

ARIS SUMMARY SHEET

District Geologist, Cranbrook

Off Confidential: 94.11.22

ASSESSMENT REPORT 23131

MINING DIVISION: Fort Steele

PROPERTY: Mat  
LOCATION: LAT 49 40 00 LONG 116 10 00  
UTM 11 5501684 560136  
NTS 082F09E

CAMP: 001 Purcell Belt (Sullivan)

CLAIM(S): Mat  
OPERATOR(S): Cominco  
AUTHOR(S): Jackisch, I.  
REPORT YEAR: 1993, 18 Pages  
COMMODITIES  
SEARCHED FOR: Lead, Zinc, Silver  
KEYWORDS: Proterozoic, Aldridge Formation, Intrusives, Sullivan type  
WORK  
DONE: Geophysical, Physical  
EMGR 8.5 km; UTEM  
Map(s) - 1; Scale(s) - 1:20 000  
LINE 8.5 km

**SUB-RECORDER  
RECEIVED**  
NOV 22 1993  
M.R.# \_\_\_\_\_ \$ \_\_\_\_\_  
VANCOUVER, B.C.

COMINGO LTD.

LOG NO:	NOV 25 1993	RD.
ACTION:		
FILE NO:		

WESTERN CANADA

EXPLORATION

NTS: 82F/9

GEOPHYSICAL REPORT

ON A

UTEM SURVEY

ON THE SULLIVAN MINE PROPERTY

FORT STEELE M.D., B.C.

- ASSESSMENT REPORT -

Latitude : 49°40'N

Longitude : 116°10'W

LOG NO:	JUN 29 1994	RD.
ACTION:	<i>back from amendment</i>	
FILE NO:		

FILMED

TIME PERIOD OF FIELD WORK : AUG. 8 - 14, 21, 1993

WORK PERFORMED BY : I. JACKISCH & D. HALL

CLAIMS COVERED : MAT 194-199, 242-247, 270, 272, 360-363

CLAIM OPERATOR : COMINCO LTD.

**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

NOVEMBER 1993

INGO JACKISCH

23,131



# British Columbia

## SULLIVAN MINE PROPERTY



NTS  
82-F/9

Drawn by:		Traced by:	
Revised by	Date	Revised by	Date

### LOCATION MAP

FORT STEELE M.D., B.C.

Scale: noted above      Date: October 1993      Plate: 892-93-1

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LEGEND FOR UTEM DATA SECTIONS

DATA SECTIONS

D.S. 1	LOOP 1	LINE	4000N
D.S. 2			3500N
D.S. 3			3000N
D.S. 4			2500N
D.S. 5			2000N

PLATE 892-93-1 Location Map [in text]

PLATE 892-93-2 CLAIM, GRID, and UTEM COMPILATION MAP

**COMINCO LTD.**

**EXPLORATION**

**WESTERN CANADA**

**NTS: 82F/9**

**GEOPHYSICAL REPORT  
ON A UTEM SURVEY  
ON THE SULLIVAN MINE PROPERTY  
FORT STEELE M.D., B.C.**

**- ASSESSMENT REPORT -**

**INTRODUCTION**

During the time period Aug. 8 - 14, 21, 1993, 8.5 kms of UTEM surveying was carried out on the SULLIVAN MINE Property by a COMINCO geophysical crew under the direction of geophysicists, I. Jackisch and D. Hall. The purpose of the UTEM survey was to search for Zn/Pb Sullivan-type deposits at depth.

One UTEM loop, 2 km by 2 km in size, was installed, with lines running east-west. Parts of the property are very steep and cliffy, especially in the area of the loop front.

This report describes the operation of the UTEM system, the UTEM plotting format, and presents the results.

**LOCATION AND ACCESS**

This survey on the SULLIVAN MINE Property is located 11 kms west of Kimberley, B.C., and 7 kms north of St. Mary Lake, at Latitude 49°40'N and Longitude 116°10'W.

Access is from the St. Mary gravel road. Turn north up the Matthew Creek gravel road [located 9 km east of St. Mary Lake]. After 7 km along this road, the road will change direction from NNW to NW. An old burn area will be passed; stay on the left fork of the road. After approximately 3 more km turn left onto a south heading road. This road crosses Matthew Creek shortly after the turnoff. There is one more fork; stay to the right. The road is extremely bad from this point on.

The back of the loop can be accessed from the St. Mary road by a sideroad 7.5 km east of St. Mary lake. This road heads NW and is very windy, requiring a map to locate oneself.

## TOPOGRAPHY

The MAT claims are on the west side of the Sullivan Mine claim group. The area is mountainous with good logging road access. Elevation range is from 1,000 to 2,600 metres in the area and 1,700 to 2,500 metres where the survey was done. Slopes are moderate with local steep sections and cliffs. There is moderately good outcrop exposure except in the valley bottoms where up to 50 metres of overburden is estimated, most of the area has about 10 metres of cover. Logging has been done up to about the 2,000 metre contour.

## GEOLOGY

The Aldridge is the oldest formation within the Proterozoic Purcell Supergroup; it consists of at least 5 kms of siliciclastic sediments and includes about 15% gabbro sills and some dykes. The sediments are predominantly turbidites and related material that represent a submarine fan deposit. Three subdivisions are recognized within the Aldridge Fm.; the lower is typically thin to medium bedded and rust weathering, the middle is thin, medium and thick bedded with grey and rust weathering, and the upper is laminated and rust weathering.

The Sullivan orebody, one of the largest SSedex deposits in the world, occurs at the top of the lower division of the Aldridge Fm. This orebody has contributed to much of the mineral wealth generated in British Columbia since its discovery in 1892, and in particular, since the start of continuous operations in 1921.

## HISTORY OF THE MAT CLAIM AREA

Most of the MAT claims, where the work being reported on was done, were staked in the 1960's; four claims were staked in 1993. These claims form the western part of the Sullivan Mine claim block. Lower and middle divisions of the Aldridge Fm. are present throughout the area. Over the years, UTEM surveys have been done at lower elevations along Matthew Creek and several holes were drilled to test conductors. No significant mineralization was discovered.

## LIST OF CLAIMS SURVEYED

The following list of claims were covered by UTEM surveying:  
MAT 194-199,242-247,270,272,360-363

## DESCRIPTION OF THE UTEM SYSTEM AND FIELD PROCEDURE

UTEM is an acronym for "University of Toronto ElectroMagnetometer". Dr. Y. Lamontagne [1975] developed the system as part of his doctoral thesis at that university.

The field procedure consists of first laying out a large transmitter loop of single strand, enamel insulated copper wire. Survey lines are usually oriented perpendicular to one side of the loop and surveying can be performed both inside and outside the loop.

The UTEM III transmitter energizes the loop with a precise triangular waveform at a carefully controlled base frequency [30.974 Hz for this survey]. Power is supplied by a 2200W motor generator. The UTEM III receiver system includes a sensor coil and backpack portable receiver which has a digital recording facility on solid state memory and backup solid state memory. Time synchronization between transmitter and receiver is achieved through quartz crystal clocks in both units, accurate to about one second in 50 years.

The receiver sensor coil measures one or more components of the electromagnetic field and responds to its time derivative. In this survey, only the vertical component was measured. Since the transmitter current waveform is triangular, the coil will sense a perfect square wave in the absence of conductors. In the presence of electrical conductors, which may be geologic or cultural in origin, deviations from the perfect square wave are observed. The receiver stacks any pre-set number of cycles to increase the signal to noise ratio.

The UTEM receiver samples each half cycle of the waveform in ten channels or time windows. The delay time of each channel is equal to the width of the time window over which the signal is averaged. For a standard 30 Hz transmitted signal the delay times range from 16 microseconds for channel 10, to 8.33 milliseconds for channel 1. Therefore, the higher numbered channels [7-10] correspond to short time or high frequency while the lower numbered channels [1-4] correspond to late time or low frequency. *Poor and/or small conductors will respond on channels 10, 9, 8, and 7. Better and/or larger conductors will give responses on progressively lower number channels as well. For example, large, massive, highly conducting sulphide or graphite bodies should produce a response on all ten channels.*

At the end of the survey day, the data in the receiver is transferred to a personal computer and processed. It is then plotted on a printer using Cominco Ltd. proprietary software. In this report, the data is presented on Data Sections as profiles, with one profile for each of the first eight channels.

## 1. Continuously Normalized Plots

This is the standard normalization scheme for general presentation.

a) For Channel 1:

$$\% \text{ Ch.1 anomaly} = \frac{\text{Ch.1} - P}{P} \times 100\%$$

where P is the primary field from the loop at the station and Ch.1 is the observed amplitude for channel 1.

b) The remaining channels [n=2 to 10] are channel 1 reduced and channel 1 normalized:

$$\% \text{ Ch.n anomaly} = \frac{\text{Ch.n} - \text{Ch.1}}{\text{Ch.1}} \times 100\%$$

where Ch.n is the observed amplitude of Channel n [n=2 to 10]

This normalizing procedure results in errors from miscalculations in the primary field, due to chainage errors, being displayed in Channel 1 only.

The channel 9 and 10 windows have such a small delay time that in most geological environments, it becomes completely saturated at a very short distance from the transmitter loop. In most cases, it provides no valuable information and overwrites other useful channels. Therefore, channels 9 and 10 have not been presented in this report.

## GEOLOGICAL INTERPRETATION OF GEOPHYSICAL RESULTS

In 1993, another UTEM survey was carried out. Weak, shallow anomalies were obtained. However, there are no known features in nearby outcrops to explain them. The southern anomaly appears to coincide with gabbro south of the Bootleg normal fault; several mineral showings on Bootleg and Pyramid mountains are associated with faults or are in gabbro. The UTEM survey did not locate a conductor that might be a significant sulphide body.



## INTERPRETATION

The claim boundary, UTEM loop, lines, and conductor locations along with their accompanying labels are shown on Plate 892-93-2. The individual line profiles are included in Data Sections 1-5.

Three crossover responses and two contact features were detected at approximately the half way point along the survey lines.

## CONCLUSIONS

8.5 kms of UTEM surveying was carried out from Aug. 8-14, and 21, 1993 on the SULLIVAN MINE Property. Three crossover responses and two contact features were detected.

Report by :

Ingo Jaekisch

Ingo Jaekisch  
Geophysicist  
Cominco Ltd.

Approved for  
Release by :

John Hamilton

J.M. Hamilton, P.Eng/P.Geo  
Manager, Exploration  
Western Canada  
Cominco Ltd.

### Distribution:

Mining Recorder	[2]
Kootenay Exploration Office	[1]
Western District Files	[1]
Geophysics Files	[1]

**REFERENCE**

Lamontagne, Y., 1975 Applications of Wideband, Time Domain EM Measurements in Mineral Exploration: Doctoral Thesis, University of Toronto

APPENDIX I

IN THE MATTER OF THE B.C. MINERAL ACT  
AND THE MATTER OF A GEOPHYSICAL PROGRAMME  
CARRIED OUT ON THE SULLIVAN MINE PROPERTY  
LOCATED 11 KMS WEST OF KIMBERLEY, B.C.  
IN THE FORT STEELE MINING DIVISION OF THE  
PROVINCE OF BRITISH COLUMBIA,


MORE PARTICULARLY

N.T.S. 82F/9

S T A T E M E N T

I, Ingo Jackisch, of 424 Somerset Street, in the City of North Vancouver, in the Province of British Columbia, make oath and say:

1. THAT I am employed as a geophysicist by Cominco Ltd. and, as such have a personal knowledge of the facts to which I hereinafter depose;
2. THAT annexed hereto and marked as "Exhibit A" to this statement is a true copy of expenditures incurred on a geophysical survey on the SULLIVAN MINE Property;
3. THAT the said expenditures were incurred from Aug. 8-14, and 21, 1993, for the purpose of mineral exploration on the above noted property.

  
\_\_\_\_\_  
Ingo Jackisch  
Geophysicist, Cominco Ltd.

Dated this 12 day of November, 1993  
at Vancouver, B.C.

APPENDIX II

EXHIBIT "A"

STATEMENT OF EXPENDITURES

SULLIVAN MINE PROPERTY - AUG. 8-14, 21, 1993

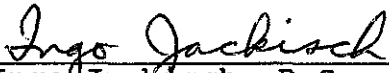
STAFF COSTS - PREPARATION, FIELD DAYS		
REPORTING		
GEOPHYSICISTS	\$	4,476.00
ASSISTANTS		3,585.50
OPERATING DAYS CHARGES		
3 DAYS @ \$445/DAY		1,335.00
EQUIPMENT RENTAL		
8 DAYS @ \$325/DAY		2,600.00
EXPENSE ACCOUNTS		1,881.92
LINE CUTTING COSTS	8.5 km	6,910.97
TRANSPORTATION		1,735.79
		-----
TOTAL		\$ 22,544.18

APPENDIX III

CERTIFICATION OF QUALIFICATIONS

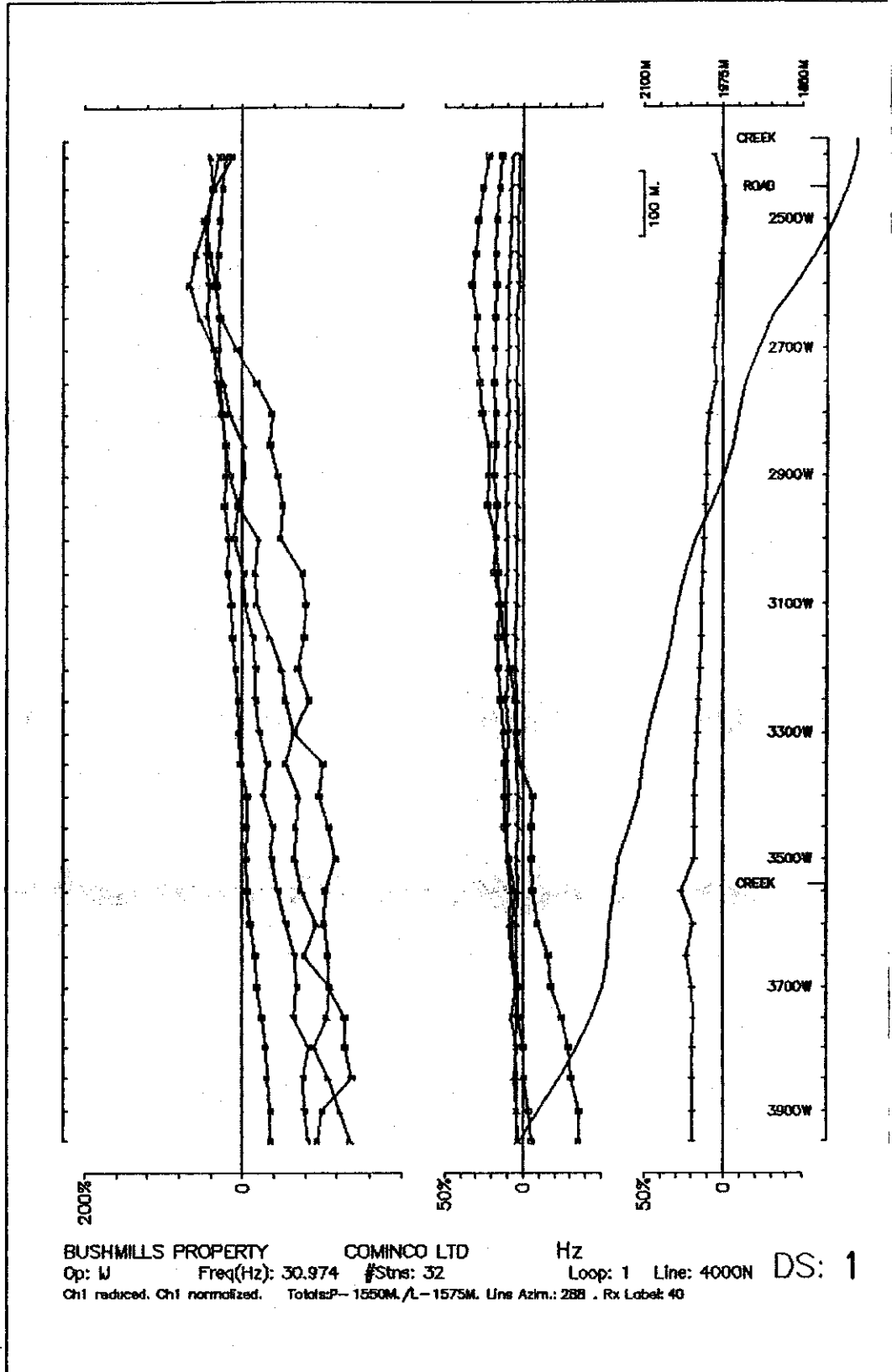
I, INGO JACKISCH, of 424 Somerset Street, in the City of North Vancouver, in the Province of British Columbia, do hereby certify:

- i. THAT I graduated with a B.Sc. in Geophysics from the University of British Columbia in 1975.
- ii. THAT I am a member in good standing of the Association of Professional Engineers and Geoscientists of the Province of British Columbia.
- iii. THAT I have been actively practising Geophysics from 1975 to 1993, and have been an employee of Cominco Ltd. from 1980 to 1993.

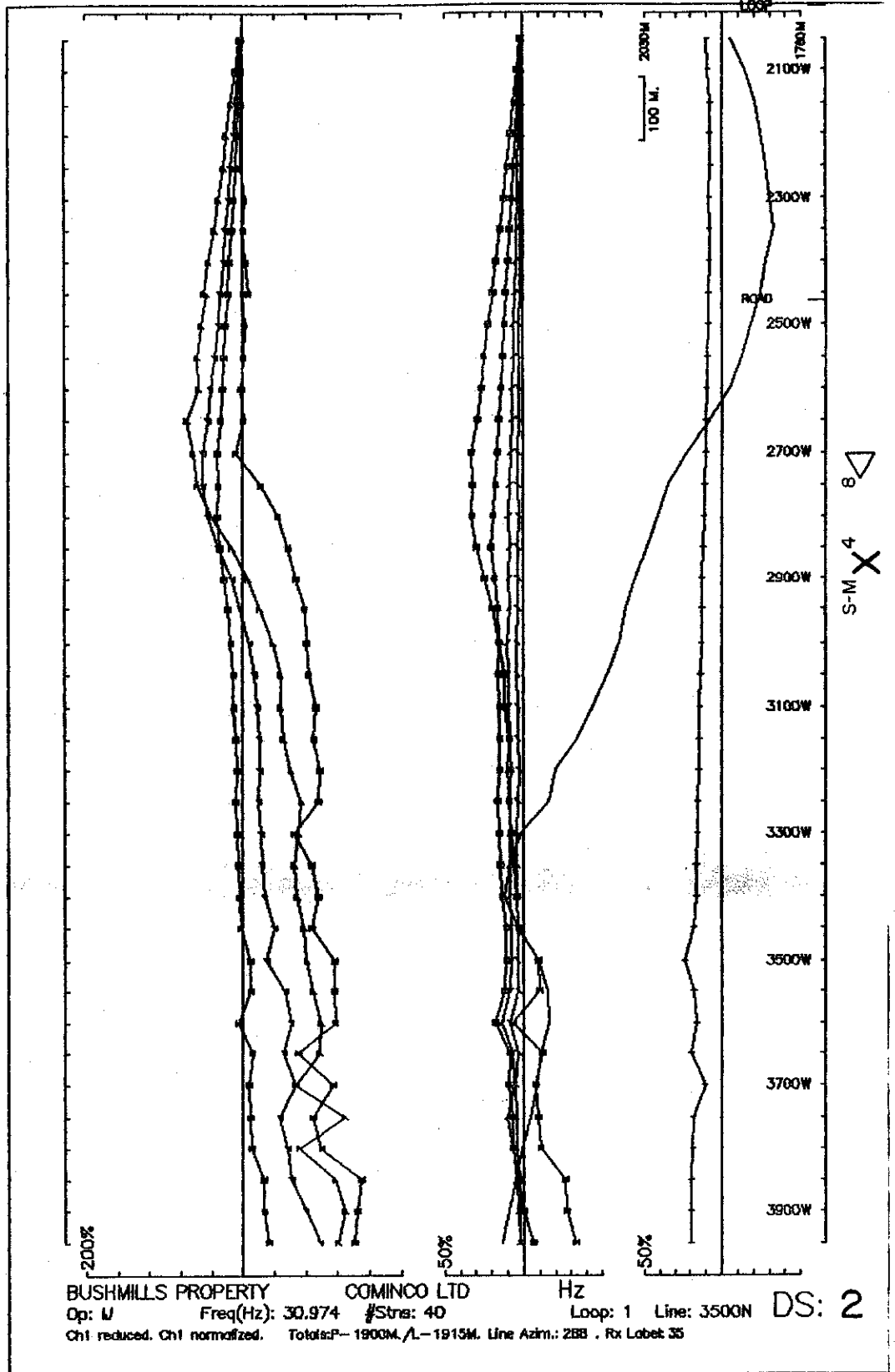
  
Ingo Jackisch, B.Sc. P.Geo.  
Geophysicist

November, 1993

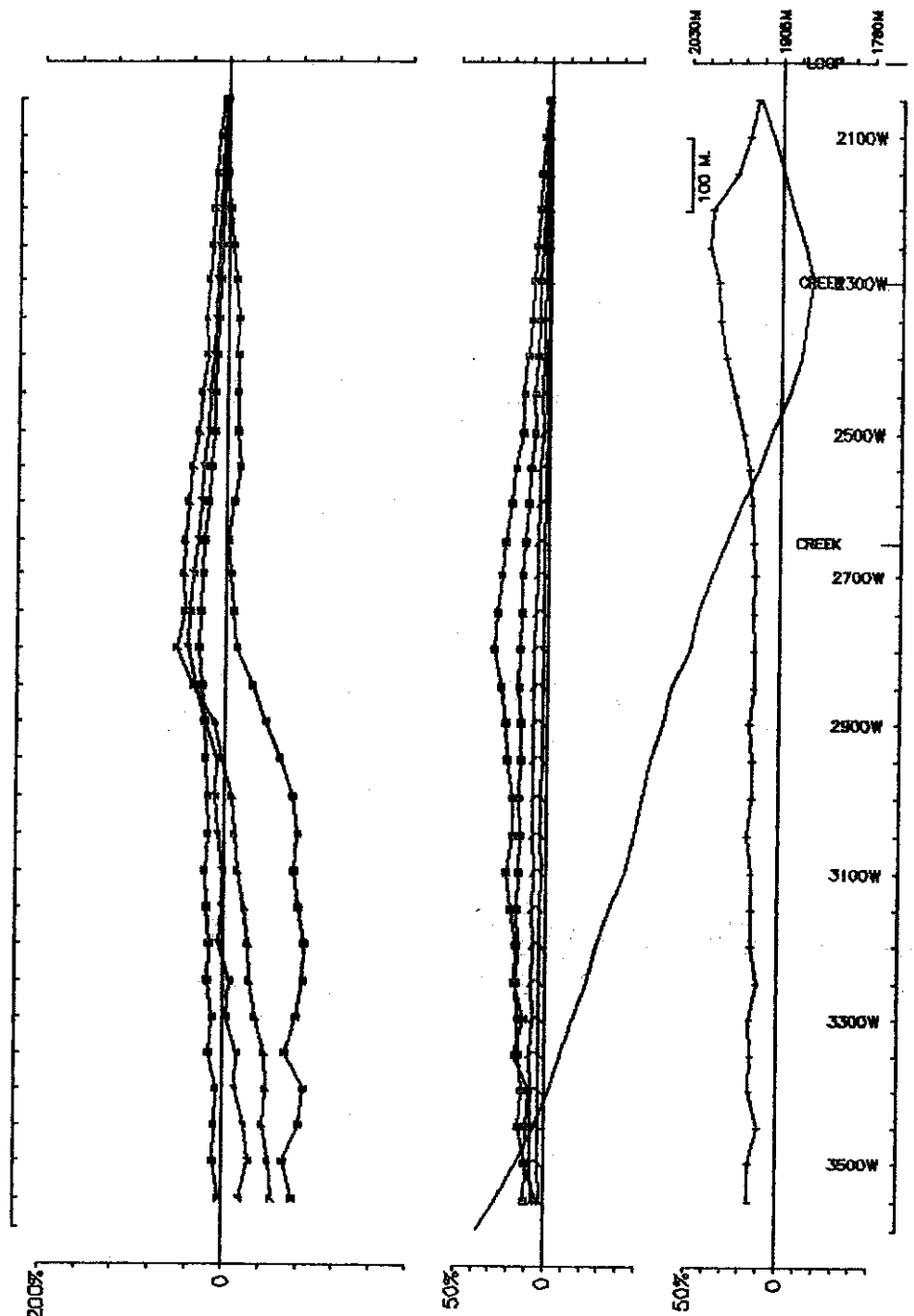




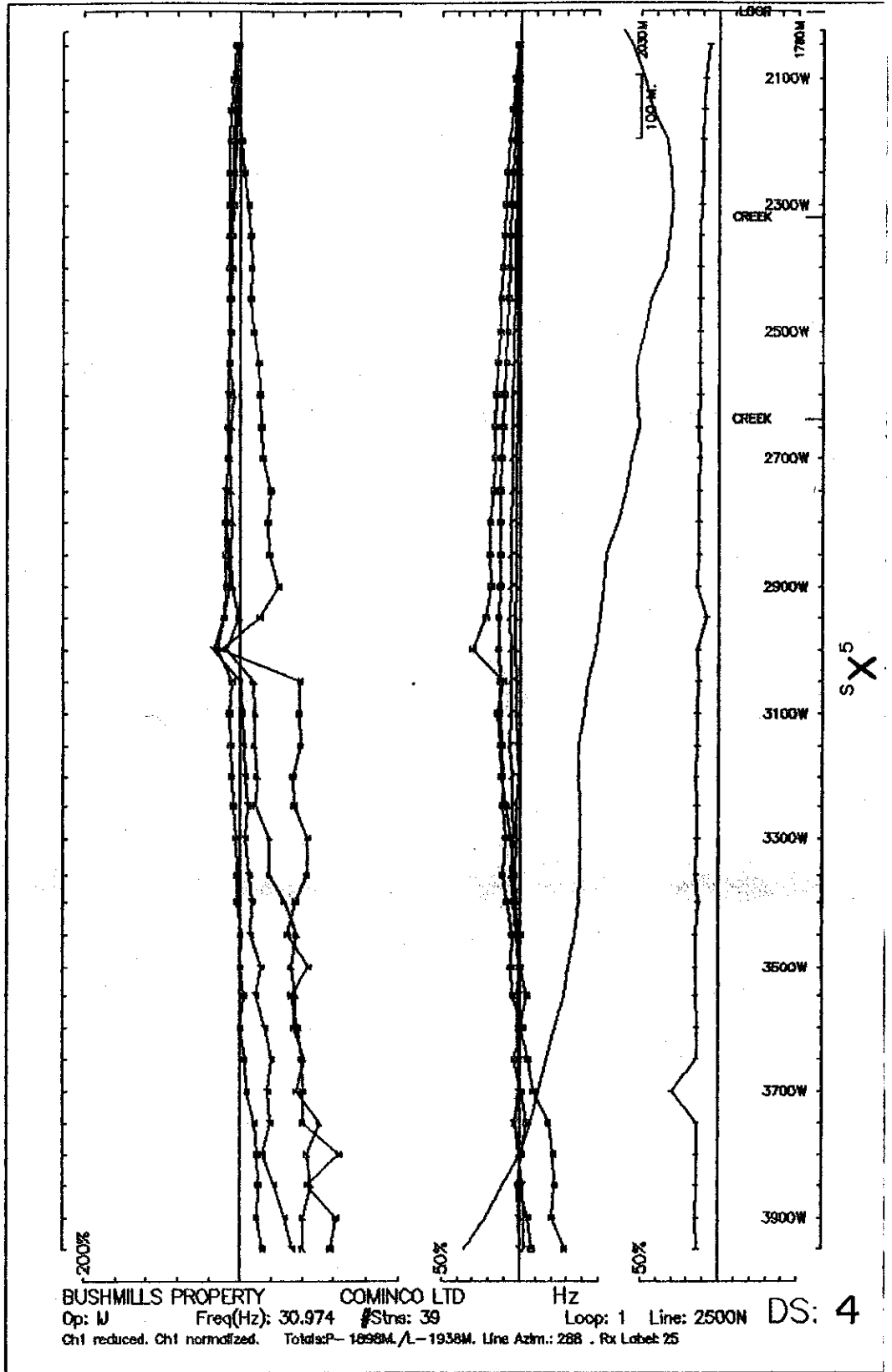
BUSHMILLS PROPERTY      COMINCO LTD      Hz  
 Op: W      Freq(Hz): 30.974      #Stns: 32      Loop: 1      Line: 4000N      DS: 1  
 Ch1 reduced, Ch1 normalized.      Totals: P-1550M, L-1575M.      Line Azim.: 288      Rx Label: 40



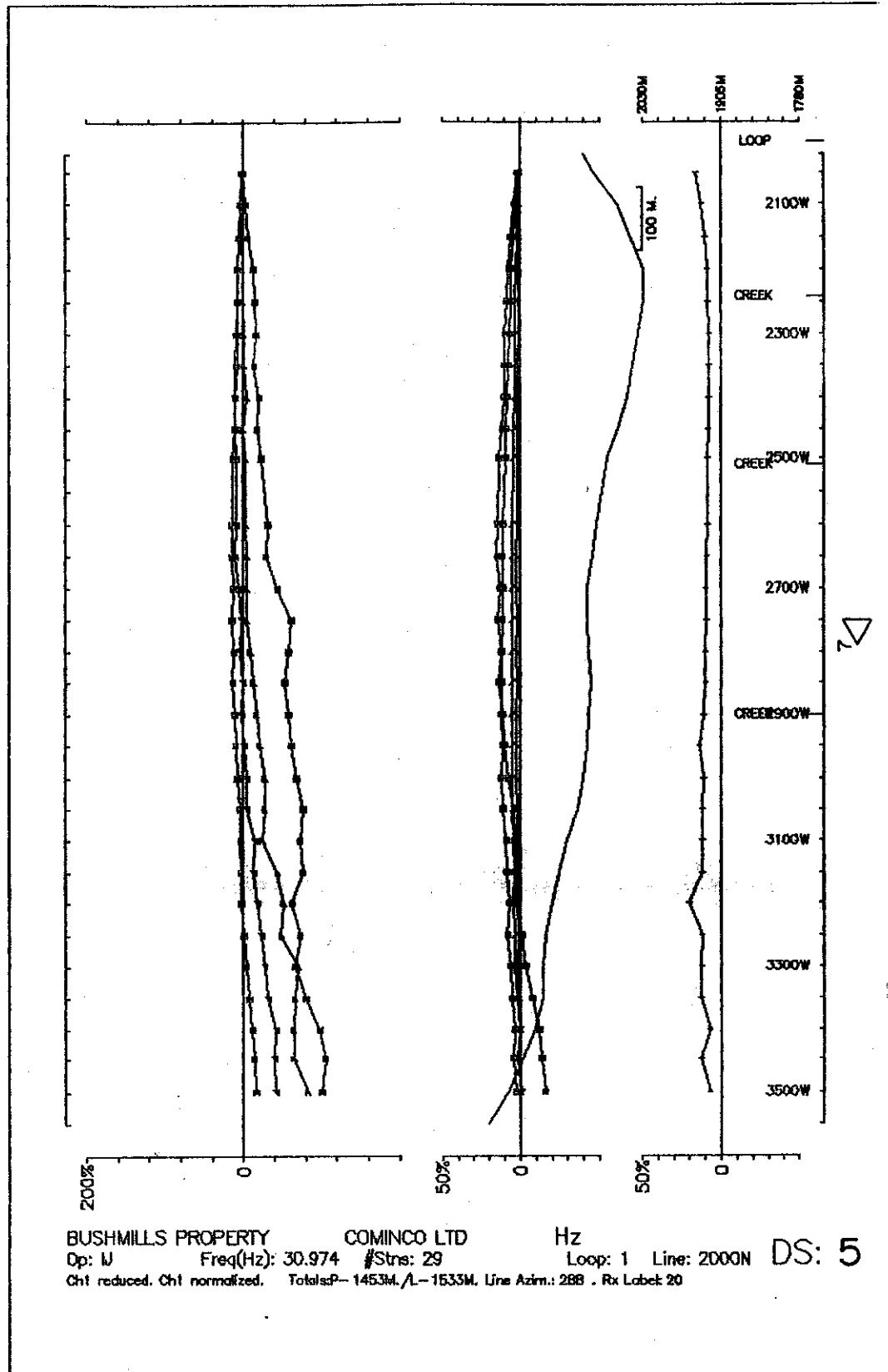




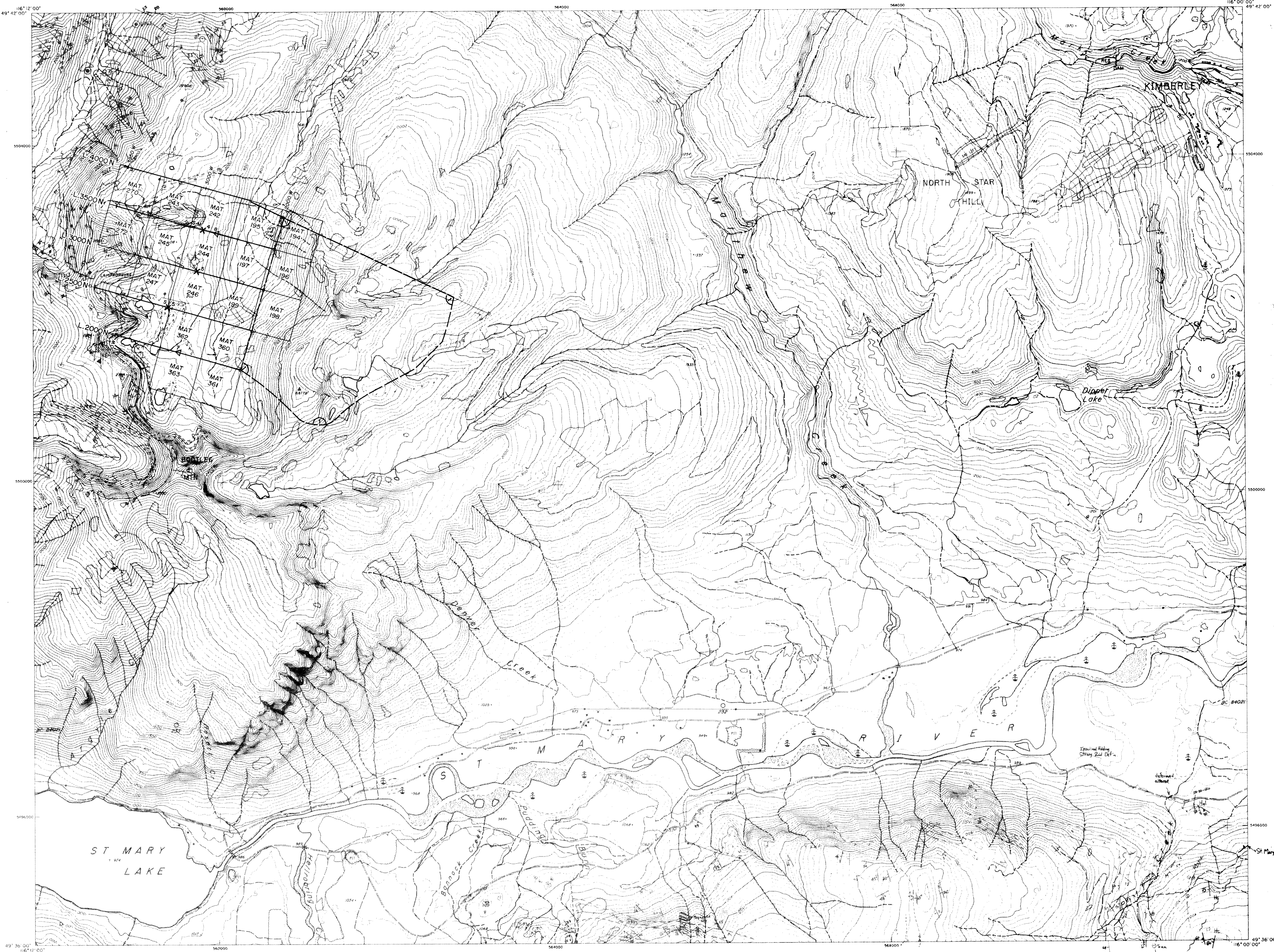
BUSHMILLS PROPERTY      COMINCO LTD      Hz  
 Op: U      Freq(Hz): 30.974      #Strs: 32      Loop: 1      Line: 3000N      DS: 3  
 Chl reduced. Chl normalized.      Totals: P-1501M, L-1540M. Line Azim.: 288 . Rx Label: 30



BUSHMILLS PROPERTY COMINCO LTD Hz DS: 4  
 Op: U Freq(Hz): 30.974 #Stns: 39 Loop: 1 Line: 2500N  
 Ch1 reduced. Ch1 normalized. Totals: P-1898M/L-1938M. Line Azim.: 288 . Rx Label: 25

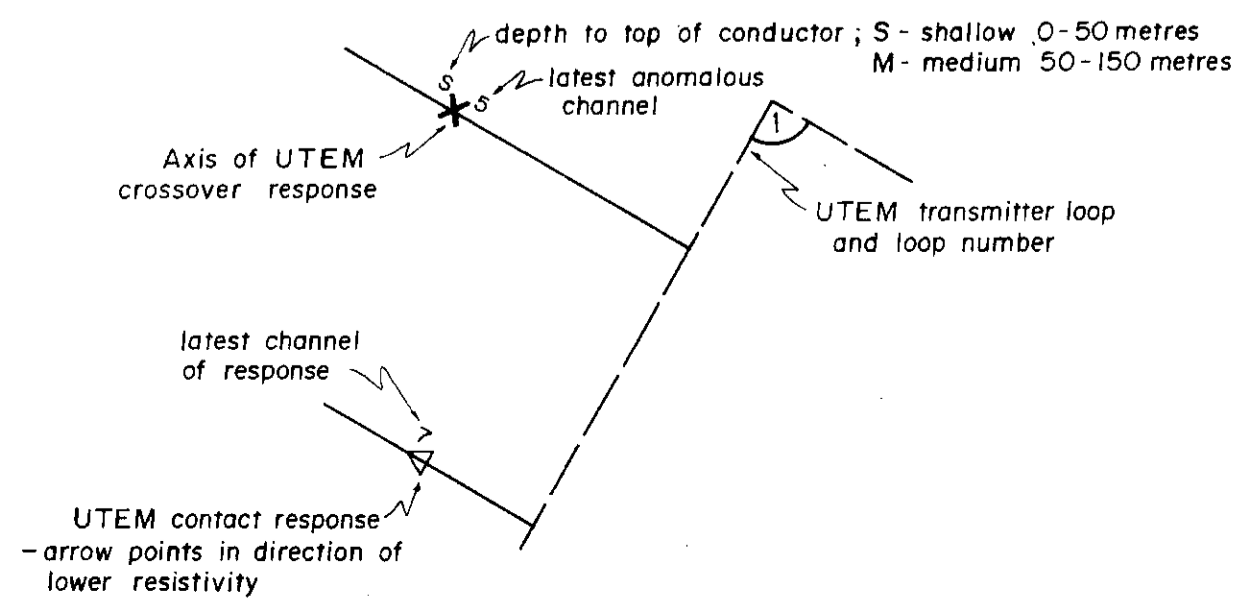
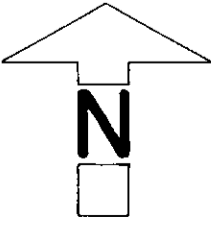






GEOLOGICAL BRANCH  
ASSESSMENT REPORT

23,131



SULLIVAN MINE PROPERTY				NTS
CLAIM, GRID and				82-F/9
UTEM COMPILATION MAP				
Fort Steele M.D., B.C.				
Drawn by:	Traced by:			
Reviewed by:	Date:	Reviewed by:	Date:	
Scale: 1:20,000	Date: November 1993	Plate: 892-93-2		