therefore is often a good instrument for delineating structure such as shear zones and contact zones, as well as massive sulphides. However, this suceptibility to lower conductivities is sometimes undesirable.

For the magnetic survey, a portable, vertical component, fluxgate magnetometer, Model G-110, also manufactured by Geotronics Surveys Ltd., was used. It is a visual-null type, utilizing a meter, with a digital dial readout that has a range of 100,000 gammas and a reading accuracy of 10 gammas. Its temperature coefficient is approximately 2 gammas per 1^{o} change on the centigrade scale. The G-110 incorporates a self-levelling device, an oil-damped gimbal, that will level the sensing element within $\pm 16^{o}$.

The vertical component of the earth's magnetic field in the survey area was approximately 55,000 gammas. Only 2 minerals are magnetic and these are magnetite and pyrrhotite. Magnetic surveys are therefore used in direct search for these minerals as a source of iron, for orebodies associated with these minerals, or for geological mapping of lithology and structure since different rock-types have different background amounts of magnetic material (usually magnetite).

SURVEY PROCEDURE

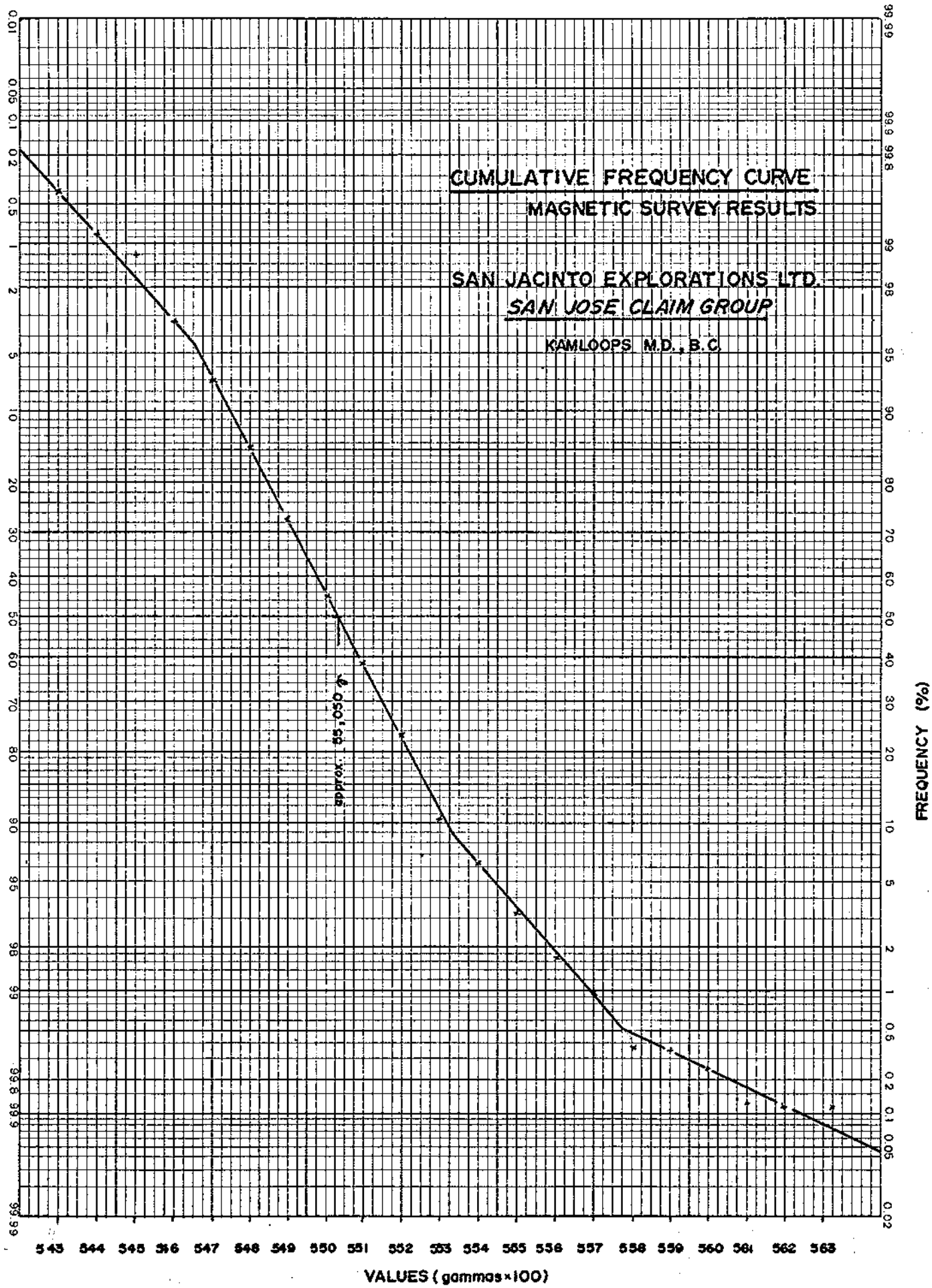
The claim line for the San Jose claims 1-12 was used as a base line which strikes in a north-south direction. The survey was run on crosslines at 500-foot intervals which were chained and compassed in. Readings of both the VLF-EM and magnetometer were read at 100-foot intervals which were marked by orange flagging tape. The magnetic diurnal variation was kept track of with a base station magnetometer read by the writer approximately every 45 minutes. The diurnal varied no more than 100 gammas per day.

TREATMENT OF RESULTS

All results are plotted on sheets 1-3 showing the grid, claims location and topography.

The VLF-EM field data are plotted on sheet 1. Negative readings indicate a conductor to the east and positive readings, to the west. Because of its relatively high frequency, this method is subject to geological and topographical noise. This noise is filtered out by use of the Fraser filter which also phase-shifts the results 90° so that they can be contoured. The contour interval is 10° and the zero contour is drawn in only where it helps delineate the conductive zones and show their continuity. The filtered results are shown on sheet 2. Often, a conductor that does not show up as a crossover on unfiltered data will show up after the filter has been applied.

The magnetic field data was corrected for diurnal variation. These results were then statistically analyzed by plotting their cumulative frequency distribution on arithmetic-probability paper. The mean background value was shown at the 50% level to be 55,050 gammas which was subsequently subtracted from all values. This divided the results into positives and negatives. These treated


CUMULATIVE FREQUENCY CURVE
MAGNETIC SURVEY RESULTS
SAN JACINTO EXPLORATIONS LTD.
SAN JOSE CLAIM GROUP
KAMLOOPS M.D., B.C.
approx. 55,050 ft
FREQUENCY (%)
VALUES (gammas×100)
0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99
543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563

results were then plotted on sheet 3 and contoured at a 200-gamma interval with the zero contour being drawn in with a heavier solid line, the positive contours a solid line, and the negative contours, a dashed line.

DISCUSSION OF RESULTS

1) VLF-EM SURVEY

As can immediately be seen the anomalies seem to trend in a north-south direction. Some of this is due to an error inherent in the survey procedure. That is, the readings are spaced 100 feet apart in an east-west direction and 500 feet apart in a north-south direction which therefore biases the results in a north-south direction.

There are 5 anomalous zones that bear further discussion. Except for one case, there appears to be a poor correlation with the soil sample results (molybdenum and copper). However, if there are any copper or moly sulphides associated with the EM anomalies, the poor correlation would likely be due to the fact that the soil is a transported glacial till.

Anomalies A, B and C strike in a north-south direction and run off of the survey area at both ends. These reach amplitudes up to 30°. Partly because of their length, it is very likely that these conductive zones reflect shear zones.

Anomaly D strikes in approximately a N30E direction, is up to 3,500 feet long and reaches an amplitude of 30°. The south end, on L-3500S, corresponds very well to a copper geochemistry anomaly. The possibility is therefore increased that this part of the anomaly, at least, is due to copper sulphides.

Anomaly E strikes in approximately the same direction as D and is up to 1,500 feet long. However, its amplitude is almost twice that of any of the other anomalies. What could cause this higher conductivity could be a stronger electrolyte within a fault or shear zone and/or sulphides.

There are a few smaller anomalies that very possibly reflect structure or sulphides and thus should be kept in mind.

2) MAGNETIC SURVEY

The range of the magnetic results, from a few extreme values is about 2,100 gammas but varies more commonly between ±400 gammas. This has been found to be typical of the Guichon Creek Batholith.

The map (sheet 3) shows a definite north-south lineation which is enhanced by the north-south bias. The direction of this lineation agrees with the VLF-EM results, the known faults, and, somewhat, the topography (the gorges strike in this direction).

The aeromagnetic anomaly as shown on the Topography and Geology Map (March 1969) should be centered at approximately where the letter "A" is placed. The ground survey revealed an anomaly of lower order than was expected which is of no higher intensity and of no larger size than 1 or 2 other anomalies within the survey area. Furthermore, the corresponding low on the ground survey correlates poorly with the low on the air survey. For these reasons, it is doubtful that the aeromagnetic anomaly is within the ground survey area but was likely misplaced as is often the case in airborne surveys.

The VLF-EM conductive anomalies, especially B, correlate fairly well with magnetic lows or relative lows in immediate areas. This strengthens the probability that these VLF-EM anomalies are due to faults or shear zones. In addition, low magnetic readings were recorded in the longest gorge in the southwest part of the survey area. This is more likely due to a fault than topography, as Morton shows a fault in this area.

The low magnetic readings in the northwest part of the survey area correlates with 2 branches of EM anomaly A and anomaly D. It is understood (from D. A. Chapman) that a diamond drill hole was put down in this area and encountered 200 feet of altered rock. For these reasons, the possibility is increased that sulphides occur in this area.

Comparing the magnetic contour map with Morton's geology map, it is seen that there is hardly any correlation with overburden which thus indicates that the overburden depth is probably not too deep, as in other areas of the property.

CONCLUSIONS AND RECOMMENDATIONS

It is in the writer's opinion that the 2 surveys were successful in their objectives. The VLF-EM revealed conductive zones that are probably faults or shear zones and the magnetics verified this. The possibility that sulphides were the cause of some, or parts, of these anomalies, especially D and E, should not be overlooked.

It is understood that a tectonic survey through air photos is being completed at this time. When the results of the magnetic and VLF-EM surveys are compared to that of the tectonic survey, diamond drill targets may be easily decided upon. An induced polarization survey is recommended, however, considering its success in delineating ore zones on other properties of the Highland Valley. It is felt this will help define diamond drill targets much more accurately, if any are forthcoming. Considering the size of target being sought, electrode spacing should be 400 feet and station spacing, 200 feet. If any anomalous zones are revealed, line spacing should be reduced to 250 feet and additional electrode spacings of 200 feet and also 600 or 800 feet should be used with a station spacing of 100

and 200 feet, respectively. This will help define the size of the source of the anomaly much more accurately.

Respectfully submitted,

GEOTRONICS SURVEYS LTD.

DAVID G. MARK
Geophysicist

DGM:ly
August 3, 1971

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH

REFERENCES

Carr, J.M., Geology of the Bethlehem and Craigmont Deposits, in "Tectonic History and Mineral Deposits of the Western Cordillera", pp. 321-328, C.I.M.M. Special Vol. No. 8, 1966.

Cockfield, W.E., Geology and Mineral Deposits of the Nicola Map-Area, British Columbia, G.S.C. Mem. 249, 1948.

Coveney, C.J., The Bethlehem Copper Property, Western Mines and Oil Review, V. 35, pp. 41-43, 1962.

Department of Energy, Mines & Resources, Ottawa, Airborne Magnetic Map - Mamit Lake, Map 5212G, Sheet 92 I/7, 1968.

-ditto- Spences Bridge, Map 5211G, Sheet 92 I/6, 1968.

Duffel, S. and McTaggart, K.C., Ashcroft Map-Area, British Columbia, G.S.C. Mem. 262, 1951.

Fraser, D.C., Contouring of VLF-EM Data, Geophysics Vol. 34, No. 6 (December 1969).

Fountain, David K., The Application of Geophysics to Disseminated Sulphide Deposits in British Columbia, McPhar Geophysics Limited, September 1969.

Geo-X Surveys Ltd., Aeromagnetic Survey of Alamo and San Jose Claim Groups, Highland Valley Area, B.C., 1969(?)

Map of Soil Sample Results on Alamo and San Jose Claim Groups, Highland Valley Area, February 1967.

Minister of Mines and Petroleum Resources, B.C., Annual Report, pp. 28-45, 1962.

Morton, Ian, Geology of Alamo and San Jose Claim Groups, Highland Valley Area, Kamloops M.D., B.C., San Jacinto Explorations Ltd., July 1967.

Northcote, K.E., Geology and Geochronology of the Guichon Creek Batholith, B.C.D.M. Bul. 56, 1969.

RESUME OF TECHNICAL AND FIELD EXPERIENCE

OF

K. McCULLOCH

1. Presently Field Supervisor and Crew Chief for Trans-Arctic Explorations Ltd./Geotronics Surveys Ltd.

2. Two years of applied field experience in various aspects of mining exploration, geophysical and geochemical surveys.

3. Instrument Operator on various geophysical instrumentation methods, i.e., magnetometer, electromagnetic, self potential, resistivity, induced polarization and transit & level surveying.

4. The above mentioned experience applied in Western Canada and the U.S.A.

RESUME OF PROFESSIONAL AND TECHNICAL EXPERIENCE

OF

DAVID G. MARK, B.Sc.

EDUCATION

Graduate of the University of British Columbia in Science (B.Sc.) in Geophysics.

EXPERIENCE IN INDUSTRY

Experience, technical and interpretational, in various geophysical surveys: magnetometer, electromagnetic, self-potential, gravity, induced polarization, resistivity and seismic methods.

1968 - Present - Geophysicist for Geotronics Surveys Ltd., Vancouver, B.C.

1968 (exploration season) - Field Geophysicist for Geo-X Surveys Ltd., Vancouver, B.C.

1967 (exploration season) - Field Supervisor in geochemical work and geological mapping for Anaconda (Canada) Company.

1966 (exploration season) - Field Supervisor for geophysical and geochemical work and prospecting for Mastadon-Highland Bell Mines Ltd.

1965 (exploration season) - Prospecting and geological evaluation for New Taku Mines Ltd.

* * * * * * *

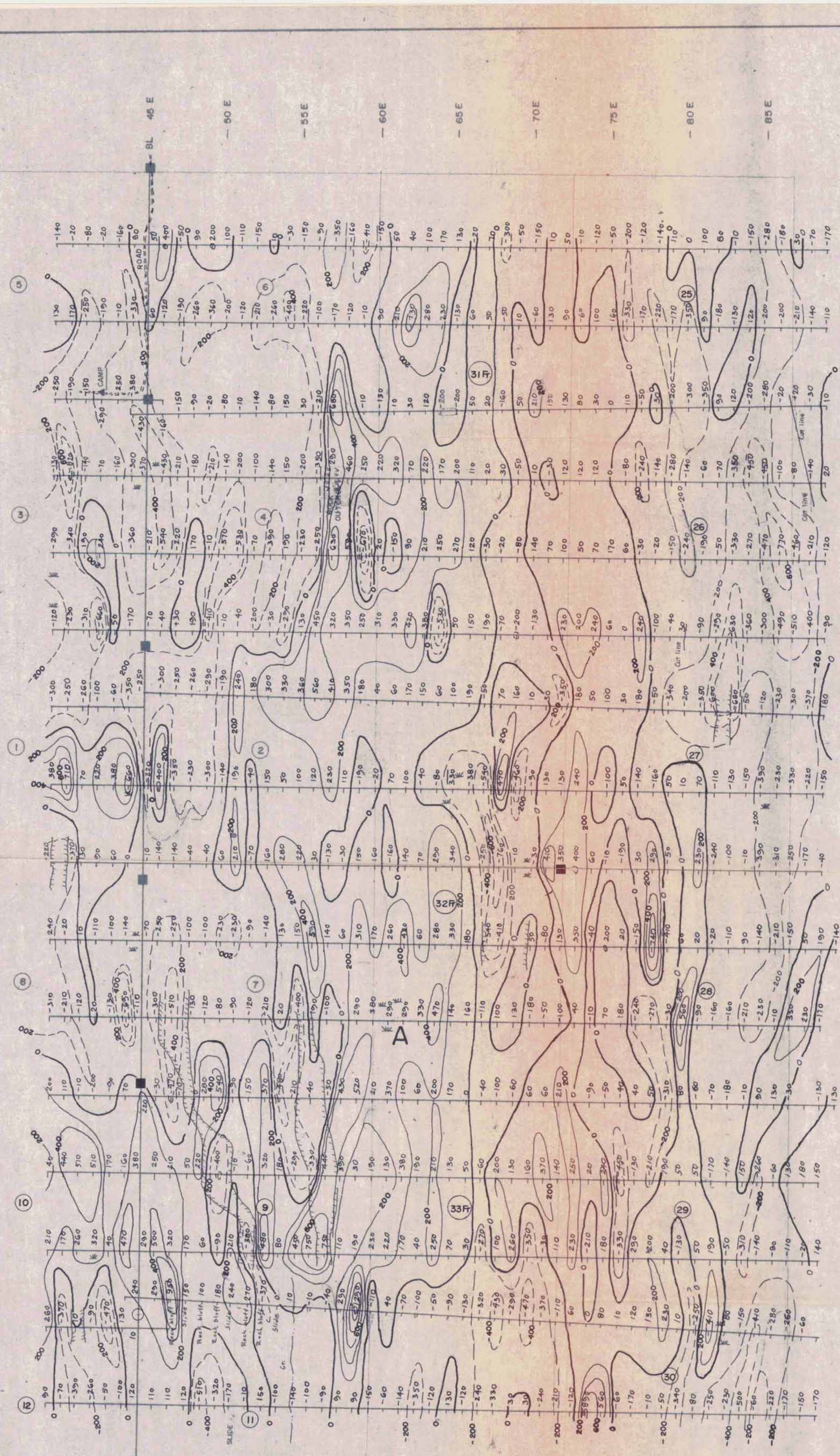
Member of the British Columbia Geophysical Society and the Vancouver Branch of The Canadian Institute of Mining and Metallurgy.

P. Eng. applied for with the Association of Professional Engineers of B.C.

Magnetic & VLF-EM Surveys
San Jacinto Explorations Ltd.

COST BREAKDOWN

Wages:		
D. Mark, Geophysicist, 12 days @ $100.00/day		$1,200.00
K. McCulloch, Magnetometer Operator, 12 days @ $60.00/day		720.00
M. Scholz, Electromagnetic Operator, 12 days @ $60.00/day		720.00
Electromagnetic unit rental	$200.00	
Magnetometer rental	400.00	
Survey equipment and supplies	200.00	
4x4 rental	250.00	1,050.00
Mapping and plotting	$300.00	
Geophysical report	600.00	
Engineering fees	300.00	1,200.00
TOTAL COST		$4,890.00



MAG. DECLINATION 23.5°

LEGEND

- SURVEY LINE
- CLAIM POST (Located / Assumed)
- (8) CLAIM No.
- SWAMP
- GORGE

CONTOURS

CONTOUR INTERVAL IS 200 gamma

- POSITIVE CONTOUR LINE
- NEGATIVE CONTOUR LINE

NTS 92I/6E,7W

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH

TO ACCOMPANY GEOPHYSICAL REPORT BY D.G.MARK, B.Sc.

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3193 MAP #5

SAN JACINTO EXPLORATIONS LTD.

SAN JOSE CLAIM GROUP

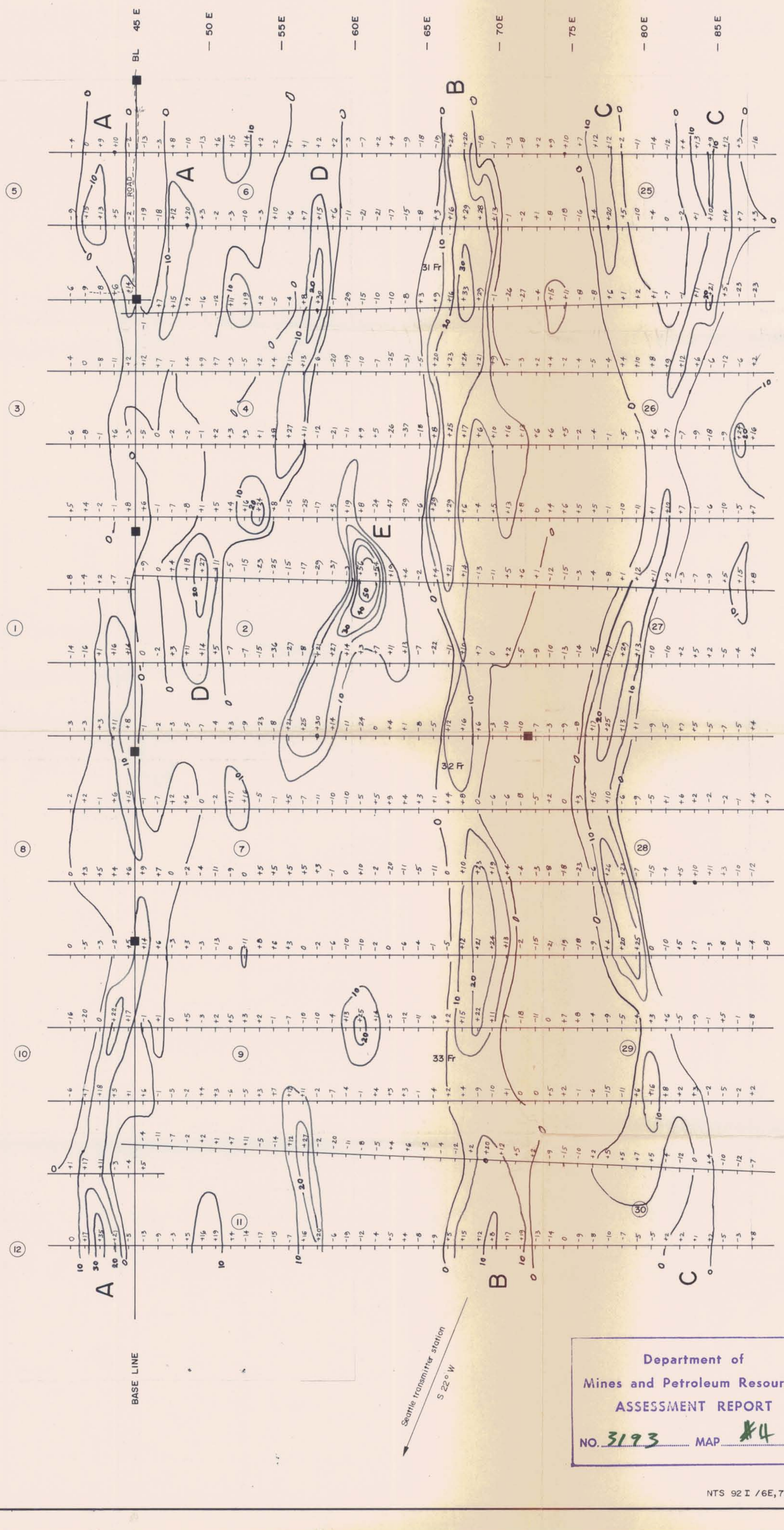
KAMLOOPS M.D., B.C.

MAGNETOMETER SURVEY

type of survey: Field data and contours

scale	date	job no.	sheet no.	drawn by
1" = 500'	JULY '71	71 - 57	3	P.P.

Geotronics Surveys Ltd.



MAG. DECLINATION 23.5°

LEGEND

SURVEY LINE

CLAIM POST

(8) CLAIM No.

NOTE: CONTOUR INTERVAL IS 10°
(READINGS ARE IN degrees)

TO ACCOMPANY GEOPHYSICAL REPORT BY D.G. MARK, B.Sc.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
Thomas R. Tough
T. R. TOUGH

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3193 MAP #4

NTS 92 I /6E, 7W

SAN JACINTO EXPLORATIONS LTD.

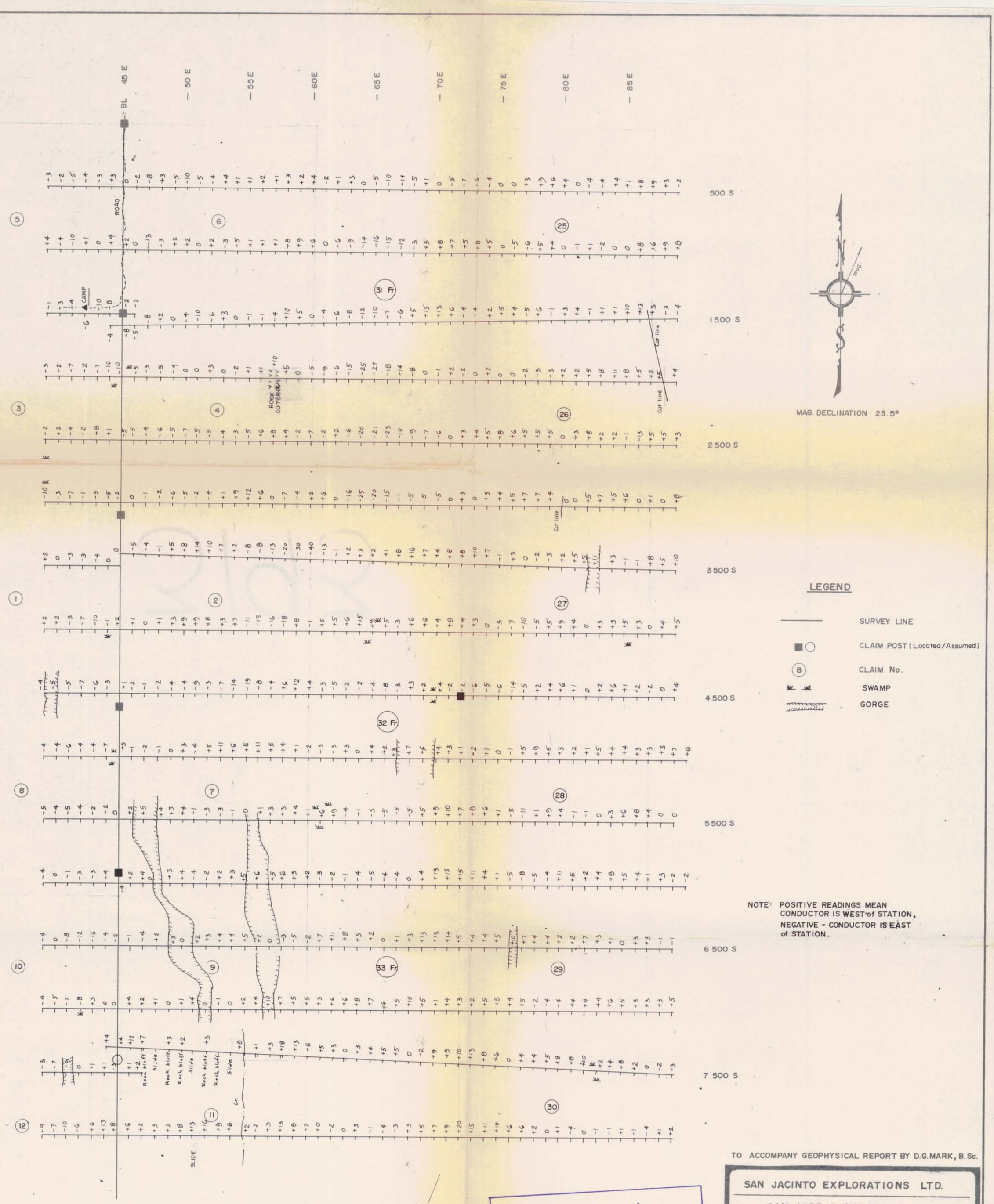
SAN JOSE CLAIM GROUP

KAMLOOPS M.D., B.C.

VLF – EM
type of survey
FRASER FILTER

scale	date	job no.	sheet no.	drawn by
1" = 500'	JULY '71	71 – 57	2	P. P.

Geotronics Surveys Ltd.
Geophysical Surveys, Ground & Airborne
517 – 602 West Hastings Street, Vancouver, British Columbia.



LEGEND

- SURVEY LINE
- CLAIM POST (Located/Assumed)
- (8) CLAIM No.
- SWAMP
- GORGE

NOTE: POSITIVE READINGS MEAN CONDUCTOR IS WEST of STATION, NEGATIVE - CONDUCTOR IS EAST of STATION.

TO ACCOMPANY GEOPHYSICAL REPORT BY D.G.MARK, B.Sc.

SAN JACINTO EXPLORATIONS LTD.

SAN JOSE CLAIM GROUP

KAMLOOPS M.D., B.C.

VLF - EM

type of survey: FIELD DATA

scale	date	job no.	sheet no.	drawn by
1" = 500'	JULY '71	71 - 57	1	P.P.

Geotronics Surveys Ltd.

317 - 609 West Hastings Street, Vancouver, British Columbia.

3193

M-3

NTS 92I/6E,7W