

GEOPHYSICAL REPORT  
ON A  
VLF-EM SURVEY  
OVER THE  
LINCOLN II CLAIM GROUP  
RETALLACK AREA  
SLOCAN MINING DIVISION  
BRITISH COLUMBIA

LINCOLN II CLAIM : On Robb Creek, 3.0 km southeast  
of Blaylock  
: 50° 117° SE  
: N.T.S. 82K/3E  
WRITTEN FOR : PHASAR RESOURCES CORPORATION  
#504-475 Howe Street  
Vancouver, B.C.  
V6C 2B3  
WRITTEN BY : David G. Mark, Geophysicist  
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Vancouver, B.C.  
V6G 2T8  
DATED : January 15, 1983



GEOTRONICS SURVEYS LTD.  
Engineering & Mining Geophysicists  
VANCOUVER, CANADA



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**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

11,102  
~~11,902~~

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## SUMMARY

During the fall of 1982, a VLF-EM survey was carried out over two areas of the Lincoln II Claim Group. The center of this property is located 2.5 km southeast of Retallack located on Highway 31A between Kaslo and New Denver, B.C. Access to much of the property is easily gained by a two-wheel drive vehicle. The terrain consists of mainly moderate to steep mountainous slopes forested with moderately dense coniferous trees. The purpose of the survey was to extend the known zones of lead, zinc and silver mineralization through mapping the structure.

The claim group is underlain by sediments of the Triassic Slocan Group, mostly argillites with a few beds of limestone. The sediments have been intruded by some sills and plugs of feldspar porphyry. This is a similar geologic environment to that of most of the mines in the area, which are hosted by the same formations. Two old workings exist on the claim group; the Vera prospect, and the Lincoln mine, which was a minor producer with a recorded output of 137 tons of lead-zinc-silver ore. The former is a fissure-lode type of occurrence, while the latter is a replacement deposit in a limestone bed.

The VLF-EM readings were taken every 10 meters on 20-meter separated northeast lines for the Lincoln survey and northwest lines for the Kootenay Star Fraction survey. They were then Fraser-filtered, plotted and contoured.

### CONCLUSIONS

The VLF-EM anomalies have reflected conductors that are probably geological structure such as faults, shears and contacts.

Some of the most interesting parts of the VLF-EM anomalies are those that appear to indicate cross-structure since these would be prime areas to look for sulphide mineralization. In general, the VLF-EM survey over both areas has revealed complex structure which is encouraging for future exploration.

### RECOMMENDATIONS

1. The VLF-EM survey should be extended over the remainder of the property.
2. A soil geochemistry survey should be carried out over the whole property using the same grid. The samples should be tested for lead, zinc and silver.
3. A magnetometer survey over the property would aid in geological mapping.
4. Further work that may be recommended is an induced polarization survey and a diamond drilling program but these are contingent upon the results of the soil geochemistry and magnetic surveys.

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INTRODUCTION AND GENERAL REMARKS

This report discusses the survey procedure, compilation of data, and the interpretation of a very low frequency electromagnetic (VLF-EM) survey carried out over the Lincoln II Claim Group from September 20th to October 8th, 1982.

This survey was done as a result of the recommendations of an engineering report by W.G. Timmins and G. Richmond. Trans-Arctic Explorations Ltd. carried out the survey under the field supervision of Pat Crook.

A magnetic survey was carried out at the same time but the data was not usable due to magnetic storm activity.

The primary purpose of the VLF-EM survey was to extend the known zones of lead-zinc-silver mineralization found on the property. A second object of the VLF-EM survey was to delineate structure such as faults and shear zones considered

important in the exploration of the property.

### PROPERTY AND OWNERSHIP

The Lincoln II Claim Group consists of 13 claims described as follows and as shown on the claim map.

<u>CLAIM NAME</u>	<u>TYPE</u>	<u>RECORD NO.</u>	<u>NOMINAL UNITS</u>	<u>EXPIRY DATE</u>
PHASAR #1	MOD. GRID	2742(10)	18	Oct. 9, 1982
PHASAR #2	MOD. GRID	2743(10)	15	Oct. 9, 1982
CATHE	MOD. GRID	2755(10)	2	Oct. 27, 1982
ZEPHYR	MOD. GRID	1988(6)	2	June 13, 1984
ZEPHYR #2	MOD. GRID	2230(10)	2	Oct. 8, 1983
PURINA FR.	FRACTIONAL	2754(10)	1	Jan. 4, 1983
LINCOLN	REV. C.G.	326(1)	1	Apr. 21, 1983
CELEBRATION	REV. C.G.	1921(4)	1	Apr. 21, 1983
DEATH'S HEAD	REV. C.G.	1922(4)	1	Dec. 18, 1983
TREADWELL	REV. C.G.	1060(12)	1	Oct. 15, 1983
KOOTENAY STAR	REV. C.G.	1456(10)	1	Oct. 15, 1983
DEMOCRAT	REV. C.G.	1517(10)	1	Oct. 15, 1983
KOOTENAY STAR FR.	REV. C.G.	1518(10)		

The property is owned by Phasar Resources Corporation of Vancouver, British Columbia.

### LOCATION AND ACCESS

The old workings of the Lincoln Crown Grant are located on the east side of Robb Creek, about 2 km upstream from where that creek meets the Kaslo River adjacent to the New Denver-Kaslo highway, a few km east of Retallack.

The geographical coordinates are 50° 01' N latitude and 117° 07' W. longitude.

A fairly good gravel road leads from the highway up the west side of Robb Creek, and crosses the creek about 1,000 m south of the old workings. Access to the workings is by foot from this point.

### PHYSIOGRAPHY

The property is found within the Selkirk Mountains, a physiographic division of the Columbia Mountain System. The country in the area is mountainous, with steep slopes and deep valleys. The elevation varies from 1,030 m to 1,930 m to give a range of 900 m. The lower slopes of the mountains are heavily forested with spruce, fir and pine, with dense underbrush in logged or burnt-off areas. An adit on the Lincoln Crown Grant is toward the top of a steep hillside, with a steep continuous slope all the way down to the valley bottom.

The main water source is Robb Creek which flows northerly through the center of the claim group into Kaslo River.

### HISTORY OF PREVIOUS WORK

A number of old workings exist on the property that date in the late 1800's. Timmins and Richmond give a full description in their report on the property. No other work has been done, however, since Phasar acquired the property.

### GEOLOGY

The following is quoted from Timmins' and Richmond's engineering report on the property:

"The Lincoln Claim Group is underlain by sedimentary rocks of the Triassic Slocan Group intruded by a few sills and plugs of feldspar porphyry, probably related to the Nelson



Plutonic rocks. The predominant rock type exposed on the claims is thin-bedded siltstone or silty argillite. Thin limestone beds are not uncommon, and at least one bed of substantial thickness occurs, which hosts the mineralization on the Lincoln Crown Grant (Cairnes, 1935). The old workings on the Lincoln Crown Grant were not visited by the writer, however it was possible to examine a small showing on the common boundary of the Zephyr and Zephyr II claims at a point about 1.5 km south of the L.C.P. (The government claim map is apparently in error, as it shows about a 200 m gap between the Zephyr and Zephyr II claims, however as seen by the writer on September 23, 1981, the two have a common L.C.P.). The rocks exposed in this showing, which has been dozer trenched, are mainly thin-bedded silty argillites of the Slocan Group, interbedded with a few thin beds of fine-grained grey crystalline limestone. The bedding strikes at south  $55^{\circ}$  east and dips  $45^{\circ}$  to the southwest. The limestone is cut by numerous small stringers of white calcite, and evidently contains some siderite, as it often has a rusty weathering surface. There are some small pockets or fractured areas where the limestone has been replaced by siderite, quartz, sphalerite and galena. As well, the more massive limestone is cut by fractures filled with galena and crystalline calcite. A sill of quartz-feldspar porphyry of about 2.5 meters in width occurs near the showings, in contact with argillites above and below. An irregular quartz veins cuts both the porphyry sill and the argillites, indicating that the sill was emplaced before deformation in the area was complete.

"This showing (designated "Zephyr showing" on the map following) does not in itself appear to have economic potential, but it is significant as an indicator of the type or types of

mineralization that may occur on the claims. Fracture-fillings of galena varying in thickness from a mere film to several centimeters were observed by the writer, as were mineralized pods that are apparently the result of limestone replacement. The showings on the Vera (Kootenay Star Fr.) and Lincoln Crown Grants are concisely described by Cairnes (1935) and these descriptions are fully quoted in this report under "History and Previous Development". The significant points are that the Vera showing appears to be a simple fracture filling, with the mineralization confined to a limestone bed due to the fact that the fractures die out in the argillites; whereas the Lincoln showing is described as a true replacement, with mineralization controlled by fracturing in the limestone but proceeding laterally from the fracture into the limestone.

"The presence of widespread fracturing in the claim area is significant, since fractures localize virtually all the ore deposits in the Slocan camp, whether they be lode or replacement type. Likewise, the presence of limestone beds of substantial thickness is also significant, as all the replacement deposits found to date in the Slocan camp are hosted by limestone. The limestone beds described at the Lincoln and Vera showings appear to be on trend with beds mapped several km to the northwest. Beds higher and lower than these in the stratigraphy are mapped southeasterly all the way to the vicinity of the Phasar claims, however these intermediate beds are not. This could be due to heavy overburden cover, poor access for mapping, or discontinuity of the beds themselves. The beds may be more or less continuous through the Phasar claims, but of insufficient size to be mapped on a regional scale as the other beds have been. Detailed mapping on the claims would clarify this situation."

### INSTRUMENTATION AND THEORY

A VLF-EM receiver, Model 27, manufactured by Sabre Electronic Instruments Ltd. of Burnaby, B.C. was used for the survey. This instrument is designed to measure the magnetic component of a very low frequency (VLF-EM) electromagnetic field. The U.S. Navy submarine transmitter located at Seattle, Washington and transmitting at 24.8 KHz was used.

In all electromagnetic prospecting, a transmitter produces an alternating magnetic field (primary) by a strong alternating current usually through a coil or wire. If a conductive mass such as a sulphide body is within this magnetic field, a secondary alternating current is induced within it which in turn induces a secondary magnetic field that distorts the primary magnetic field. It is this distortion that the EM receiver measures. The VLF-EM uses a frequency range from 16 to 24 KHz whereas most EM instruments use frequencies ranging from a few hundred to a few thousand Hz. Because of its relatively high frequency, the VLF-EM can pick up bodies of a low conductivity and therefore is more susceptible to clay beds, electrolyte-filling fault or shear zones and porous horizons, graphite, carbonaceous sediments, lithological contacts as well as sulphide bodies of too low a conductivity for other EM methods to pick up.

Consequently, the VLF-EM has additional uses in mapping structure and in picking up sulphide bodies of too low a conductivity for conventional EM methods and too small for induced polarization (in places it can be used instead of IP). However, its susceptibility to lower conductive bodies results in a number of anomalies, many of them difficult to explain and, thus, VLF-EM preferably should not be inter-

puted without a good geological knowledge or the property and/or other geophysical and geochemical surveys.

#### SURVEY PROCEDURE

There were two areas covered during the survey. The first was 7 km of VLF-EM entirely covering the Kootenay Star Fr. and partially extending onto the Purina Fr; Phasar #2; Democrat and Kootenay Star.

The baseline was run for 500 m at a bearing of  $28^{\circ}$  E and is well marked with orange survey flagging.

The crosslines were run perpendicular to the baseline at 20 m spacing.

The instrument readings were taken at 10 m intervals along the crosslines.

The second area of survey was entirely situated within the Lincoln and Death's Head claim boundary's. It consisted of 3.32 line km of survey.

The baseline was run for 500 m at a bearing of  $330^{\circ}$ . This line was also well flagged.

The crosslines also run parallel to each other at a 20 m spacing.

The instrument readings were taken at 10 m intervals along these traversed lines.

All readings were taken with the instrument facing the transmitter at Seattle.

### COMPILATION OF DATA

The readings were reduced by applying the Fraser filter. Filtered data, as shown on Sheet 1, are plotted between the reading stations. The positive filtered values were contoured at intervals of  $4^{\circ}$  starting at  $0^{\circ}$ .

The Fraser filter is essentially a 4-point difference operator which transforms zero crossings into peaks, and a low pass smoothing operator which reduced the inherent high frequency noise in the data. Therefore, the noisy, non-contourable data are transformed into less noisy, contourable data. Another advantage of this filter is that a conductor that does not show up as a cross-over on the unfiltered data quite often will show up on the filtered data.

### DISCUSSION OF RESULTS

The major cause of the VLF-EM anomalies, as a rule, are geologic structures such as fault, shear and breccia zones. It is therefore logical to interpret VLF-EM anomalies to likely be caused by these structural zones. Of course, sulphides may also be a causative source. But in the writer's experience, when VLF-EM anomalies correlate with sulphide mineralization, the anomalies are usually reflecting the structure associated with the mineralization rather than the mineralization itself.

There is considerable variation in intensity from one VLF-EM anomaly to the next. This may not only be due to the conductivity of a causative source, but also the direction it strikes relative to the direction to the transmitter. In other words, those conductors lying closer to the same direction as the direction to the transmitter (S60W in this case), can be picked up easier than those that are lying at a greater angle. Depending upon its conductivity, a conductor

may not be picked up at all if it is at too great an angle.

A noticeable feature on both maps is that the anomalies are very non-linear. It is the writer's experience that most, or at least half, of the anomalies within a VLF-EM survey area are long and linear in shape. This occurs since often the VLF-EM is responding to structures that are primarily fault zones.

On this survey, lengthy fault zones may exist but possibly at a direction close to that of the survey lines. In other words, contouring of the anomalous responses is biased in favour of the direction perpendicular to that of the survey lines. Another reason that faults may not be reflected as lineal anomalies on this survey is that the terrain may cause the surface expression of the faults to vary in direction.

Nevertheless, the writer has drawn in lineations that could be reflective of structure and that are not apparent from the contouring. These may or may not be actual geological structures and therefore should only be used as a guide. Prominent directions on both survey areas is northeast and northwest, especially on the Kootenay Star Fraction survey.

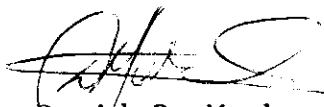
Faults, shears and contacts are often important for the emplacement of mineralizing fluids especially where the structures cross. Many of these cross points are reflected by higher VLF-EM responses, that is, anomalies of greater amplitude. These are considered to be prime exploration targets. Two anomalies especially of interest, because of their high amplitude, are those centered at (L-240 N, 33 W) and (L-220 N, 21 W) on the Kootenay Star Fraction.

In general, both surveys have revealed several complex VLF-EM anomalies that indicate much cross-structure which is quite encouraging for further exploration.

On the Lincoln Claim survey, the adit located at (L-4 N, 18 W) correlates with a VLF-EM anomaly that may indicate some length to the strike of mineralization on which the adit may have drifted on. The anomaly has a length of 90 m and is open to the south.

The direction of the transmitter station chosen for the Lincoln survey is almost the same as that of the survey lines, where the preferable direction is perpendicular to the survey lines. Nevertheless, the VLF-EM survey appeared to have picked up conductors that are encouraging for further exploration on the property.

Respectfully submitted,  
GEOTRONICS SURVEYS LTD.



David G. Mark,  
Geophysicist

January 15, 1983

SELECTED BIBLIOGRAPHY

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

Read, P.B., Map - Geology, Lardeau West Half, O.F. 432, Geological Survey of Canada, 1976.

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Timmins, W.G. and Richmond, G.S., Geological Report on the Lincoln Claim Group for Phasar Resources Corporation, W.G. Timmins Exploration & Development, January 20th, 1982.




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 located 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 15 years and have been active in the mining industry for the past 18 years.
3. I am an active 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 a VLF-EM survey carried out by Trans-Arctic Explorations Ltd. under the supervision of P. Crook from September 20th to October 8th, 1982.
5. I have no direct or indirect interest in the Lincoln II Claim Group nor in Phasar Resources Ltd., Vancouver, B.C., nor do I expect to receive any interest therein as a result of writing this report.

  
David G. Mark,  
Geophysicist

January 15, 1983

AFFIDAVIT OF EXPENSES

The VLF-EM survey was carried out on the Lincoln II Claim Group, Retallack Area, Slocan, M.D., B.C. to the value of the following:

FIELD

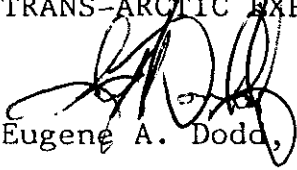
Geophysical Technician and helper 60 hours at \$35/hour	\$2,100.00
Vehicle rental, 9 days at \$60/day	540.00
Room and board, 2 men at \$30/man day, 9 days	540.00
Survey supplies	90.00
VLF-EM instrument rental, 2 weeks at \$75/week	150.00
	<u>\$3,420.00</u>

REPORT

Geophysicist 10 hours at \$30/hour	\$ 300.00
Office assistant, 14 hours at \$15/hour	210.00
Drafting and printing	350.00
Typing, photocopying and compilation	120.00
	<u>\$ 980.00</u>

TOTAL	<u>\$4,400.00</u>
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Respectfully submitted,  
TRANS-ARCTIC EXPLORATIONS LTD.

  
Eugene A. Dodd, Manager

117°07'30"

STAKED

New Denver  
← 14 Km.

STAKED  
(C.G.)

Kaslo

Lyle  
Ck.

River

Rossiter  
Ck.

Jardine  
Ck.

50°01'30"

Cathe

Phasar 2

1518 (10)

1517 (10)

2754 (10)

2230 (10)

2755 (10)

1456 (10)

1060 (12)

1988 (6)

1922 (4)

326 (1)

1921 (4)

2742 (10)

2743 (10)

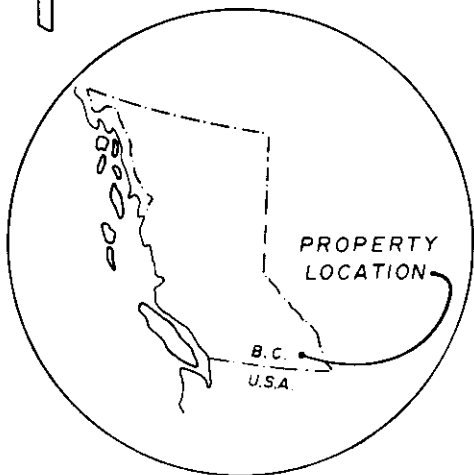
STAKED

STAKED

Zephir I

Zephir

Phasar I



PROPERTY  
LOCATION

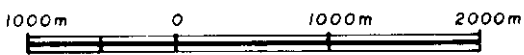
B.C.  
U.S.A.

# PHASAR RESOURCES CORPORATION

## LINCOLN II CLAIM GROUP

### RESTALLACK AREA

#### SLOCAN M.D.



NTS 82K/3E

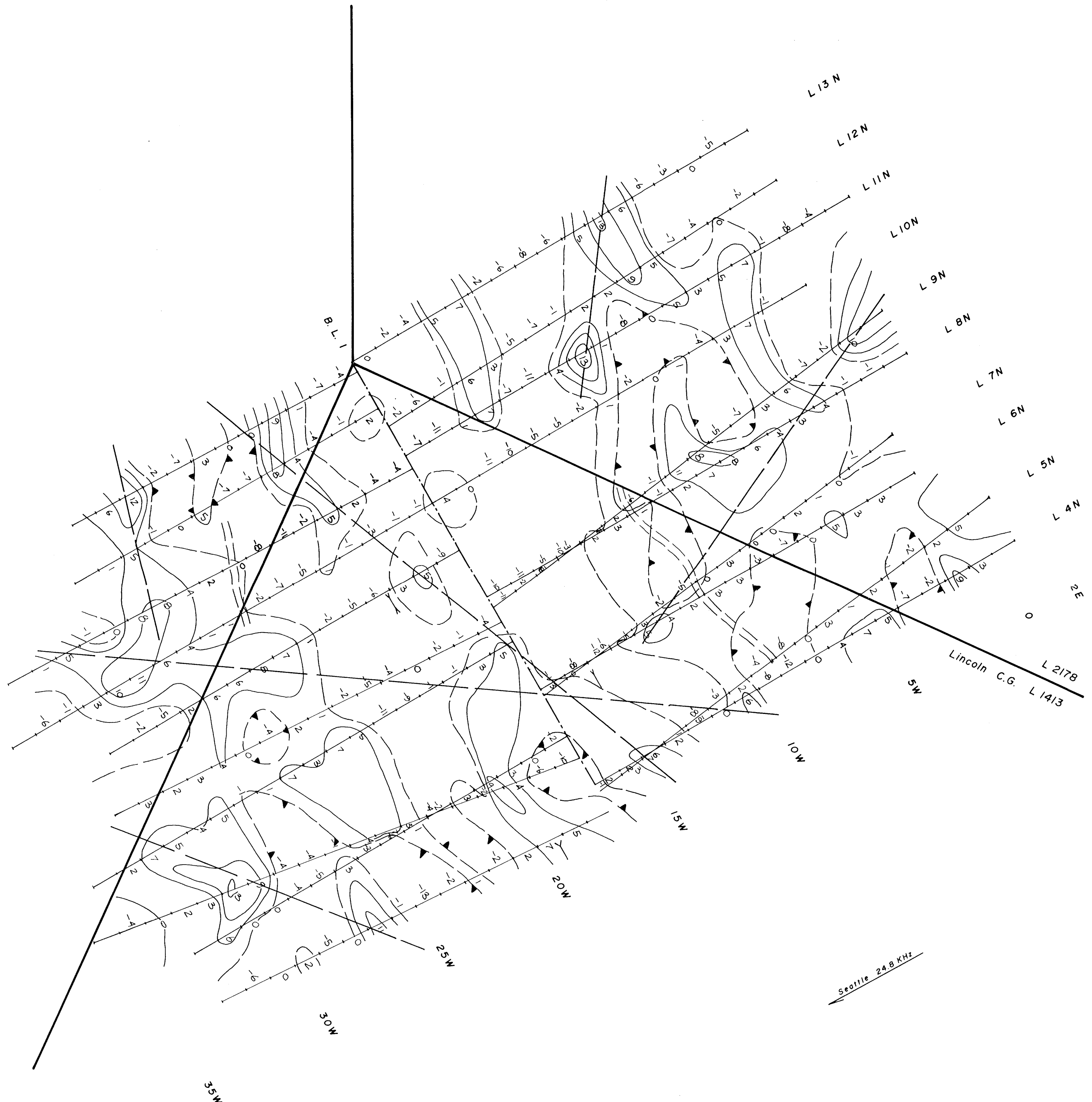
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DEC-82.

82-43

B.D.S.

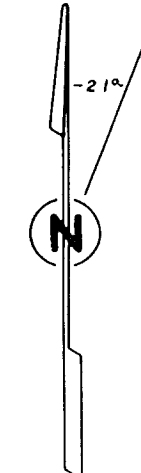
50° 00' 30"



LEGEND

- Base line
- Station
- Trail
- Trench
- Adit
- Depression zones

Lineations not apparent from the contouring

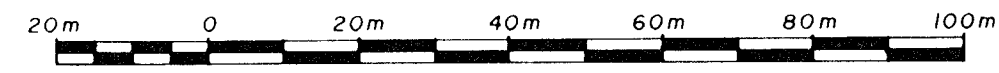


GEOLOGICAL BRANCH ASSESSMENT REPORT

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PHASAR RESOURCES CORPORATION  
 LINCOLN CLAIM  
 RETALLACK AREA  
 SLOCAN M.D.  
 VLF-EM  
 10m FRASER FILTER

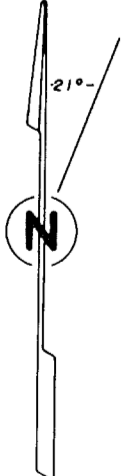
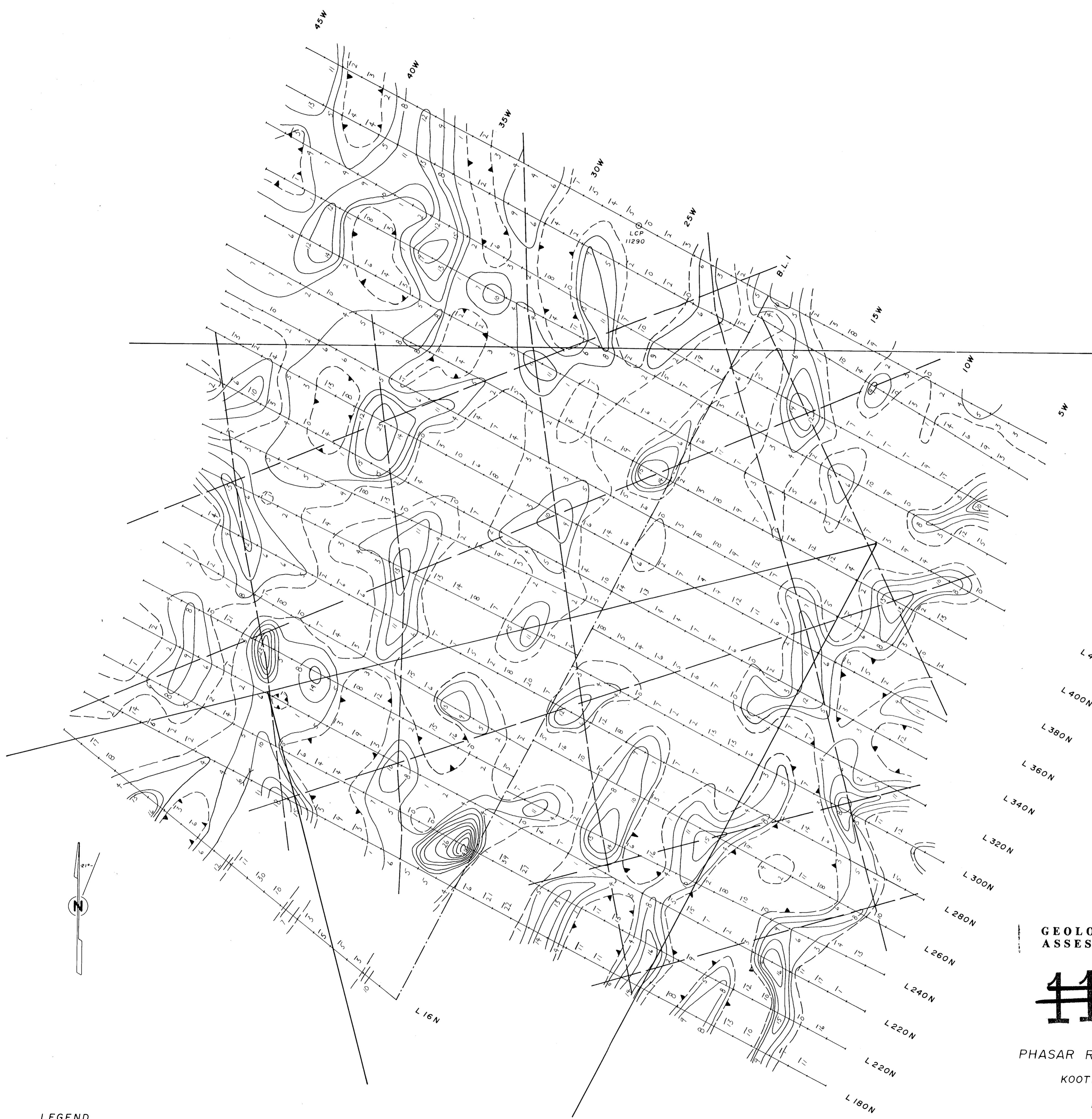
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N.T.S. 82 K/3 E

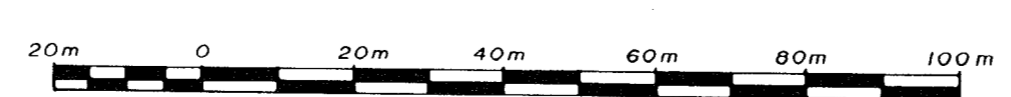
Contour interval 4°

50° 01' 30"



**LEGEND**

- Legal claim post
  - Base line
  - Trench
  - Station sample
- Lineations not apparent from contouring



N.T.S. 82 K/3 E

117° 07' 45"

Contour interval: 4°

1:1000

SHT. No. 1

DEC. 82.

B.D.S.

**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

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PHASAR RESOURCES CORPORATION

KOOTENAY STAR FRACTION

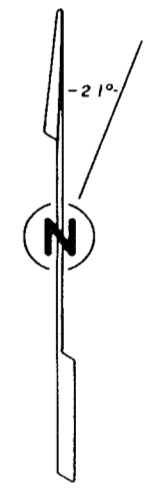
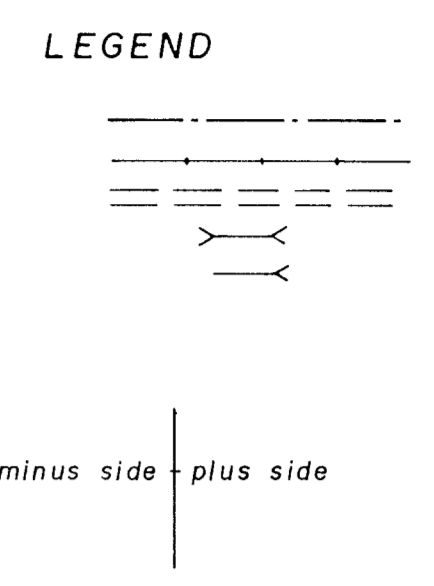
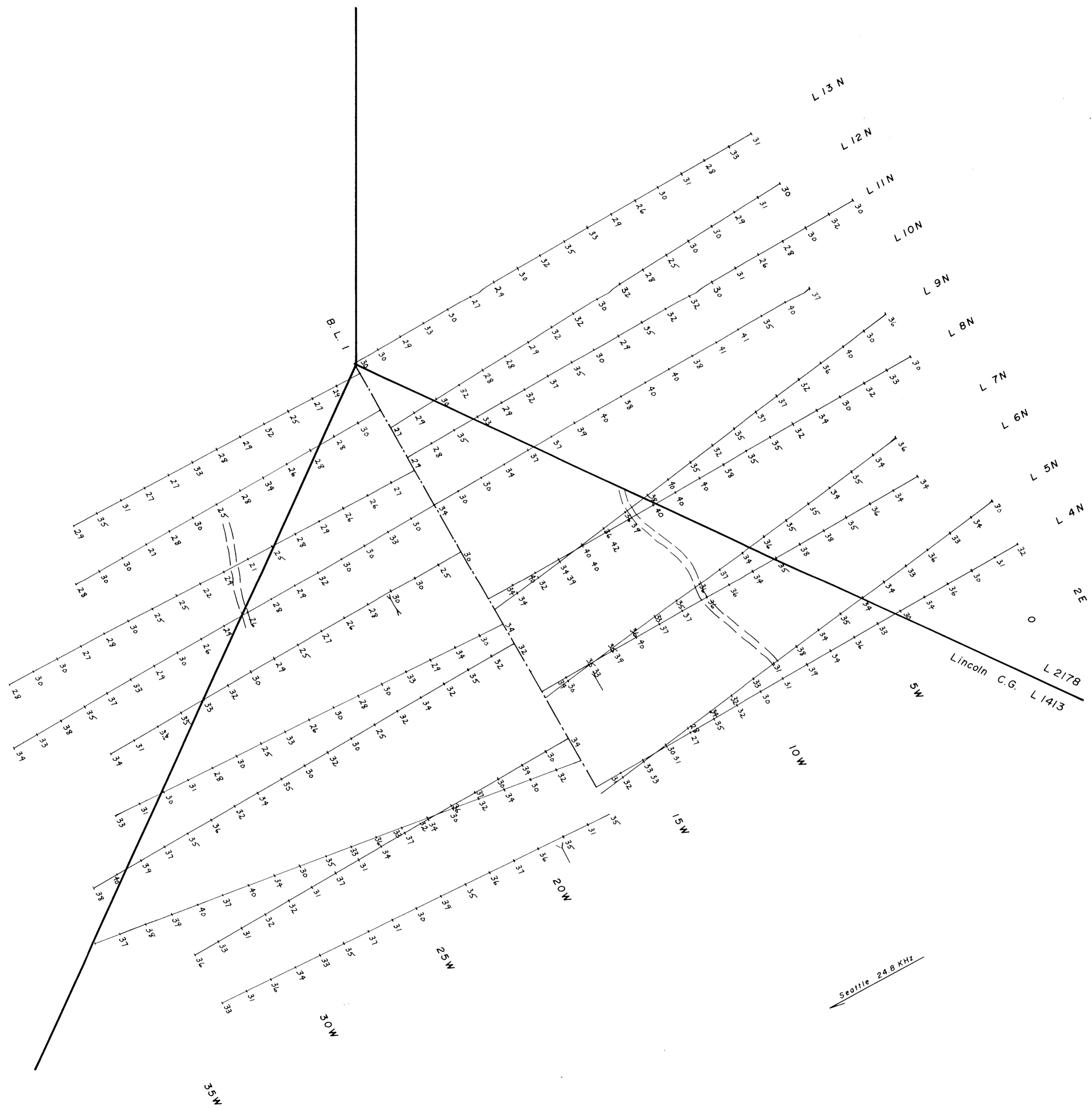
RETALLACK AREA

SLOCAN M.D.

VLF-EM

10m FRASER FILTER

50° 00' 30"

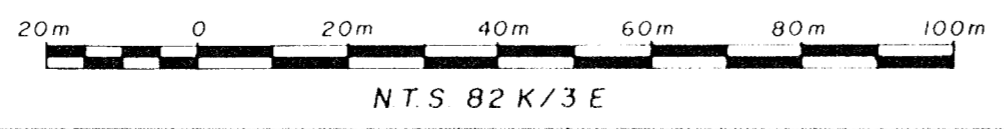


**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

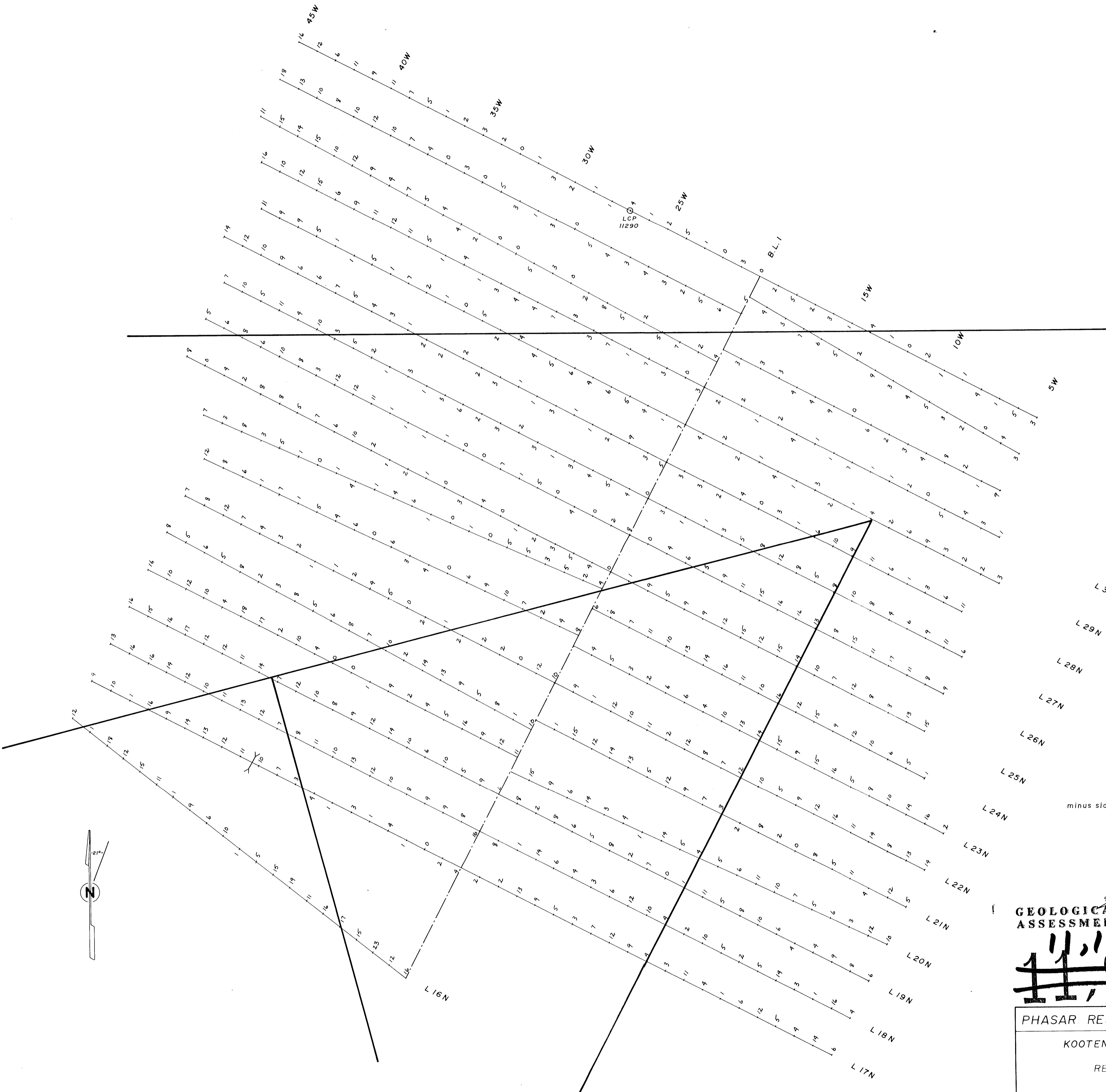
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PHASAR RESOURCES CORPORATION			
LINCOLN CLAIM			
RETAILLACK AREA			
SLOCAN M.D.			
VLF-EM			
RAW DATA			
1:1000	SHT. No. 3	DEC. 82	B. D. S.

117° 07' 30"



50°01'30"



minus side | plus side

Seattle 24.8 KHz

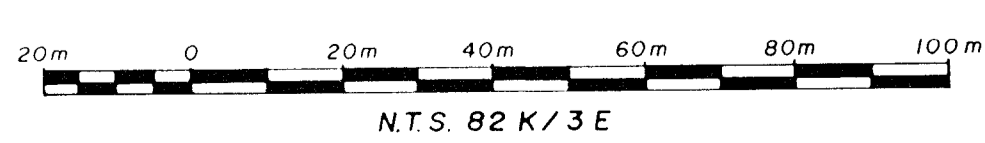
**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

**11,102**  
~~11,902~~

PHASAR RESOURCES CORPORATION			
KOOTENAY STAR FRACTION			
RETAILLACK AREA			
SLOCAN M.D.			
VLF-EM			
RAW DATA			
1:1000	SHT. No. 4	DEC. 82.	B.D.S.

**LEGEND**

- Legal claim post
- Base line
- Trench
- Station sample



117°07'45"