81-#935-#9719

GEOPHYSICAL SURVEY

ON A

SEISMIC REFRACTION SURVEY

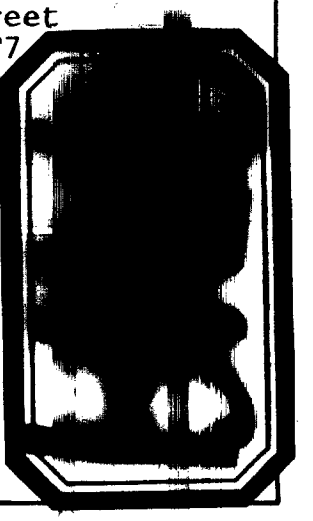
ON

CASCA CLAIM GROUP

KEITHLEY CREEK

CARIBOO MINING DISTRICT, BRITISH COLUMBIA

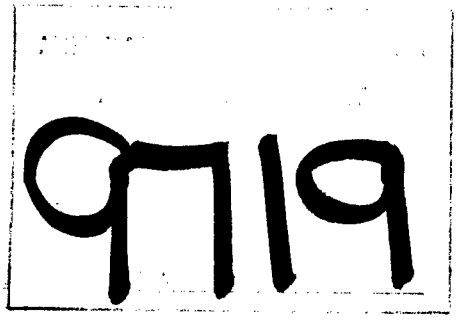
CASCA CLAIM GROUP	: At the confluence of Snowshoe Creek and Keithley Creek, 21.8 km N10E of Likely, B.C.
	: 50° 121° NE
	: N.T.S. 93A/14W
WRITTEN FOR	: CASCADIA MINES AND RESOURCES LTD. 1127-510 West Hastings Street Vancouver, B.C. V6b 1L8
BY	: David G. Mark, Geophysicist GEOTRONICS SURVEYS LTD. 403-750 West Pender Street Vancouver, B.C., V6C 2T7
DATED	: September 22, 1981



GEOTRONICS

GEOTRONICS SURVEYS LTD.
Engineering & Mining Geophysicists
VANCOUVER, CANADA

TABLE OF CONTENTS



LIST OF ILLUSTRATIONS

SUMMARY

A seismic refraction survey was carried out over the Casca Claim Group at the confluence of Snowshoe Creek and Keithley Creek in the Cariboo M.D., B.C. during the period November 17th to 20th, 1980. The mouth of Snowshoe Creek is located 21.8 km N10E of Likely. The object of the survey was to determine the depth of bedrock, as an aid to the search for base metal deposits.

The claims are underlain by Cambrian to Mississippian sediments and meta-sediments overlain by glacial till and fluvial sands and gravels.

The survey was carried out using a 12-channel seismic refraction system with 165-meter spreads, and employing explosives as the energy source. The data were analyzed using an intercept-delay time technique.

The seismic refraction survey showed the depth of overburden to vary from 2 to over 50 m. One spread did not record any refractions from bedrock; this anomalously deep area may represent an old buried course of Snowshoe Creek.

CONCLUSIONS

Considerable depths of overburden are present on parts of the claims. A particularly deep feature cuts three of the lines

and may represent an old river channel, or alternatively it could be a major structural feature such as a fault or shear zone. A smaller velocity discontinuity feature on another of the seismic lines may have a similar cause.

Careful account should be taken of overburden depths when planning test drilling programs or other geophysical surveys.

RECOMMENDATIONS

1. Additional seismic work should be considered to define the shape and nature of the deep overburden feature, and resolve the discrepancy between the seismic depths and the bedrock level interpreted in two of the boreholes. This work should take the form of two profiles, parallel to Keithley Creek, across the width of the claim.

2. Other geophysical surveys, such as IP, should be used to directly detect any mineralization present, especially in the areas where the seismic indicates that faults or shear zones could be present. The electrode spacing on any IP work should be adjusted on various parts of the claims, to ensure sufficient current penetration into the bedrock.

GEOPHYSICAL REPORT

ON A

SEISMIC REFRACTION SURVEY

ON

CASCA CLAIM GROUP

KEITHLEY CREEK

CARIBOO MINING DISTRICT, BRITISH COLUMBIA

INTRODUCTION AND GENERAL REMARKS

This report discusses the field procedure, compilation of data, and interpretation of results of a seismic refraction survey carried out over the Casca group of claims at the confluence of Snowshoe Creek and Keithley Creek during the period November 17th to 20th, 1980.

The field work was carried out under the supervision of the writer with 4 helpers. A total of 11 spreads was completed over a profile length of 1.8 km.

The objective of the survey was to measure bedrock depth and velocity, to assist in the base metal exploration of the claims. Knowledge of the bedrock profile may help in the understanding of the area's structure, and in planning drilling programs.

Any low velocity zones detected in the bedrock surface could represent fault or shear zones which may be mineralized.

PROPERTY AND OWNERSHIP

The Casca Group consists of 6 contiguous claims, as shown on Sheet 2 and as described below:

Claim Name	Record No.	No. of Units	Expiry Date
J 1	865	10	October 12, 1981
Casca 1	2004	8	October 2, 1981
Casca 2	2005	20	October 23, 1981
Casca 3	2081	16	October 23, 1981
Casca 4	2082	16	October 23, 1981
Casca 5	2084	20	October 23, 1981

LOCATION AND ACCESS

The claims are located at the confluence of Snowshoe Creek with Keithley Creek which is about 21.8 km N10^{o}E of Likely, B.C., within the Cariboo Mining District.

The geographical coordinates are 52^{o} 48' N latitude and 121^{o} 29' W longitude.

Access is easily gained by a 2-wheel drive vehicle over a series of logging roads, about 42 km out of Likely.

PHYSIOGRAPHY

The property is located within the Quesnel Highlands which is a physiographic division of the Interior Plateau System. Much of the topography consists of upland areas that are remnants of a deeply dissected plateau of moderate relief.

The Casca Claim Group lies mainly to the northeast of Keithley

Creek, near its junction with Snowshoe Creek. The sides of the creek valley are moderately steep, varying in elevation within the property boundaries from 1,250 m to 1,400 m.

GEOLOGY

The bedrock underlying the property is probably Devonian to Mississippian sediments and meta-sediments either of the Snowshoe Formation or of the Midas Formation, both of which outcrop nearby. The Snowshoe Formation is composed of quartzite, meta-greywacke, phyllite, schist, and minor limestone. The Midas Formation comprises chert, phyllite, argillite, limestone, and minor siltstone.

The overburden consists of fluvial sands and gravels and glacial till.

HISTORY OF PREVIOUS WORK

No previous exploration is known to have taken place on the property, although the area may have been mined for placer deposits during the Cariboo gold rush.

INSTRUMENTATION

A 12-channel seismograph, Model 1210F, manufactured by Geometrics/Nimbus of Sunnyvale, California, was used on the project. This instrument features signal enhancement by stacking repeated signals in a digital memory. A CRT (cathode ray tube) continuously displays the signal stored in the memory on all channels. The stored signal can then be printed on a permanent paper record by a built-in electric-writing oscillograph.

The instrument also contains active signal filters on each amplifier.

A 165-meter geophone cable was used, as well as 8 cycle/sec marsh geophones, manufactured by Mark Products of Houston, Texas.

The blasting was done with 1 encoder and 2 decoders, Series 200, manufactured by Input/Output of Houston, Texas. These were interfaced with Motorola portable FM radios.

FIELD PROCEDURE

The 'two-way, in-line shot' seismic refraction method was used for all traverses. The technique consisted of laying out 12 geophones in a straight line and recording arrival times from shots fired at either end of the spread. The arrival times from 2 additional shot points approximately every 1/3 of the spread length within the spread were also recorded. This provided the overburden depth and velocity variations along the spread, and also gave additional information about the deeper layers. Finally for each spread, two off-end shots were fired at a distance of one-half the spread length from the nearest geophone. Since the off-end shots were a good distance from the nearest geophone, it was safely assumed that the first arrivals were in fact from the bedrock surface. This was felt necessary so that the refractions received from other shots points could be correlated and assigned the correct layer number.

Each of the eleven seismic profiles comprised one 165 m long spread (15 m geophone interval). The shots ranged in size

from 0.5 to 2.0 kg, and were placed in holes 0.4 to 0.7 m deep.

COMPUTING METHOD

All seismic data was analyzed using an intercept-delay time technique. Implementation of this method requires reverse refraction profiles with bedrock refraction emanating from a common point for at least two detectors. This rock overlap is necessary in order to obtain a true refractor velocity and travel time in the overburden, independent of bedrock dip and/or surface irregularities. The off-end shot times are used to extrapolate the rock locations. With this information and related overburden velocities, it is possible to compute the depth to rock not only below each shot point, but also below each detector. However, the computed depths below shot points should be considered slightly more accurate than those below detectors.

The procedure is as follows:

1. Pick the first arrivals from the field records and draw time-distance graphs for each spread;

2. With the help of a plot of the difference in arrival times, determine which points are bedrock and which are overburden, and how many layers occur in the overburden;

3. Draw a delay line for each end shot and from this determine the delay time for each geophone;

4. Proportion the delay time for each geophone into

the various times spent in the various layers. Multiply each layer time by the corresponding layer velocity, adjusting to Snell's Law to obtain the layer thickness. Adding the layer thicknesses together will give the total overburden depth.

DISCUSSION OF RESULTS

The spread locations and interpreted depths to bedrock have been presented on Sheet 1, at a scale of 1:2,400 (1" = 200'). The results have also been shown in section form on Sheets 2 to 9, at a scale of 1:600 (1" = 50').

The seismic refraction work has revealed a 3-layer case along 8 of the 11 lines surveyed. The remaining 3 lines, which are SL-3, SL-4 and SL-11, were revealed to be 2-layer cases, with a single overburden layer overlying the bedrock.

The first layer ranges in velocity from 270 to 880 m/s and varies in thickness from 1.5 to 11.0 meters. This velocity layer is likely to represent a surficial overburden varying in compactness from loose to semi-compact. The water content is probably quite low.

The second layer on SL-8, SL-9 and SL-10 has a velocity range of 1,200 to 1,250 m/s. The second layer on the remaining 3-layer case lines has a velocity ranging from 1,500 to 2,500 m/s. The material is probably compact to very compact sands and gravels, or possibly glacial till. The difference in velocity between that of the first group and that of the second group is probably caused by differences in water content. (A velocity above 1,500 m/s is generally considered to imply water saturation). Compactness of soil would also account

for higher velocities, especially those above 2,000 m/s. The thickness of layer 2 varies from 0 m on these lines where only a 2-layer case occurs, to at least 52 m. On SL-5, it appears the second layer has an even greater thickness since bedrock was not reached.

The third layer with its relatively high velocities, is undoubtedly bedrock. It has been divided into 2 velocity classes. The first class has a range of 3,670 to 4,220 m/s and has been interpreted to be volcanics. The second class has a velocity range of 4,470 to 6,500 m/s and has been interpreted to be intrusives. The boundary between the 2 groups is somewhat arbitrary and is based on the writer's experience. However, an intrusive with fracturing and/or weathering could have a velocity as low as, or lower than 4,220 m/s.

The bedrock contours shown on Sheet 1 suggests that a bedrock channel exists on SL-5, SL-6 and SL-7. The strike appears to be north-south and it may therefore represent an old buried channel of Snowshoe Creek. This is supported by seismic work done to the north of the claims.

On SL-8, there is a slow zone below geophones 5, 6 and 7. This could easily be an offshoot buried canyon-type channel to the main buried channel, and/or a fault zone.

The depths to bedrock from drill holes 24 and 25 near SL-8 and drill hole 28 near SL-10 agree very closely with those calculated from the seismic results. However, the bedrock depths from drill holes 27 and 29 near SL-7 are quite different. Drill hole 27 reached an apparent depth of 10 m whereas 20 m away the seismic-calculated depth was about 36 m. The steep

rockhead dip implied does not seem likely. Drill hole 29's apparent bedrock depth was 24.4 m which compares with about 52 m from the seismic results. An explanation for this is that the drill in these 2 holes encountered large floats rather than the bedrock itself. This is partly supported by the fact that the 10 m depth of drill hole 27 is about half of that encountered on nearby holes to the east and west.

A suggested velocity classification is as follows;

Velocity (meters/seconds)	Material
270 - 880	Fairly dry to partially saturated, loose to semi-compact silts, sands and gravels.
1,200 - 1,250	Partially saturated, semi-compact sands and gravels.
1,500 - 2,500	Saturated, compact sands and gravels.
3,670 - 4,220	Bedrock: volcanics.
4,470 - 6,500	Bedrock: intrusives.

Respectfully submitted,
GEOTRONICS SURVEYS LTD.

David G. Mark,
Geophysicist

September 22, 1981

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 #403-750 West Pender Street, Vancouver, British Columbia.

I further certify:

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 my profession for the past 13 years and have been active in the mining industry for the past 15 years.

3. I am an active member of the Society of Exploration Geophysicists and a member of the European Assocation of Exploration Geophysicists.

4. This report is compiled from data obtained from a seismic refraction survey carried out under the supervision of myself during the period November 17th to 20th, 1980.

5. I do not hold any interest in Cascadia Mines & Resources Ltd. or the Casca Claim Group, nor do I expect to receive any interest as a result of writing this report.

David G. Mark,
Geophysicist

September 22, 1981

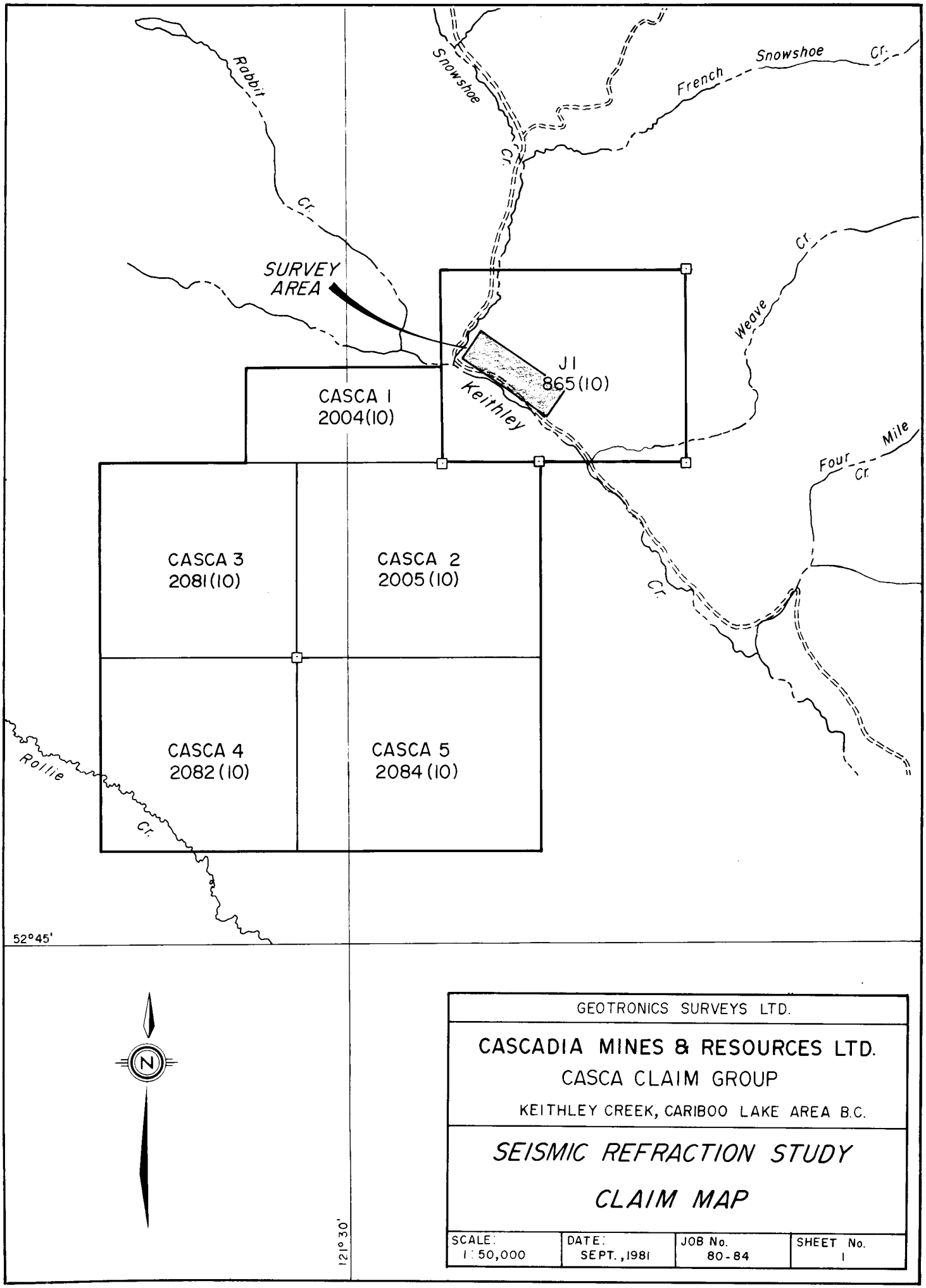
AFFIDAVIT OF EXPENSES

This is to certify that the seismic refraction survey carried out on the Casca Claim Group from November 17th to the 20th was done to the value of the following:

5-man crew, 50 hours at $110/hour	$ 5,500
Room and board	544
Instrument rental	600
Explosives and seismocaps	375
Truck rental and gas	550
Airfares and airfreight	467
Interpretation and report	2,424
	$10,460

Respectfully submitted,
GEOTRONICS SURVEYS LTD.

David G. Mark, Manager
Geophysicist



GEOTRONICS SURVEYS LTD.

CASCADIA MINES & RESOURCES LTD.

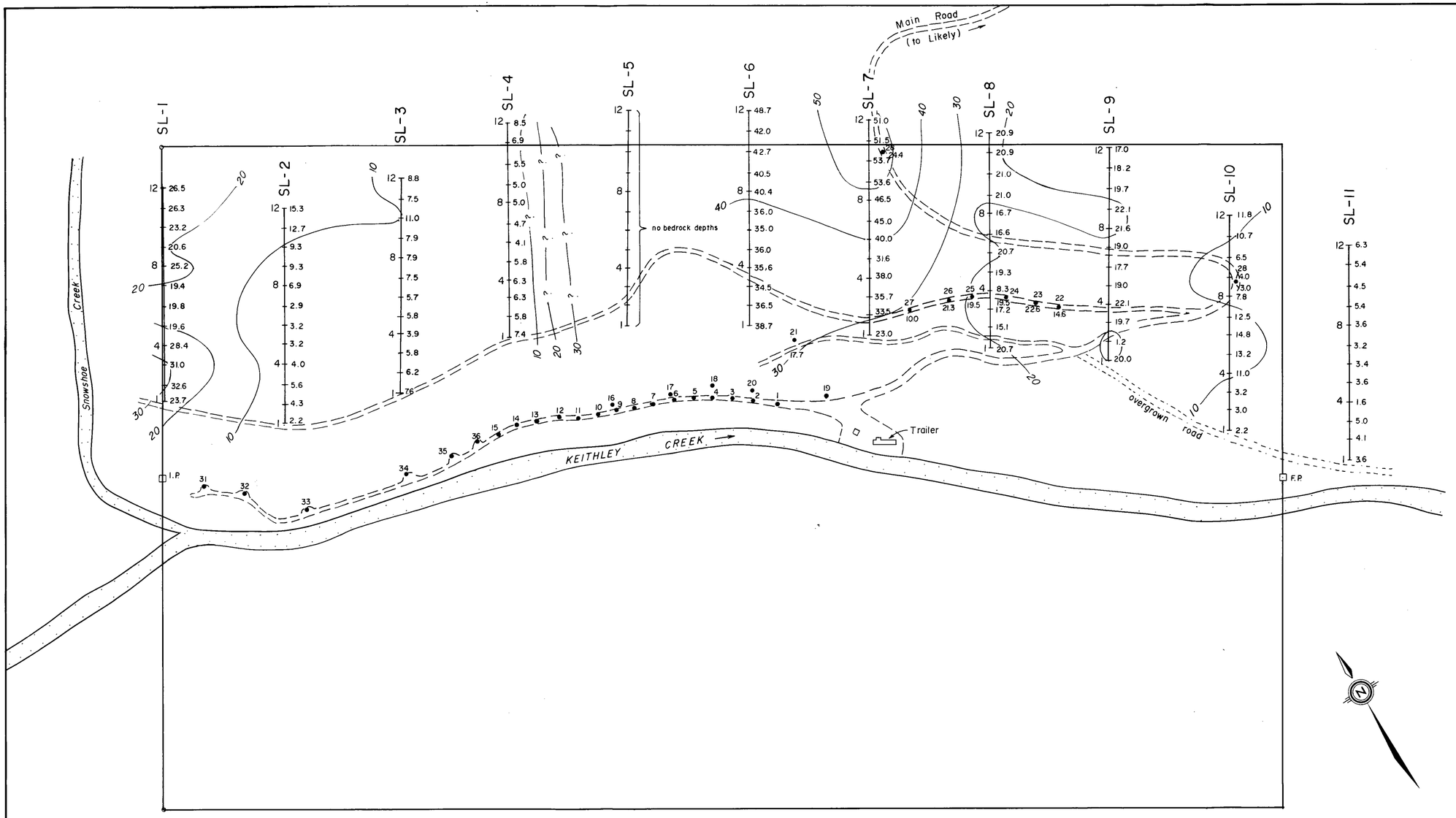
CASCA CLAIM GROUP

KEITHLEY CREEK, CARIBOO LAKE AREA B.C.

SEISMIC REFRACTION STUDY

CLAIM MAP

SCALE:	DATE:	JOB No.	SHEET No.
1:50,000	SEPT., 1981	80-84	1



LEGEND

- Seismic line
- 4 — 28.4 — Seismic depth to bedrock in metres.
- Geophone number
- 28 — Drill hole location showing
- 21.3 — Depth to bedrock in metres.
- 40 — Depth to bedrock contour. Contour interval – 10 m.

NOTE: Sketched from information from M.K. Lorimer and seismic survey notes.

SCALE IN METRES

50 25 0 50 100

GEOTRONICS SURVEYS LTD.

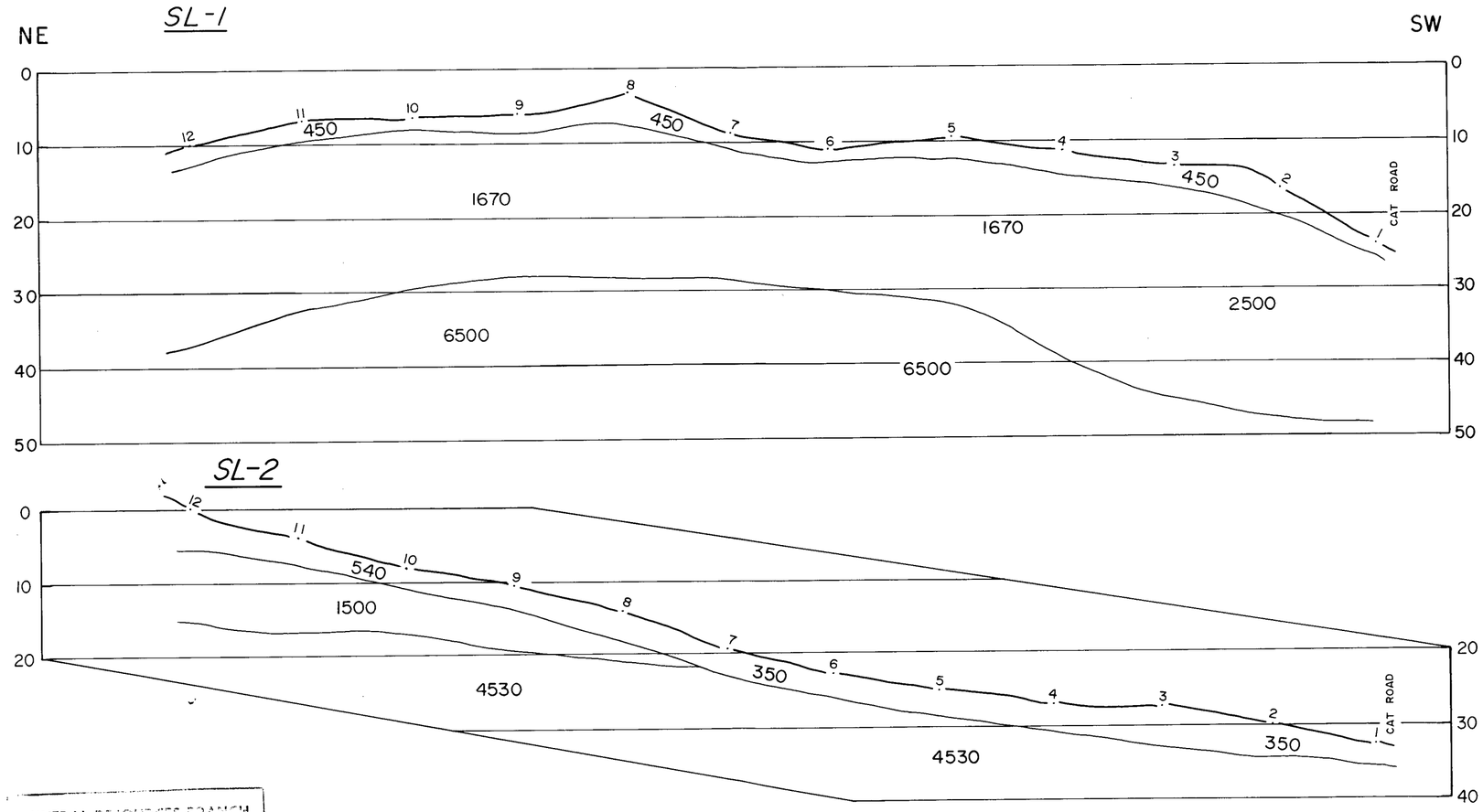
CASCADIA MINES & RESOURCES LTD.

CASCA CLAIM GROUP

KEITHLEY CREEK, CARIBOO LAKE AREA, B.C.

SEISMIC REFRACTION STUDY
PLAN OF RESULTS

SCALE:	DATE:	JOB No.	
1" : 2400	SEPT. 1981	80-84	SHEET 2



LEGEND

2 — Geophone location

Calculated seismic interface

2100 — Average velocity in metres per second

Drill hole showing bedrock

VELOCITY (m/s)	CLASSIFICATION
270 – 880	– Fairly dry to partially saturated, loose to semicompact silts, sands and gravels.
1200 – 1250	– Partially saturated, semicompact sands and gravels.
1500 – 2500	– Saturated, compact sands and gravels.
3670 – 4220	– Bedrock: volcanics
4470 – 6300	– Bedrock: intrusives; possibly volcanics.

DIRECTION OF LINE – N. 60°E.

SCALE IN METRES

10 5 0 10 20 30

GEOTRONICS SURVEYS LTD.

CASCADIA MINES & RESOURCES LTD.

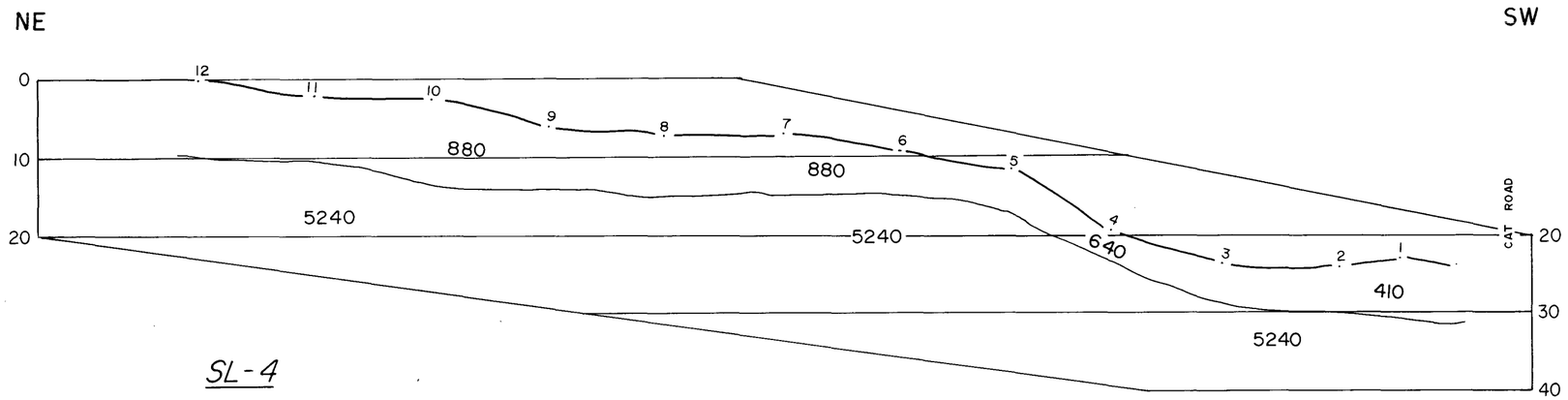
CASCA CLAIM GROUP

KEITHLEY CREEK, CARIBOO LAKE AREA, B.C.

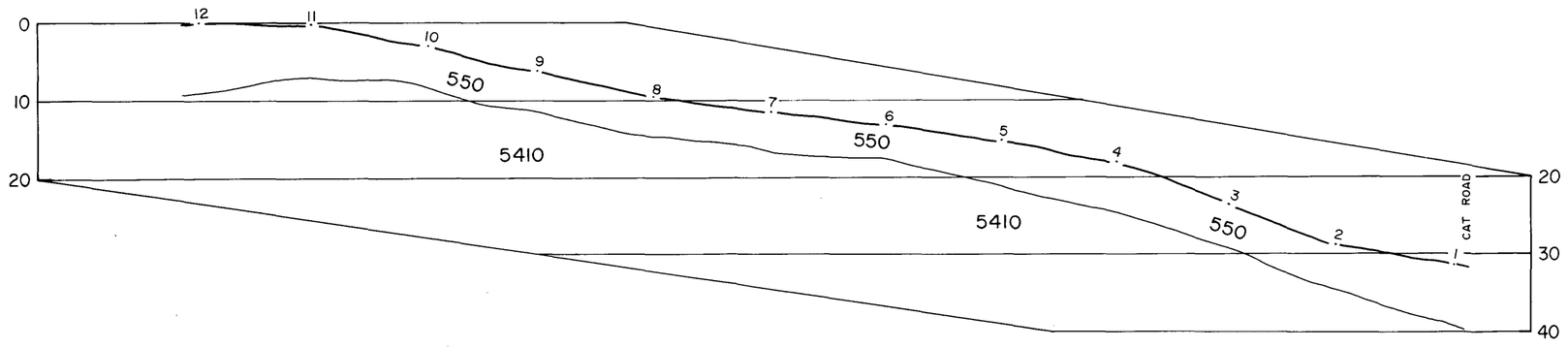
SEISMIC REFRACTION STUDY
PROFILE SL-1 & SL-2

SCALE:	DATE:	JOB No.	SHEET
1 : 600	SEPT. 1981	80-84	3

SL-3



SL-4



LEGEND

2 — Geophone location

Calculated seismic interface

2100 — Average velocity in metres per second

Drill hole showing bedrock

VELOCITY (m/s)	CLASSIFICATION
270 - 880	- Fairly dry to partially saturated, loose to semicompact silts, sands and gravels.
1200 - 1250	- Partially saturated, semicompact sands and gravels.
1500 - 2500	- Saturated, compact sands and gravels.
3670 - 4220	- Bedrock: volcanics
4470 - 6300	- Bedrock: intrusives; possibly volcanics.

DIRECTION OF LINE - N. 60°E.

SCALE IN METRES

10 5 0 10 20 30

GEOTRONICS SURVEYS LTD.

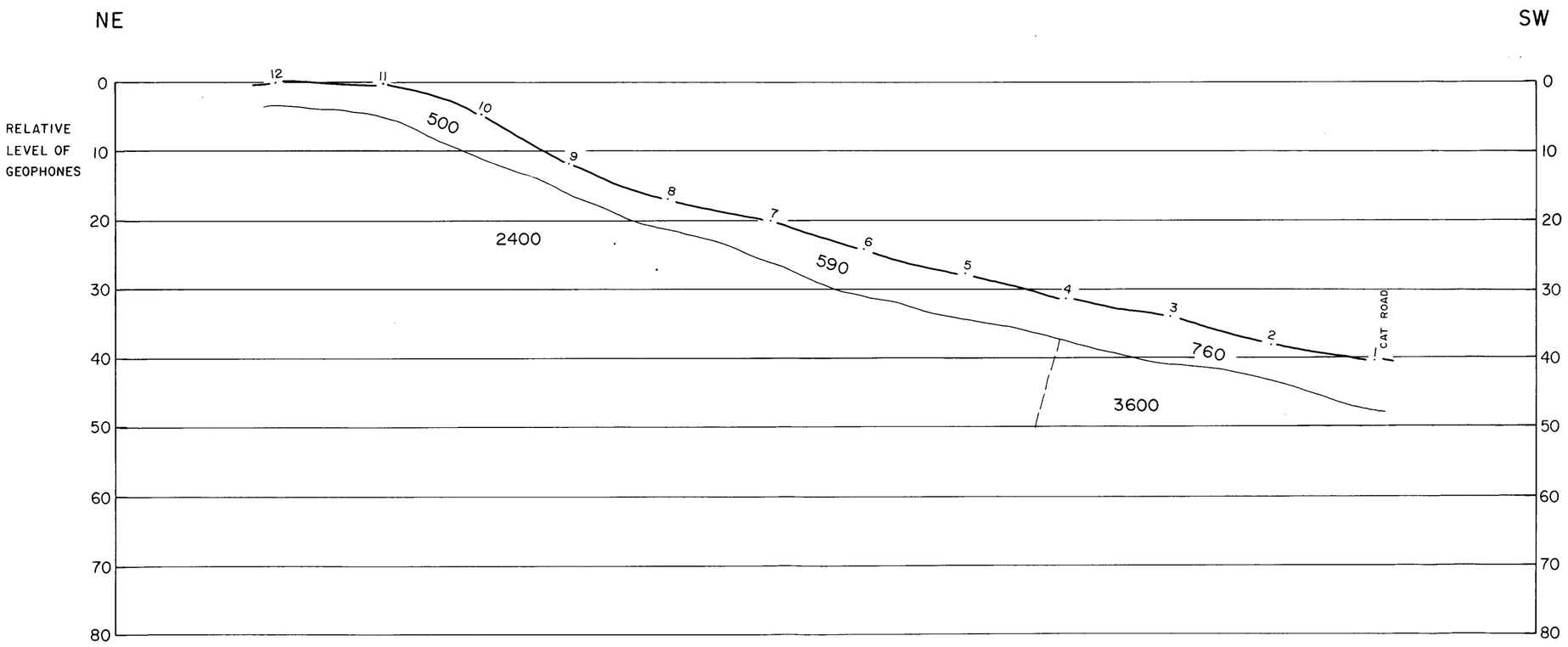
CASCADIA MINES & RESOURCES LTD.

CASCA CLAIM GROUP

KEITHLEY CREEK, CARIBOO LAKE AREA, B.C.

SEISMIC REFRACTION STUDY
PROFILE SL-3 & SL-4

SCALE:	DATE:	JOB No.	SHEET
1 : 600	SEPT. 1981	80-84	4



LEGEND

2 — Geophone location

Calculated seismic interface

2100 — Average velocity in metres per second

Drill hole showing bedrock

VELOCITY (m/s)	CLASSIFICATION
270 - 880	- Fairly dry to partially saturated, loose to semicompact silts, sands and gravels.
1200 - 1250	- Partially saturated, semicompact sands and gravels.
1500 - 2500	- Saturated, compact sands and gravels.
3670 - 4220	- Bedrock: volcanics
4470 - 6300	- Bedrock: intrusives; possibly volcanics.

DIRECTION OF LINE - N. 60°E.

SCALE IN METRES

10 5 0 10 20 30

GEOTRONICS SURVEYS LTD.

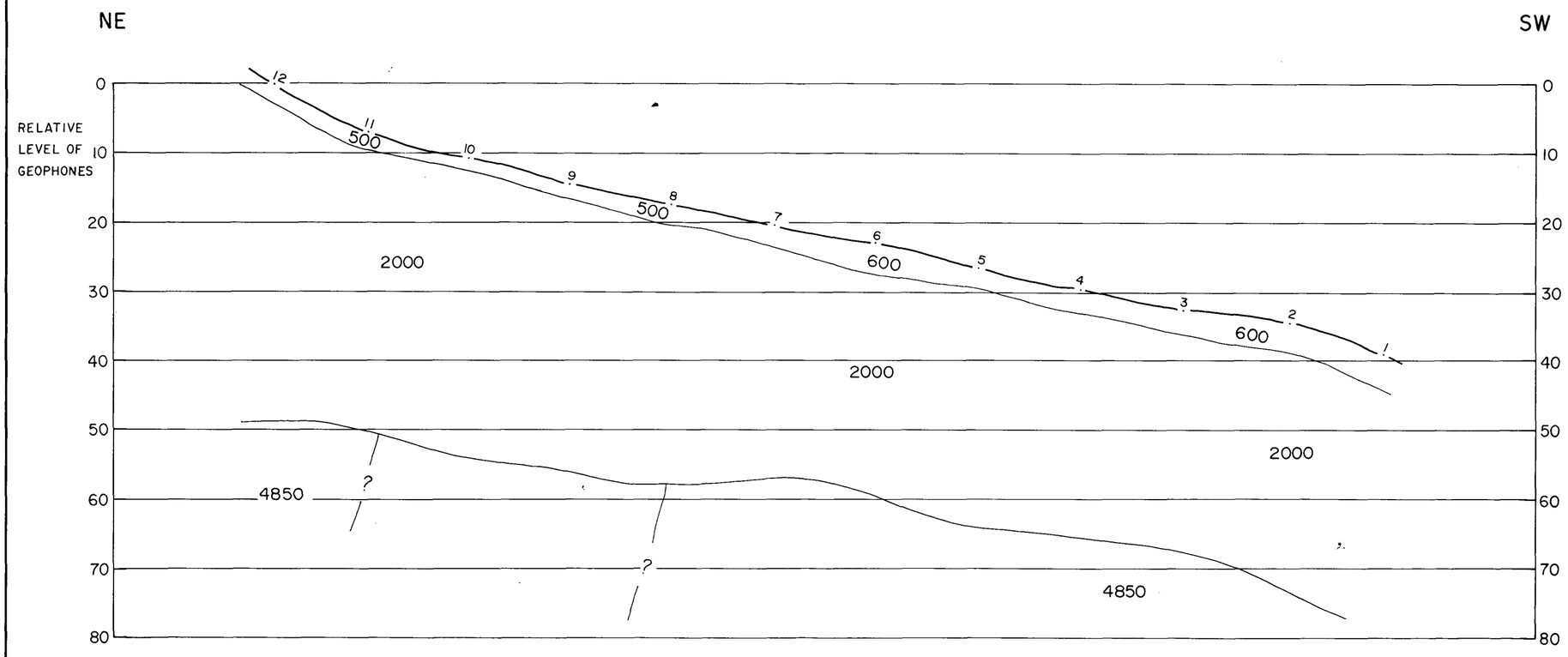
CASCADIA MINES & RESOURCES LTD.

CASCA CLAIM GROUP

KEITHLEY CREEK, CARIBOO LAKE AREA, B.C.

SEISMIC REFRACTION STUDY
PROFILE SL-5

SCALE:	DATE:	JOB No.	SHEET 5
1:600	SEPT. 1981	80-84	



LEGEND

2 — Geophone location

Calculated seismic interface

2100 — Average velocity in metres per second

Drill hole showing bedrock

VELOCITY (m/s)	CLASSIFICATION
270 – 880	– Fairly dry to partially saturated, loose to semicompact silts, sands and gravels.
1200 – 1250	– Partially saturated, semicompact sands and gravels.
1500 – 2500	– Saturated, compact sands and gravels.
3670 – 4220	– Bedrock: volcanics
4470 – 6300	– Bedrock: intrusives; possibly volcanics.

DIRECTION OF LINE – N. 60°E.

SCALE IN METRES

10 5 0 10 20 30

GEOTRONICS SURVEYS LTD.

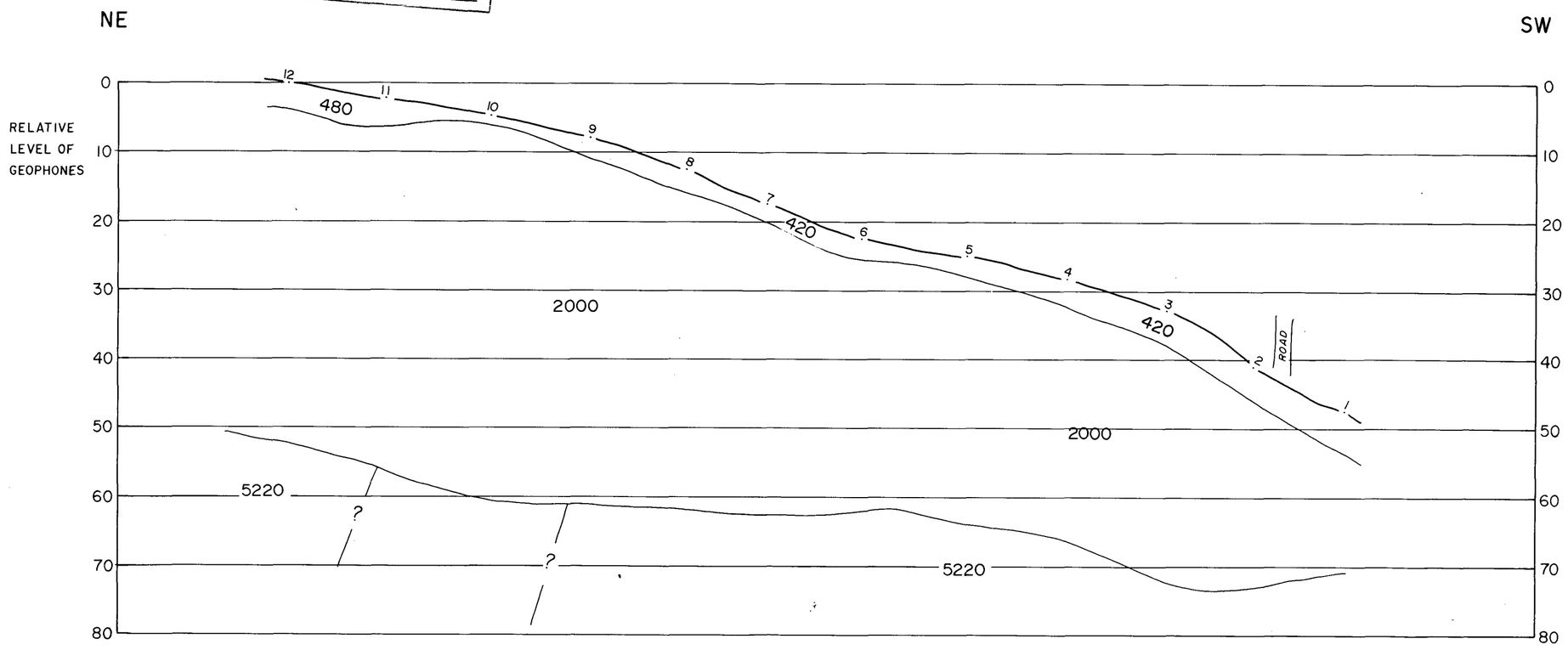
CASCADIA MINES & RESOURCES LTD.

CASCA CLAIM GROUP

KEITHLEY CREEK, CARIBOO LAKE AREA, B.C.

SEISMIC REFRACTION STUDY
PROFILE SL-6

SCALE:	DATE:	JOB No.	
1 : 600	SEPT. 1981	80-84	SHEET 6



LEGEND

2 — Geophone location

Calculated seismic interface

2100 — Average velocity in metres per second

Drill hole showing bedrock

VELOCITY (m/s)	CLASSIFICATION
270 – 880	– Fairly dry to partially saturated, loose to semicompact silts, sands and gravels.
1200 – 1250	– Partially saturated, semicompact sands and gravels.
1500 – 2500	– Saturated, compact sands and gravels.
3670 – 4220	– Bedrock: volcanics
4470 – 6300	– Bedrock: intrusives; possibly volcanics.

DIRECTION OF LINE – N. 60°E.

SCALE IN METRES

10 5 0 10 20 30

GEOTRONICS SURVEYS LTD.

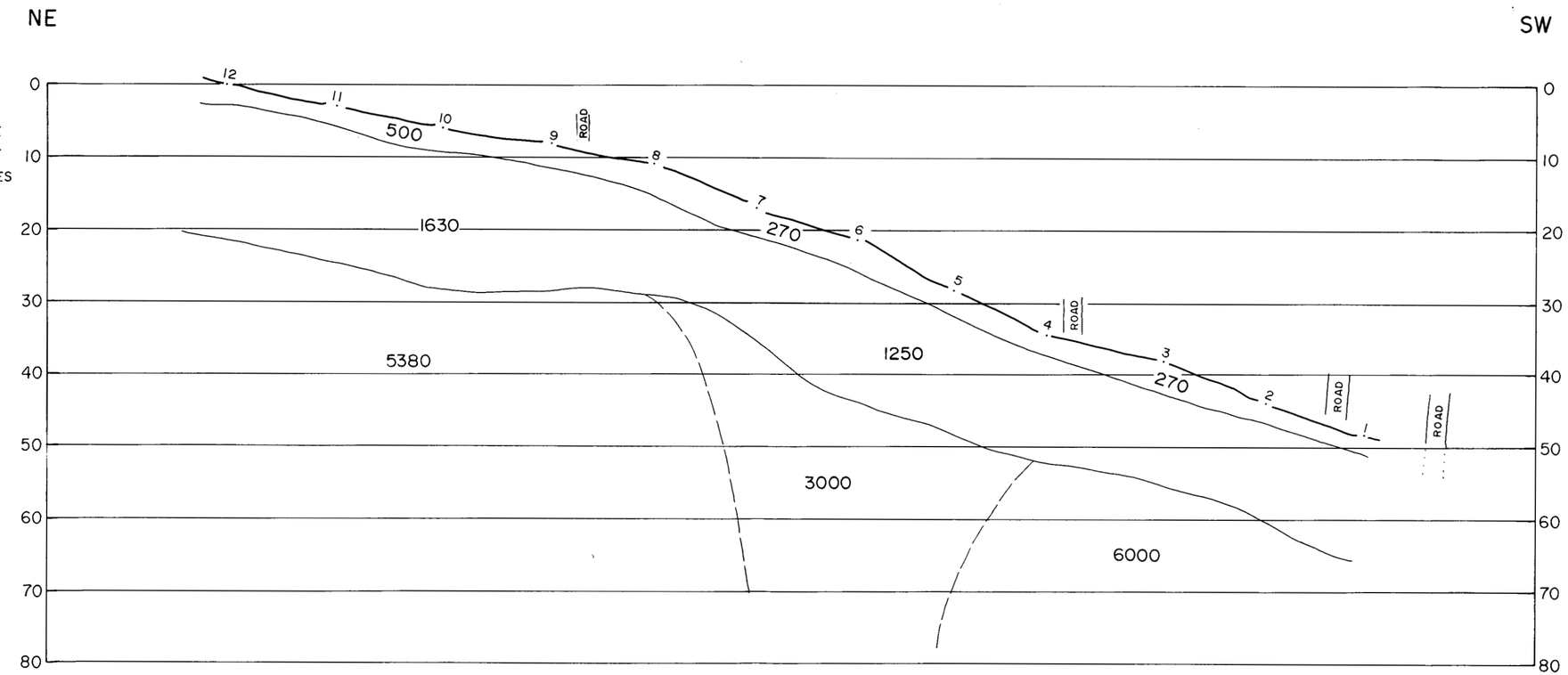
CASCADIA MINES & RESOURCES LTD.

CASCA CLAIM GROUP

KEITHLEY CREEK, CARIBOO LAKE AREA, B.C.

SEISMIC REFRACTION STUDY
PROFILE SL-7

SCALE:	DATE:	JOB No.	
1 : 600	SEPT. 1981	80-84	SHEET 7



LEGEND

2 — Geophone location

Calculated seismic interface

2100 — Average velocity in metres per second

Drill hole showing bedrock

VELOCITY (m/s)	CLASSIFICATION
270 - 880	- Fairly dry to partially saturated, loose to semicompact silts, sands and gravels.
1200 - 1250	- Partially saturated, semicompact sands and gravels.
1500 - 2500	- Saturated, compact sands and gravels.
3670 - 4220	- Bedrock: volcanics
4470 - 6300	- Bedrock: intrusives; possibly volcanics.

DIRECTION OF LINE - N. 60°E.

SCALE IN METRES

10 5 0 10 20 30

GEOTRONICS SURVEYS LTD.

CASCADIA MINES & RESOURCES LTD.

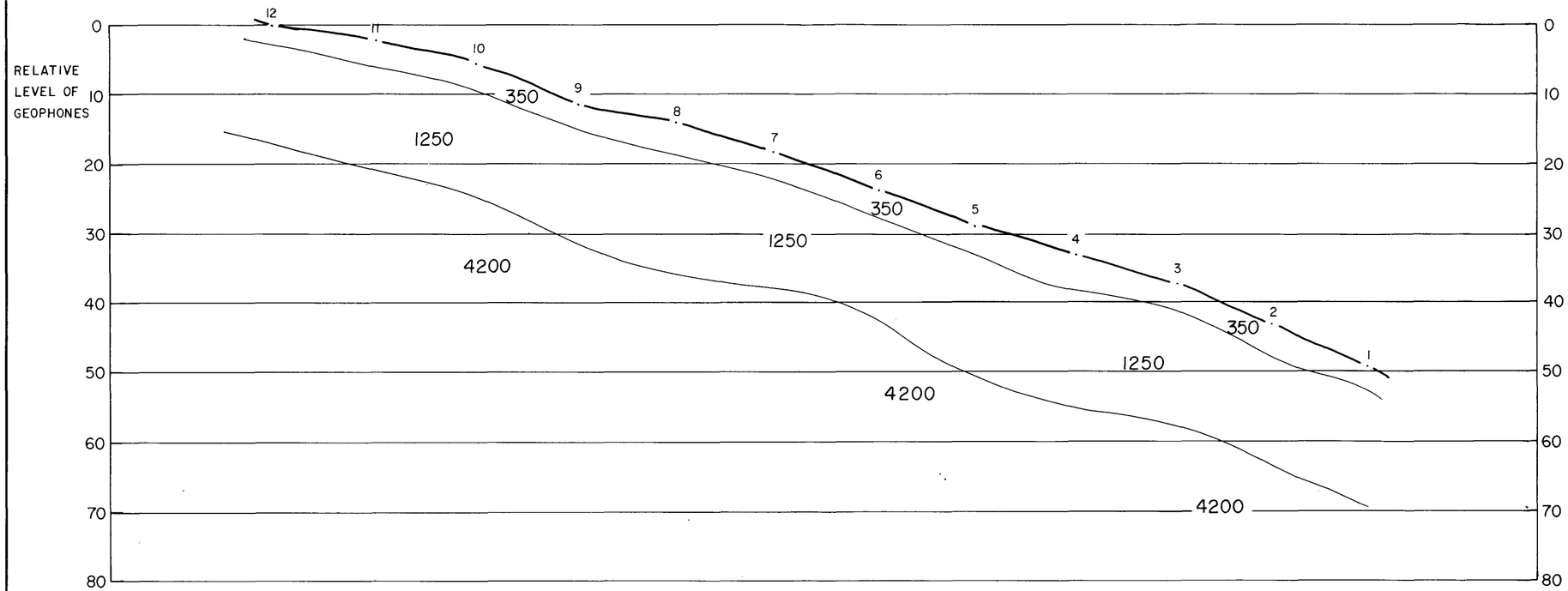
CASCA CLAIM GROUP

KEITHLEY CREEK, CARIBOO LAKE AREA, B.C.

SEISMIC REFRACTION STUDY

PROFILE SL-8

SCALE:	DATE:	JOB No.	
1 : 600	SEPT. 1981	80-84	SHEET 8



LEGEND

2 — Geophone location

Calculated seismic interface

2100 — Average velocity in metres per second

Drill hole showing bedrock

VELOCITY (m/s)	CLASSIFICATION
270 – 880	- Fairly dry to partially saturated, loose to semicompact silts, sands and gravels.
1200 – 1250	- Partially saturated, semicompact sands and gravels.
1500 – 2500	- Saturated, compact sands and gravels.
3670 – 4220	- Bedrock: volcanics
4470 – 6300	- Bedrock: intrusives; possibly volcanics.

DIRECTION OF LINE – N. 60°E.

SCALE IN METRES

10 5 0 10 20 30

GEOTRONICS SURVEYS LTD.

CASCADIA MINES & RESOURCES LTD.
CASCA CLAIM GROUP
KEITHLEY CREEK, CARIBOO LAKE AREA, B.C.

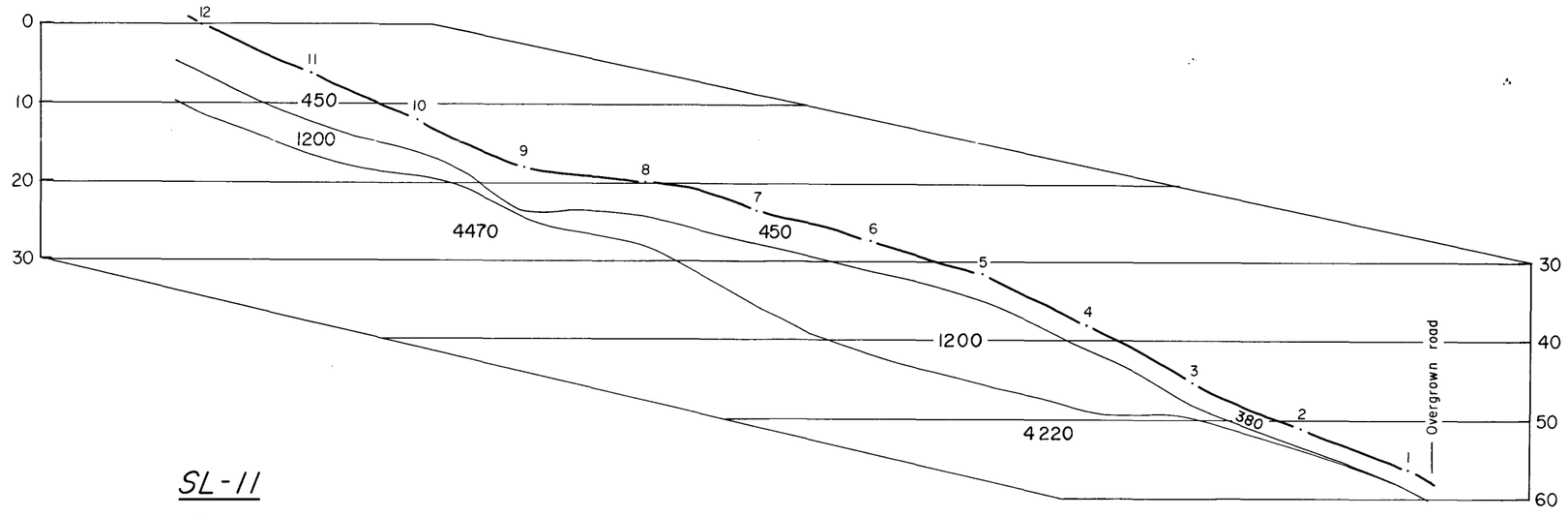
SEISMIC REFRACTION STUDY
PROFILE SL-9

SCALE:	DATE:	JOB No.	
1 : 600	SEPT. 1981	80-84	SHEET 9

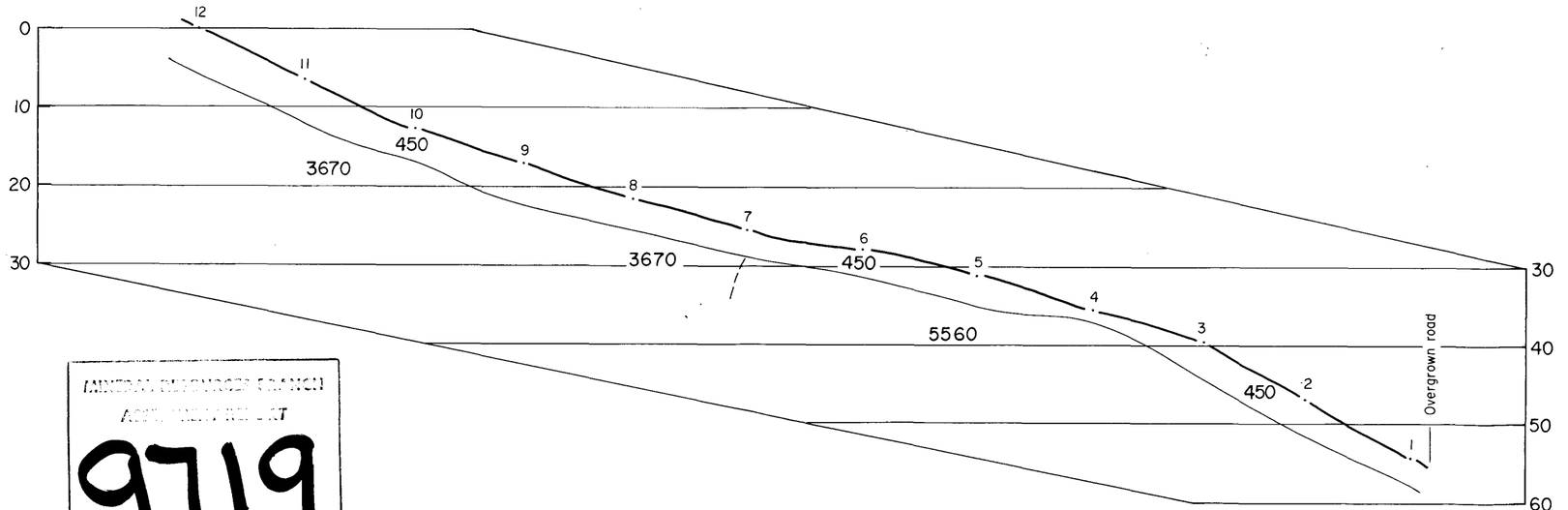
NE

SL-10

SW



SL-11



LEGEND

2 — Geophone location

Calculated seismic interface

2100 — Average velocity in metres per second

Drill hole showing bedrock

VELOCITY (m/s)	CLASSIFICATION
270 – 880	– Fairly dry to partially saturated, loose to semicompact silts, sands and gravels.
1200 – 1250	– Partially saturated, semicompact sands and gravels.
1500 – 2500	– Saturated, compact sands and gravels.
3670 – 4220	– Bedrock: volcanics
4470 – 6300	– Bedrock: intrusives; possibly volcanics.

DIRECTION OF LINE – N. 60° E.

SCALE IN METRES

10 5 0 10 20 30

GEOTRONICS SURVEYS LTD.

CASCADIA MINES & RESOURCES LTD.

CASCA CLAIM GROUP

KEITHLEY CREEK, CARIBOO LAKE AREA, B.C.

SEISMIC REFRACTION STUDY

PROFILES SL-10 & SL-11

SCALE:	DATE:	JOB No.	
1 : 600	SEPT. 1981	80-84	SHEET 10