85-201-13609
01/86

GEOPHYSICAL REPORT

ON A

VLF-EM SURVEY

OVER THE

HELLROARING CLAIM GROUP

GRASSY MOUNTAIN, CRANBROOK AREA

FORT STEELE MINING DIVISION

BRITISH COLUMBIA

PROPERTY	: 27 km S85°W of Cranbrook, B.C. on Grassy Mountain
	: 49° 28' North Latitude 116° 10' West Longitude
	: N.T.S. 82F/8E
OWNED BY	: TRANS-ARCTIC EXPLORATIONS LTD. 815-850 West Hastings Street Vancouver, B.C., V6C 1E2
SURVEY BY	: TRANS-ARCTIC EXPLORATIONS LTD. 815-850 West Hastings St Vancouver, B.C., V6C 1E
WRITTEN BY	: David G. Mark, Geophysi GEOTRONICS SURVEYS LTD. 403-750 West Pender Str Vancouver, B.C., V6C 2T
DATED	: April 6, 1985

GEOTRONICS SURVEYS LTD.
Engineering & Mining Geophysicists
VANCOUVER, CANADA

13609

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LIST OF ILLUSTRATIONS

SUMMARY

A VLF-EM survey, was carried out over a portion of the Hellroaring Claim Group during mid-December, 1984. The property is located 27 km S85°W of Cranbrook, British Columbia on Grassy Mountain. Access to the property is easily gained by a two-wheel drive vehicle. The terrain consists of moderate to steep slopes covered with light to moderately dense coniferous trees. The purpose of the work was to locate probable areas of gold-sulphide mineralization as is found on the nearby Leader A Claim. Of particular interest were intrusive porphyries known to be associated with gold deposits in the area.

The property is primarily underlain by the Creston Formation, which is composed mostly of argillites and quartzites. Trending northeasterly through the property is an 1,800 m band of the Kitchener-Siyeh Formation which is composed of impure magnesium limestone, argillites, and calcareous quartzites. The northeasterly-trending Sawmill Creek Fault forms the northwest contact between the two formations. On the nearby Leader A Claim occurs an auriferous quartz vein (Wellington prospect) on the Sawmill Creek Fault returning assays up to 0.598 oz gold/ton and 10.56 oz silver/ton across 0.58 m.

The VLF-EM readings were taken every 20 meters on 50-meter separated east-west lines on the eastern side of the Hellroaring claim. The data was then reduced, plotted and contoured.

CONCLUSIONS

1. The Hellroaring Claim Group is located in an area of numerous gold deposits. The most well-known is the Wellington on nearby Angus Creek which occurs on the Sawmill Creek Fault. This fault runs through the Hellroaring claims. Others in close proximity to the property are the Rome and Valley deposit and the Running Wolf deposit.

2. The VLF-EM survey revealed conductors striking predominantly northerly. Conductors are indicative of geological structure such as fault, shear and contact zones. Parts or all of any one conductor can be caused by mineralization.

3. The survey area is quite limited and no other work has been done on the property. Therefore, when the exploration program is continued, a more meaningful interpretation will then be possible.

RECOMENDATIONS

1) The property should be soil sampled on a 50 meter by a 100 meter grid. Creeks and gullys should also be sampled. In the laboratory, the whole soil sample should be pulverized, screened for metalics and then fire-assayed with an AA finish for gold. It would also be useful to test for lead, zinc, silver, and copper. Any anomalies discovered should then be detailed on a 10 meter by 10 meter grid and the same lab procedure followed.

2. The property should be geologically mapped.

3) The VLF-EM survey should be extended over the whole property.

4. The detailed soil anomalies should be trenched by 'cat' or backhoe.

5) Soil anomalies should then be tested by resistivity-IP sections to optimize the locations and angles of diamond drill holes.

GEOPHYSICAL REPORT

ON A

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OVER THE

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GRASSY MOUNTAIN, CRANBROOK AREA

FORT STEELE MINING DIVISION

BRITISH COLUMBIA

INTRODUCTION AND GENERAL REMARKS

This report discusses the survey procedure, compilation of data and the interpretation of a VLF-EM survey carried out over a portion of the Hellroaring Claim Group during the period of December 9th to 19th, 1984.

The survey was carried out by Trans-Arctic Explorations Ltd. under the field supervision of Guy Royer, geologist, with the aid of Dean Bowra. A total of 19.5 line km of VLF-EM survey were done.

The primary purpose of the exploration program was to look for gold deposits such as are common in this area, as, for example, the auriferous quartz veins containing sulphides on the nearby Leader A Claim (Wellington). Of particular interest were porphyritic intrusives (flows?) commonly known as 'miner's porphyries' which in this area frequently occur with gold deposits. The VLF-EM survey was carried out to delineate geological structure such as fault and shear zones or sulphide deposits either of which

could be related to gold deposits.

PROPERTY AND OWNERSHIP

The property consists of six claims containing 85 units staked within the Fort Steele Mining Division as shown on Map 2 and as described below:

Claim Name	No. Units	Record No.	Expiry Date
Goat	4	2049	Jan. 5, 1986
Grassy	20	2050	Jan. 5, 1986
Hellroaring	20	2053	Jan. 5, 1986
Sherwood	20	2071	Feb. 6, 1986
Sourdough	12	2072	Feb. 6, 1986
Drift	9	2073	Feb. 6, 1986
	85		

The expiry date shown takes into account the survey under discussion as being accepted for assessment credits.

The claims are owned by Trans-Arctic Explorations Ltd. of Vancouver, British Columbia.

LOCATION AND ACCESS

The property is located 27 km S85°W of Cranbrook on Grassy Mountain and on Hellroaring Creek.

The geographical coordinates for the center of the property are 49° 28' north latitude and 116° 10' west longitude.

Access is easily gained by travelling north from Cranbrook on Highway #95A for 23 km to Marysville or 7 km south from Kimberley to Marysville on the same highway. One then takes the westerly-

running St. Mary River Road and travels for 17 km to the east end of St. Mary Lake. At this point one crosses the bridge across St. Mary River to the south and immediately takes the southerly-running Hellroaring Creek access road. The northern boundary of the property's Goat claim is about 18 km from St. Mary River. The total distance from Cranbrook is about 58 km.

PHYSIOGRAPHY

The property lies to the west of the Rocky Mountain trench within the Purcell Mountains which ia a physiographic division of the Columbia Mountain System. The terrain consists of steep, partially logged slopes throughout most of the property. It lies on the northwest side of the northeasterly-trending valley of Perry Creek.

Elevations vary from about 1,450 meters a.s.l. on Hellroaring Creek on the northern boundary of the Goat claim, to 2,491 meters a.s.l. on the peak of Grassy Mountain within the north central part of the property to give an elevation difference of 1,041 meters.

The main water source is the northwesterly-flowing Hellroaring Creek. Its tributaries as well as the upper reaches of Manchester, Liverpool and Shorty Creeks which drain the eastern side of the property into Perry Creek, are also sources of water.

The forest cover consists of fir, spruce and hemlock(?) and varies from closely growing, immature stands to more widely spaced, mature stands.

HISTORY OF PREVIOUS WORK

Since the six claims have been staked, no previous work has been done.

The history of the area goes back to the 1880's when prospectors working the Perry Creek placers discovered the Wellington vein now covered by the nearby Leader A Claim. Little ore has been shipped from this vein, even though assays have run as high as 4.8 oz/ton Au and 6.8 oz/ton Ag. There are also high values in lead, zinc and copper.

GEOLOGY OF AREA

The following is quoted from L. Sookochoff's 1983 Geological Evaluation Report on the adjoining Leader 2 Claim:

"The general geological setting of the area is of the Proterozoic Lower Purcell Group which is divided into three Formations. In the Hellroaring Creek - Angus Creek - Perry Creek area the Creston and Kitchener Formation predominate and are lenticularly northeasterly trending, commonly in a fault contact and bounded to the north and south by the Aldridge Formation.

"The basal Aldridge Formation - the oldest formation known to occur in the area - is composed mainly of grey to brownish grey, rusty weathering argillite and argillaceous quartzite.

"The Creston Formation is transitional from the Aldridge Formation and embraces that succession of greyish argillaceous quartzites which is included between the dark rusty weathering, argillaceous quartzites of the lower Aldridge Formation and the thin bedded, calcerous rocks of the upper Kitchener Formation. In gen-

eral, the Creston Formation consists of argillaceous quartzites, purer quartzites and argillites whose beds average about one foot in thickness. Narrow beds, pods, and lenses of calcerous rocks occur in the upper part of the formation. These are more numerous toward the top of the Creston and where they are abundant, the strata are considered to belong to the overlying Kitchener Formation.

"The Creston Formation is host to gold quartz veins on Perry Creek, a northeasterly flowing tributary of the St. Mary River with the confluence 13 km northwest of Cranbrook. The deposits occur in the argillaceous quartzites which are well bedded in beds '2 inches to 2 feet' in thickness, the latter separates by thin beds of meta-argillites.

"The deposits occur as true fissure veins averaging about '8 feet' with some as wide as '20 feet'. They can be traced for long distances along strike. The gold values occur as native in the outcrops and with pyrite at depth.

"The Kitchener Formation, [on some maps this formation is combined with the Siyeh Formation and called the Kitchener-Siyeh Formation], consists predominantly of impure, magnesium limestone, argillite and calcerous quartzite. Limestone and calcerous rocks compose the bulk of the formation and serve to distinguish it from the underlying formations. The upper part is generally argillaceous. Due to the formation containing easily deformed rocks, great stretches of it have been altered to chlorite and talc-carbonate schist.

"A small stock of porphyritic granite within one km west of the property intrudes sediments of the Creston Formation. The granite contains large idiomorphic crystals of orthoclase in an isometric groundmass of plagioclase, quartz and hornblende.

STRUCTURE

"The general structure of the area is of a broad, northerly striking anticline exposing the core of the Proterozoic rocks with younger rocks to the west and east. The regional St. Mary's fault trends east northeast to the north of the property area and creates a fault contact with the Aldridge and younger formations.

"Faults extending from the south generally terminate or trend into the St. Mary's fault and commonly indicate contacts between the Creston and Kitchener formations.

"One of the fault contacts referred to as the Sawmill Creek Fault determines a Creston-Kitchener Formation contact which trends through the Leader A Claim. The St. Mary's fault is within two km north.

MINERALIZATION

"On the adjacent Leader A Claim a mineralized quartz vein follows a strong fissure with varying strike from nearly north-south to north 35-50° with a dip of from 68° to 80° east. The vein varying from 'a few inches to three feet wide' can be traced along a length of '2,000 feet'. The vein is composed of white banded quartz containing galena, pyrite and locally chalcopyrite with tungsten reported in the adit at the southernmost extension of the vein.

"Assays from the Leader A vein reportedly returned up to .598 oz Au/ton and 10.56 oz Ag/ton across '1.9 feet' with a reported assay of 4.80 oz Au/ton. A reported 1720 tons of possible ore were calculated on the vein."

PROPERTY GEOLOGY

Rice's G.S.C. map shows the Hellroaring Claim Group is entirely underlain by both the Creston and the Kitchener-Siyeh formations.

The Creston Formation underlies most of the property and the younger Kitchener-Siyeh Formation trends northeasterly through the property as an 1,800-m wide band. The northwest contact is a fault which appears to be the same one on which the Wellington (Leader) prospect occurs on. As mentioned above, this is known as the Sawmill Creek Fault.

MINERAL DEPOSITS IN CLOSE PROXIMITY

The following is a description of two deposits occurring along the Old Baldy Fault, a few km to the northeast, and is taken from Rice's Memoir 228, dated 1941.

Rome and Valley Group

"The Rome and Valley group consists of twenty-three claims held by location, controlled by J.M. Baird and associates of Cranbrook, B.C. It is located near the head of Rome Creek, a tributary of Perry Creek, about a mile from the Perry Creek road near Sawmill Creek.

"The deposits consist of two or more large and persistent quartz veins apparently occupying fissures in a fault zone. In a few places the contain small amounts of pyrite and galena. Crystals of pyromorphite (lead phosphate) were seen in one open-cut. Assays from samples taken by the owners are reported to range from $1.10 to $19.95 a ton in gold (gold at $35 an ounce).

"The main workings consist of thirteen open-cuts, ten of which expose a vein striking north 15 degrees east and dipping 35 degrees to 50 degrees southeast. The vein has been traced for 1,550 feet and probably continues for at least another 1,000 feet to the north. It varies in width from 2 to 25 feet and averages about 9 feet. The remaining open-cuts are located on a parallel vein of the same type and apparently comparable in size with the first described.

Running Wolf Group

"The Running Wolf group is located on French Creek, a tributary of Perry Creek, and is reached by a trail about a mile long from the Perry Creek road.

"The deposit consists of a number of quartz veins occupying fissures in greatly altered Creston argillaceous quartzite. The workings consist of five adits, three of which are now caved. The main adit exposes three veins, each about 30 feet wide. Two of these veins occupy fissures striking in the same direction as the fault zone on the Rome and Valley group and approximately in line with it. The third vein is in a cross fracture. A few hundred feet down the hill another adit has been driven along a vein that parallels the main veins above. The veins are composed of massive quartz with occasional specks of pyrite and are reported to carry gold. They have been fractured by post-mineral movements along the original faults.

"The Rome and Valley and the Running Wolf groups are apparently on the same zone of fracturing and faulting, and this zone probably continues south across the ridge between Perry Creek and Moyie River at Old Baldy Mountain. Exposed on the Ridge at this point is a strong fracture zone that is occupied by a large quartz vein."

INSTRUMENTATION AND THEORY

A VLF-EM receiver, Model 27, manufactured by Sabre Electronic Instruments Ltd. of Burnaby, 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-EM), which for this survey is transmitted at 24.8 KHz from Seattle, Washington.

In all electromagnetic prospecting, a transmitter produces an alternating magnetic field (primary) by a strong alternating current usually through a coil of 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 much lower 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 I.P.). 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 interpreted without a good geological knowledge of the property and/or other geophysical and geochemical surveys.

SURVEY PROCEDURE

The survey consisted of 29.5 line km of VLF-EM survey of the property as shown on Maps 3 and 4.

The base line, on a bearing of due south, was extended for 1,400 m to the southern boundary of the Hellroaring claim, being well flagged with survey flagging. It was started 120 m east of Hellroaring Creek and sub-parallels the creek. The survey lines were run perpendicular to the base line (east-west) at 50 m spacings. The instrument readings were taken every 20 m along the survey lines facing towards the transmitter at Seattle.

COMPILATION OF DATA

The VLF-EM field results were plotted on Map 3 at a scale of 1:2,000. They were then reduced by applying the Fraser-filter. The filtered results were subsequently plotted on Map 4, at the same scale. The filtered data were plotted between actual reading stations. The positive dip-angle readings were then contoured at an interval of 4°.

The Fraser-filter is essentially a 4-point difference operator, which transforms zero crossings into peaks, and a low pass smoothing operator which induces 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 crossover on the unfiltered data quite often shows 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 when VLF-EM anomalies correlate with sulphide mineralization, the anomalies are often reflecting the structure associated with the mineralization rather than the mineralization itself.

There is some variation in intensity from one VLF-EM anomaly to the next. This is not only 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 parallel or sub-parallel to the direction of the transmitter (S70W 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.

VLF-EM highs are of particular economic interest since they may be reflecting sulphides, fracturing and/or alteration any of which could be associated with gold mineralization. The highs often are at points of intersection of two or three conductors striking in two or three different directions. If the conductors are in fact geological structures, then the points of intersection represent areas that could be amenable to mineralizing fluids.

From the Fraser-filtered data, the writer has attempted to draw in the conductors that the contouring is trying to outline. The results are plotted on Map 3 with the raw data. A word of caution is that the results may not be strictly correct since the con-

touring is quite complex. It was not always obvious where the conductor was situated or which direction it trended.

From the plot of the conductors it would appear that the primary direction of structure on this property is northerly with the secondary direction being northeasterly. This partially agrees with the G.S.C. regional geological mapping which indicates that bedding planes strike northeasterly. When geologically mapping on the property is carried out, this should help determine the causative sources and verify the direction of localized geological structure.

Of particular interest are those parts of the conductors which have greater conductivity that is shown by the higher values. These indicate, perhaps, zones of mineralization. The greater conductivity could be due to sulphides, alteration, and/or fracturing, any of which can be associated with gold deposits.

Little else can be said about the VLF-EM survey results at this time until further work is done on the property. Then a more meaningful interpretation can be applied to the results.

Respectfully submitted,
GEOTRONICS SURVEYS LTD.

David G. Mark,
Geophysicist

April 6, 1985

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1930 - p. 243,
1932 - p. 162,
1950 - p. 155

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 16 years and have been active in the mining industry for the past 19 years.

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

4. This report is compiled from data obtained from a VLF-EM survey carried out by Trans-Arctic Explorations Ltd., under the field supervision of geologist, Guy Royer, from December 9th to 19th, 1984.

5. I do not hold any interest in Trans-Arctic Explorations Ltd. nor in any of the claims of the Hellroaring Claim Group, nor will I receive any interest as a result of writing this report.

David G. Mark
Geophysicist

April 6, 1985

AFFIDAVIT OF EXPENSES

The VLF-EM survey was carried out during the period of December 9th to 19th, 1984 on the Hellroaring Claim Group, in the Cranbrook Area, Fort Steele Mining Division, B.C., to the value of the following:

FIELD:

Supervisor, 3 days at $200/day,	$ 600
Geologist/Instrument operator, 95 hours at $35/hour	3,325
Surveyor's helper, 95 hours at $15/hour	1,425
Helper/cook, 11 days at $100/day	1,100
Two 4 X 4, 3/4 ton truck, 11 days at $180/day (includes oil and gas)	1,980
Snowmobile rental, 2 at $160/day	1,760
Room and board, 33 man-days at $50/man-day	1,650
Instrument rental (VLF-EM), 14 days at $25/day	350
Survey supplies	425
	$12,615

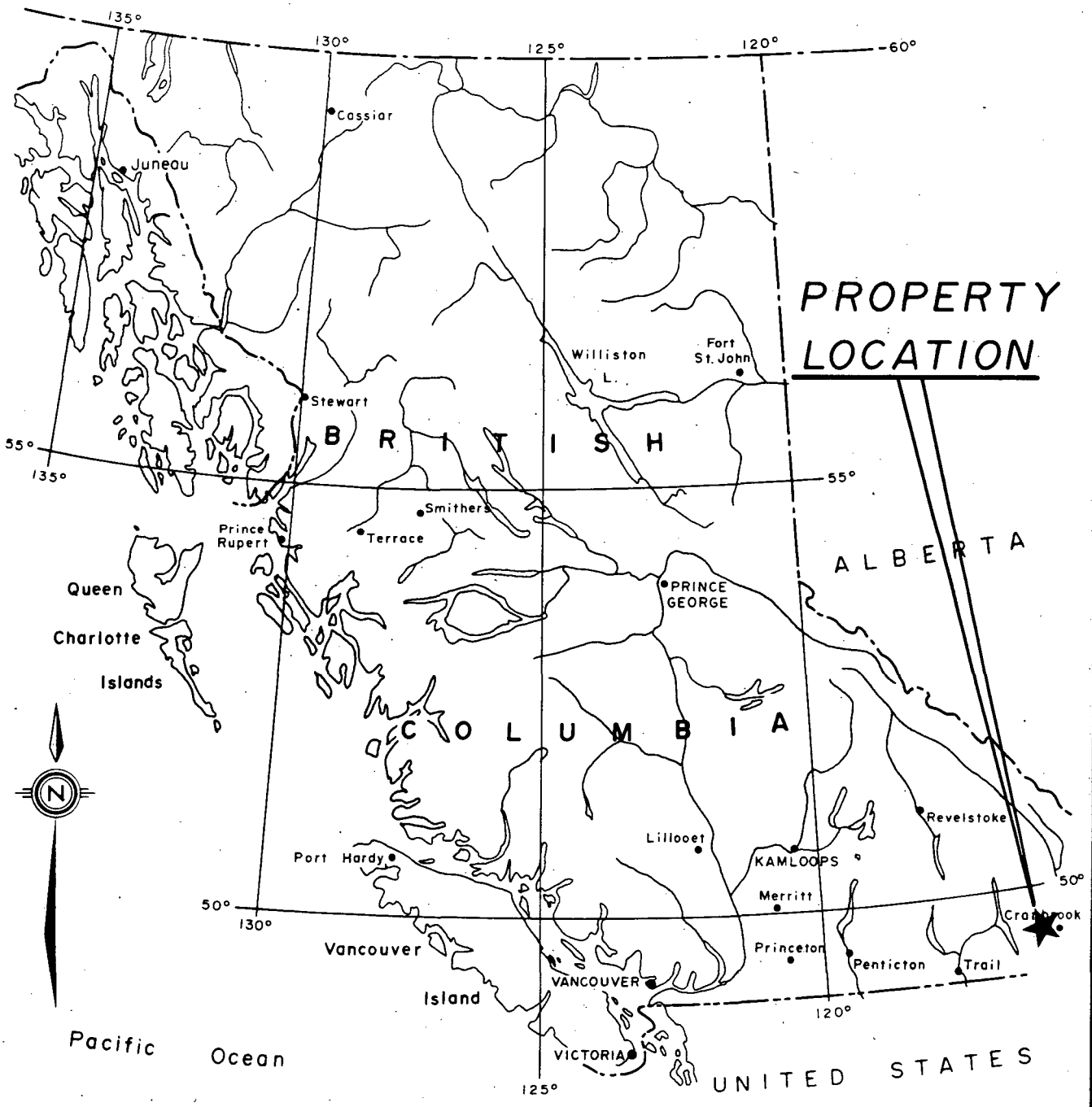
REPORT:

Geophysicist	$ 400
Geophysical technician, 26 hours at $25/hr	500
Drafting and printing	750
Typing, compilation and photocopying	150
	$ 1,800

GRAND TOTAL $14,415

Respectfully submitted,
TRANS-ARCTIC EXPLORATIONS LTD.

R. Simpson
Manager

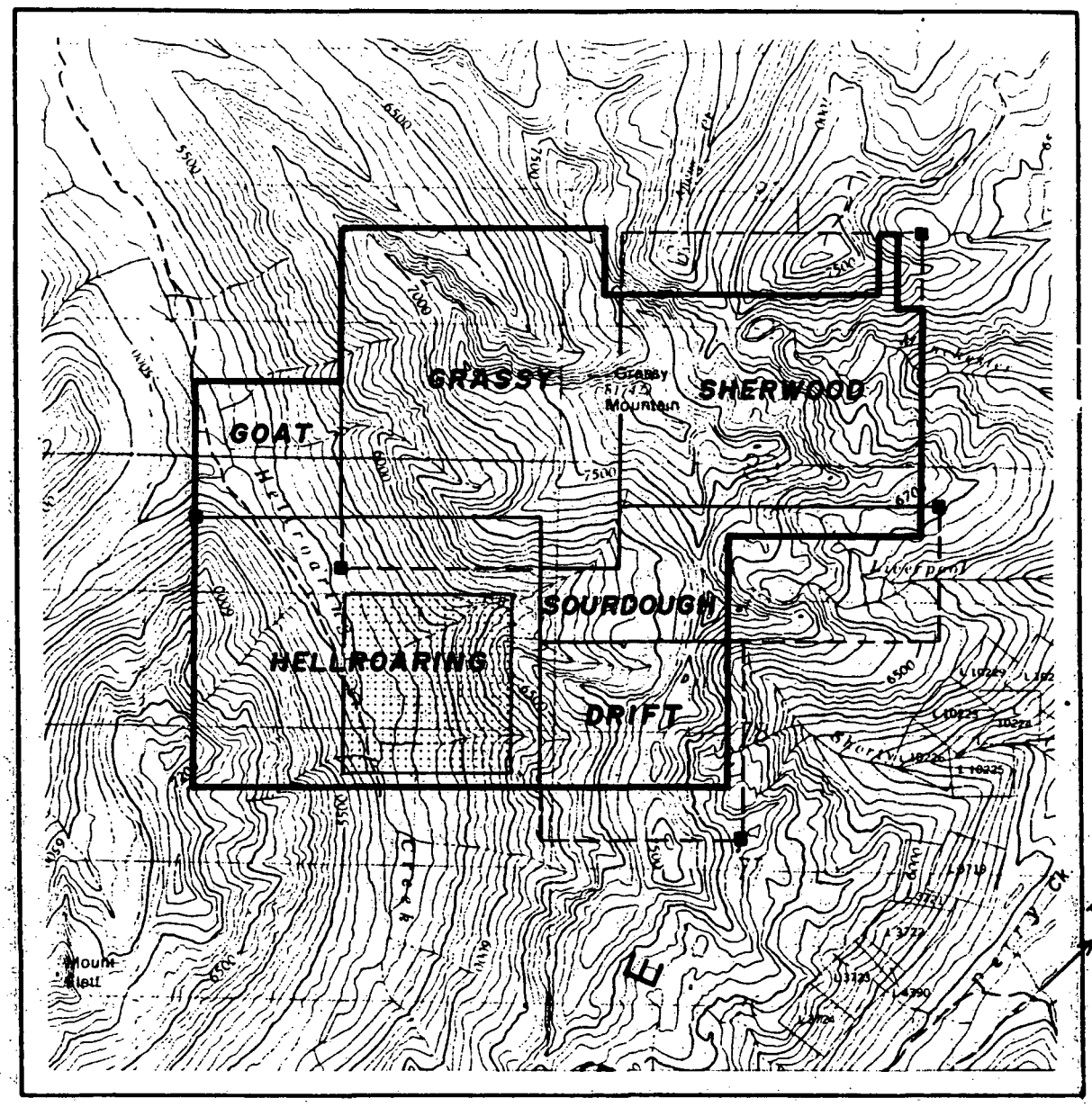


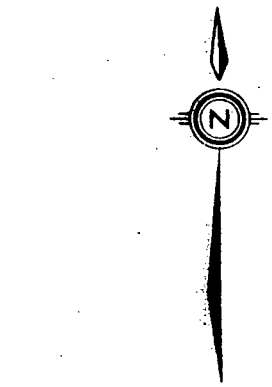
HELLROARING CLAIM GROUP

100 0 100 200 300 400 Km.

100 0 100 200 Mi.

MAP 1 BRAD'S DRAFTING SERVICE





TRANS-ARCTIC EXPL. LTD.

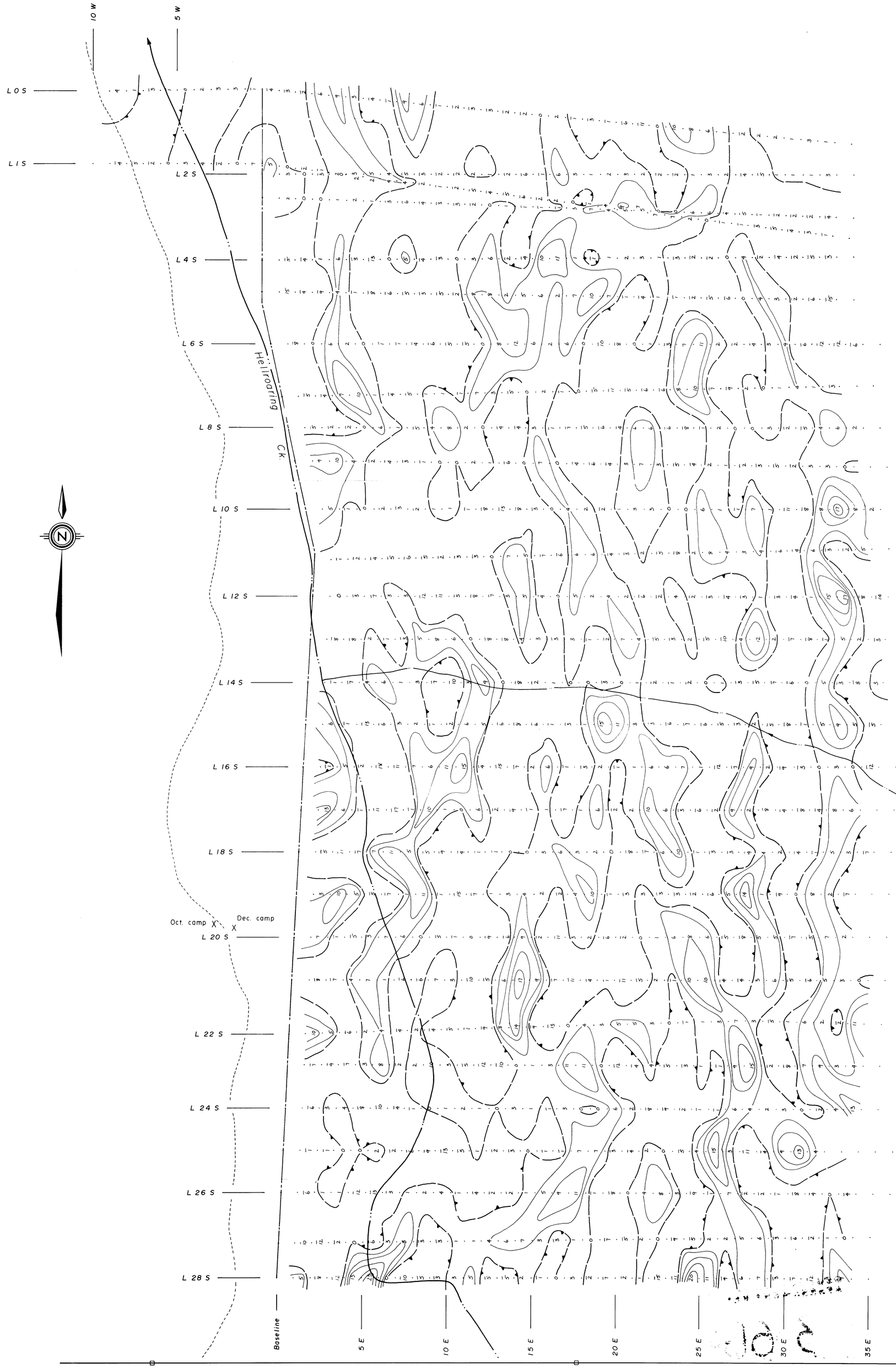
HELLROARING CLAIM GROUP

HELLROARING CREEK, CRANBROOK AREA, B.C.

FORT STEELE M. D.

CLAIM LOCATION MAP

SCALE:	DATE:	MAP:	N.T.S.
1:50,000	April 85.	2	82 F/8 E



SOURDOUGH

HELLROARING DRIFT

LEGEND

- Claim boundary
- Creek
- I.D. post (assumed)
- Survey station
- Road

CONTOUR INTERVAL

- 0 degree
- 4 degree and higher
- Magnetic depression

INSTRUMENT

Sabre Model 27 VLF-EM Unit

Only positive values are contoured

TRANSMITTER DIRECTION

Seattle 24.8 KHz

40 0 200
Metres

Survey Carried Out By: TRANS-ARCTIC EXPLORATIONS LTD.

GEOLOGICAL BRANCH
ASSESSMENT REPORT

13,609

To Accompany Report By: DAVID G. MARK, Geophysicist.

TRANS-ARCTIC EXPLORATIONS LTD.

HELLROARING CLAIM GROUP

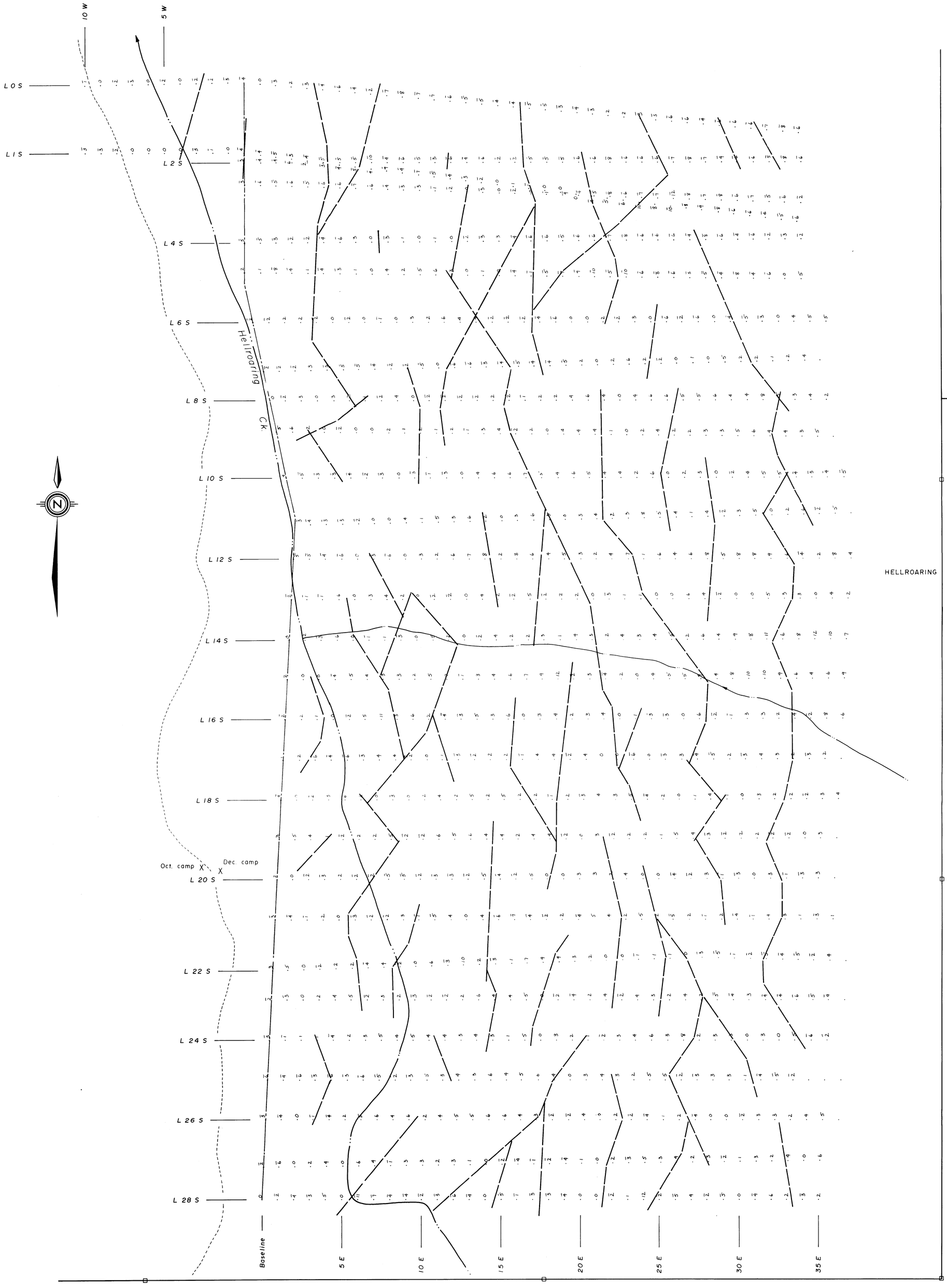
HELLROARING CK, GRASSY MTN., CRANBROOK AREA, B.C.

FORT STEELE M.D.

VLF-EM SURVEY

FRASER FILTERED DATA & CONTOURS

SCALE:	DATE:	MAP:	DRAFTED BY:
1:2,000	March 84.	4	B.D.S.



SOURDOUGH

HELLROARING DRIFT

LEGEND

- Claim boundary
- Creek
- I.D. post (assumed)
- Survey station
- Road
- VLF-EM Conductors

INSTRUMENT

Sabre Model 27 VLF-EM Unit

Only positive values are contoured

TRANSMITTER DIRECTION

Seattle 24.8 KHz.

40 0 200

Metres

Survey Carried Out By: TRANS-ARCTIC EXPLORATIONS LTD.

GEOLOGICAL BRANCH
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HELLROARING CLAIM GROUP

HELLROARING CK, GRASSY MTN., CRANBROOK AREA, B.C.

FORT STEELE M.D.

VLF-EM SURVEY

RAW DATA & CONDUCTORS

SCALE:	DATE:	MAP:	DRAFTED BY:
1:2,000	March 84.	3	B.D.S.