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COMINCO LTD.

EXPLORATION

WESTERN CANADA

NTS: 82F/9

GEOPHYSICAL REPORT
ON A
UTEM SURVEY
ON THE ROAR PROPERTY
FT. STEELE MINING DISTRICT
BRITISH COLUMBIA
- ASSESSMENT REPORT -

LAT. 49°33'N

LONG. 115°16'W

WORK PERFORMED: SEPT 13 - 21, 1994

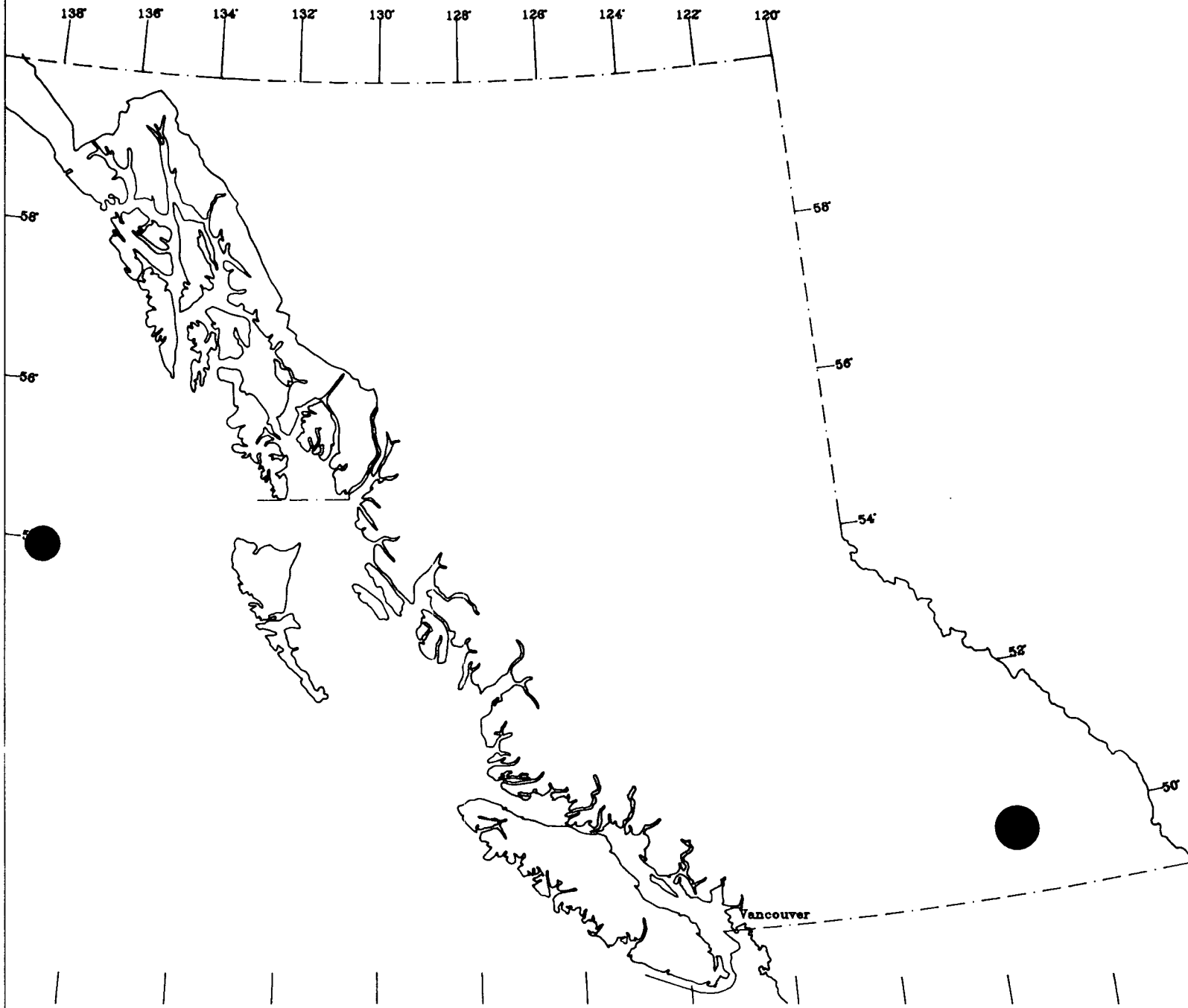
CLAIMS COVERED : ROAR 40-45, 61, 62, 72, 73
CLAIR 16, 17, 19

GEOLOGICAL BRANCH
ASSESSMENT REPORT

NOVEMBER 1994

23,622

I. JACKISCH



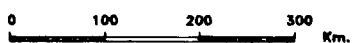
N.T.S. 82F/9

ROAR PROPERTY



Drawn by:	Traced by:
Revised by:	Date:
	Acad file: KEVBC

LOCATION MAP



SCALE: 1:8,000,000 DATE: NOV 94 PLATE NO: 412-94-1

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LEGEND FOR UTEM DATA SECTIONS	

DATA SECTIONS	D.S.1	LOOP 3	LINE	
	2	3	6200N	
	3	3	5500N	
	4	3	5000N	
	5	3	4500N	
	6	4	8600N	
	7	4	8000N	
	8	4	7500N	
	9	4	7000N	
	10	5	11200N	
	11	5	10700N	
	12	5	10000N	
	13	5	9500N	
			9000N	

LIST OF PLATES

	PLATE#
LOCATION MAP	412-94-1
GRID, CLAIM, AND GEOPHYSICS COMPILATION MAP	412-94-2

**EXPLORATION
NTS:82F/9**

COMINCO LTD

WESTERN CANADA

**GEOPHYSICAL REPORT ON A
UTEM SURVEY ON THE
ROAR PROPERTY
FT. STEELE M.D., B.C.**

- ASSESSMENT REPORT -

INTRODUCTION

From Sept. 13 to 21, 1994, a University of Toronto Electro-magnetic [UTEM] survey totalling 21.5 km was carried out by a Cominco Ltd. geophysical crew under the direction of geophysicists I. Jackisch and D. Hall. The purpose of the survey was to search for Zn/Pb Sullivan-type deposits.

The survey was carried out on a cut and picketed grid. This report describes the operation of the UTEM system, the UTEM plotting format, and presents the results.

LOCATION AND ACCESS

The ROAR Property is located 30 kms southwest of Kimberley, B.C., and 6 kms west of St. Mary Lake, in the Purcell Mountain Range. The coordinates are Latitude 49°33'N and Longitude 115°16'N.

The main access to the property is from an east-west traveling gravel road which originates just south of St. Mary Lake and parallels Meagher Creek. Numerous tributary logging roads, some which are not driveable, provide access to some points on the loops and lines. A helicopter was needed to lay out, pick up, and on one occasion to repair the eastern part of loop 3.

GEOLOGY

The geology in the area of the UTEM survey lines is Lower to Middle Aldridge Fm. sediments intermixed with long, thin layers of gabbro sills occurring parallel to the roughly N-S geological strike. The dip is shallow and to the west.

UTEM EQUIPMENT, PROCEDURES, AND DATA PRESENTATION

"UTEM" is an acronym for "University of Toronto Electromagnetometer". The system was developed by Dr. Y. Lamontagne while he was a graduate student at that university.

The field procedure consists of first laying out a large loop of single strand, enamel insulated copper wire in a roughly rectangular shape with sides one to two kms in length. This "loop" is energized by a few amperes of current from a transmitter powered by a 2 Kw motor generator. Survey lines are generally oriented perpendicular to one side of the loop and surveying is performed

outside the loop.

The UTEM III transmitter energizes the loop with a precise triangular waveform at a carefully controlled frequency (30.974 Hz for this survey). The receiver system includes a sensor coil and backpack portable receiver which has solid state internal recording facilities. Time synchronization between transmitter and receiver is achieved through quartz crystal clocks in both units, which are accurate to within about one second in fifty years.

The receiver sensor coil typically measures the vertical component of the electromagnetic field and responds to its time derivative. [In some cases, the horizontal component is also recorded to provide additional information, but this was not the case for this survey]. Since the transmitter current waveform is triangular, the receiver coil will sense a perfect square wave in the absence of geological conductors. Deviations from the perfect square wave are caused by electrical conductors which may be geologic or cultural in origin. The receiver stacks any pre-set number of cycles in order to increase the signal to noise ratio. The number of cycles stacked is quite small near the loop front (1000 to 2000 cycles) but increases away from the loop (8000 to 12,000 cycles). In the presence of powerline noise or distant thunderstorms the number of cycles stacked can increase significantly.

The UTEM receiver gathers and records 10 channels of information at each station. The higher number channels (7,8,9,10) correspond to short time or high frequency while the lower number channels (1,2,3) correspond to long time or low frequency. Poor and/or small conductors will respond on channels 10,9, 8,7, and 6, while better conductors will produce anomalous responses on progressively lower number channels as well. For example, massive, highly conducting sulphide or graphite will produce a response on all ten channels.

At the end of the survey day, the digitally recorded data in the receiver's solid state memory is dumped to a computer at the base camp, processed, and plotted onto a printer. These results are presented on a data section containing profiles of each of the ten channels, one section for each survey line. On the ROAR property channels 9 and 10 have been omitted because they become saturated at a very short distance from the loop front and overwrite more useful channels on the data section plots.

Several normalizing schemes may be utilized to present the results in data section format, of which only the continuously normalized plot is used in this report.

1.] CONTINUOUSLY NORMALIZED PLOTS - This is the standard normalization scheme for general presentation.

a] For Channel 1: % Ch.1 anomaly = $\frac{\text{Ch.1} - P}{P} \times 100\%$

where P is the primary field from the loop at the

survey 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]

The above normalizing procedure results in any miscalculations of the primary field, caused by chainage errors, being displayed on Channel 1 only.

INTERPRETATION

Large downward spikes on Channel 1 occur 1] on Loop 3, Line 6200N, Station 100W (D.S. 1), 2] on Loop 5, Line 11,200N, Station 2500W (D.S. 9), and 3] on Loop 5, Line 9000N, Station 3750W (D.S. 13). These spikes are errors caused by a bad connection between the sensing coil and the receiver which stacks the transmitted signal. The error is apparent in Channel 1 only, not on any of the other channels on the same station.

The Data Sections [D.S. 1 to 13] show numerous crossover conductors ranging from channels 2 to 8, and from shallow to deep. The results of Line 8000N show a channel 3 conductive block located between stations 2050W and 2900W.

The geophysics grid, outline of the claims, and UTEM interpretation are presented in plan form on Plate 412-94-2. The large 500 metre line spacing makes it difficult to connect responses from line to line.

CONCLUSIONS

21.5 kms of UTEM surveying were carried out on the ROAR Property from Sept. 13 - 21, 1994. Numerous crossover conductors and one block conductor were detected.

Report by :

Ingo Jackisch
Ingo Jackisch
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.

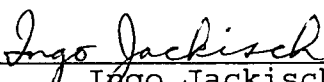
APPENDIX I
IN THE MATTER OF THE B.C. MINERAL ACT
AND THE MATTER OF A GEOPHYSICAL PROGRAMME
CARRIED OUT ON THE ROAR PROPERTY
LOCATED 30 KMS SOUTHWEST OF KIMBERLEY, B.C.
IN THE FORT STEELE MINING DIVISION OF THE
PROVINCE OF BRITISH COLUMBIA,
MORE PARTICULARLY

N.T.S. 82F/9

STATEMENT

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 ROAR Property;
3. THAT the said expenditures were incurred from Sept. 13 - 21, 1994, for the purpose of mineral exploration on the above-noted property.



Ingo Jackisch
Geophysicist
Cominco Ltd.

Dated this 24 day of November, 1994
at Vancouver, B.C.

APPENDIX II

EXHIBIT "A" - STATEMENT OF EXPENDITURES

ROAR PROPERTY - SEPT 13 to 21, 1994

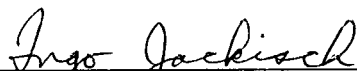
1.] GEOPHYSICAL STAFF COSTS		
I. JACKISCH, Geophysicist		2160
D.C. HALL, Geophysicist		2640
A. Robulak, Assistant		1250
K. Bilquist, Assistant		905
M. Magill, Assistant		1330
J. Allardyce, Assistant		1070
		<hr/>
		\$9355.00
2.] GEOPHYSICAL EQUIPMENT RENTAL		
UTEM System		\$2500
Second UTEM Receiver		1500
Wire, Reels, Radios		250
Computer, Printer, Software		500
4X4 Crew Cab Truck		925
		<hr/>
		\$5675.00
3.] OPERATING DAY CHARGE	[covers cost of data compilation, drafting, and report writing]	
		<hr/>
		\$4005.00
4.] EXPENSE ACCOUNTS		
I. JACKISCH	1369.94	
D.C. HALL	872.25	
A.M. ROBULACK	396.16	
K. BILQUIST	421.97	
M. MAGILL	525.23	
J. ALLARDYCE	283.02	
		<hr/>
		\$3868.57
5.] LINECUTTING		<hr/>
		\$22,616.56
		<hr/>
	TOTAL EXPENDITURES	\$45,520.13

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 1994, and have been an employee of Cominco Ltd. from 1980 to 1994.



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

November, 1994

LEGEND

UTEM DATA SECTIONS

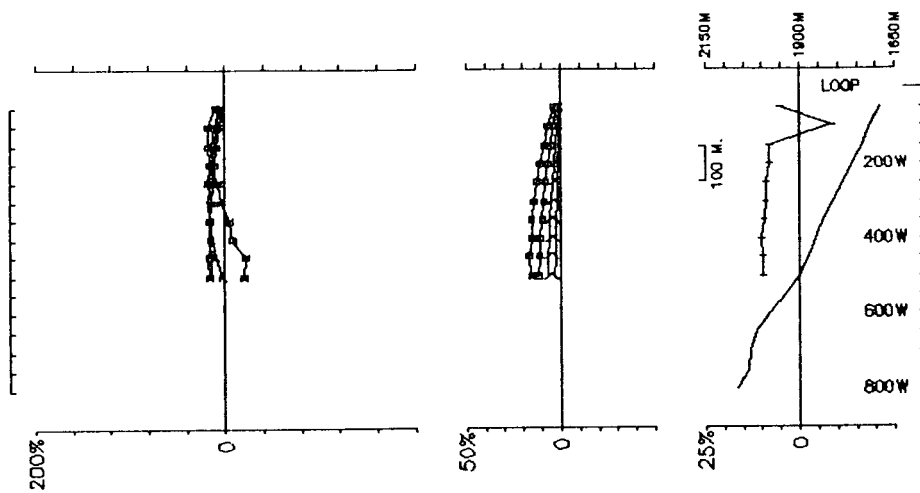
ORDINATE: Amplitude scale is given in %

ABSCISSA: Station or Picket Numbers in Hundreds of Meters

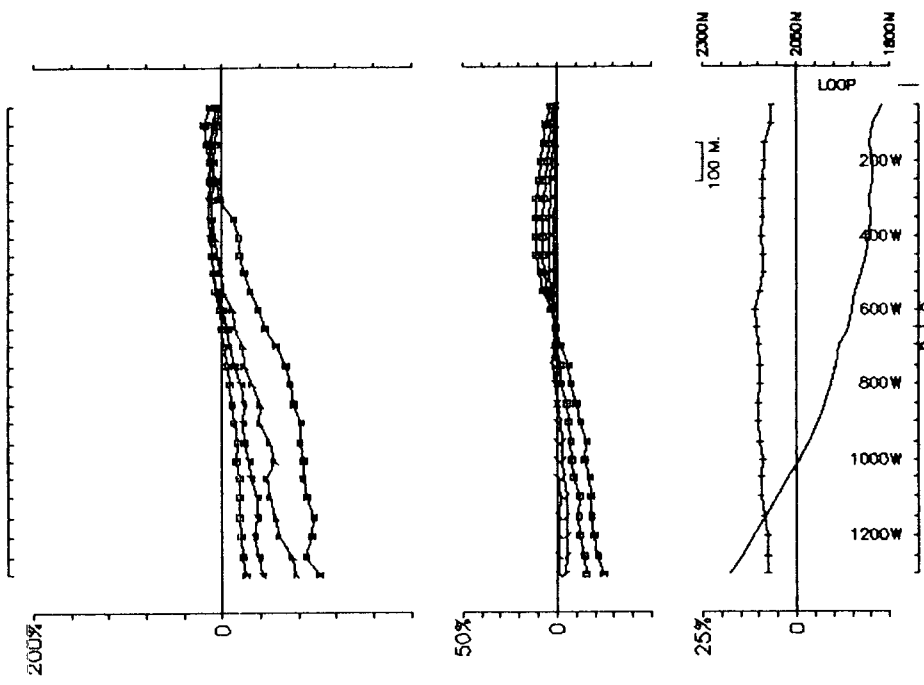
<u>SYMBOL</u>	<u>CHANNEL</u>	<u>MEAN DELAY TIME [30 HZ]</u>
|	. . . . 1	12.8 ms
/	. . . . 2	6.4
\	. . . . 3	3.2
□	. . . . 4	1.6
Σ	. . . . 5	0.8
△	. . . . 6	0.4
7	. . . . 7	0.2
⊗	. . . . 8	0.1
△	. . . . 9	0.05
◇	. . . . 10	0.025

DESCRIPTION OF INTERPRETATION SYMBOLS

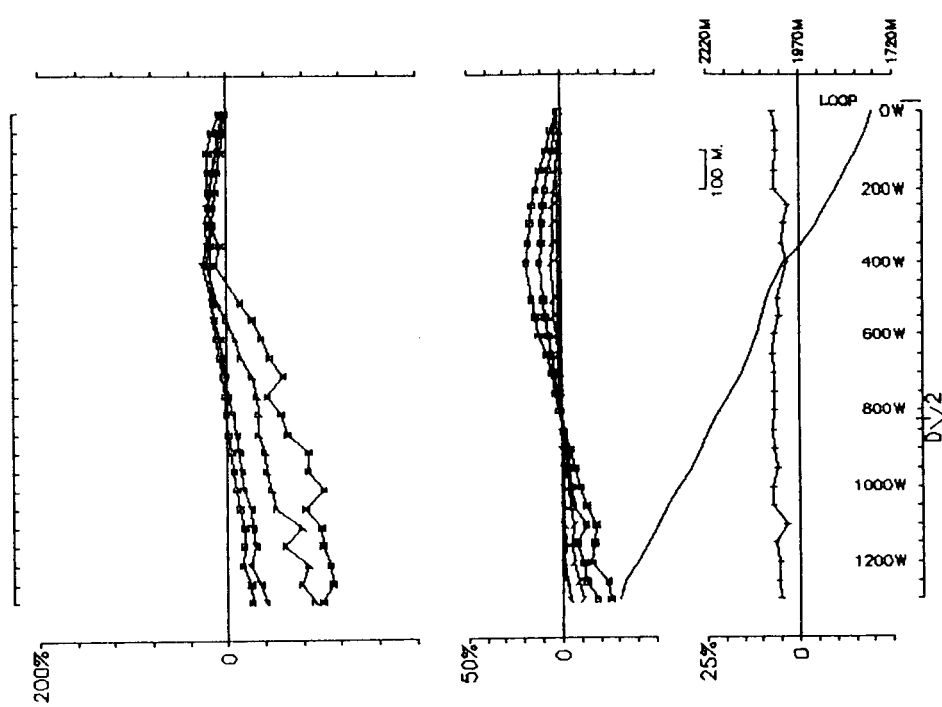
- Superscript indicates depth to top {S shallow 0-50m
 {M moderate 50-150m
 {D deep >150m
- Superscript indicating latest anomalous channel
- s² — Axis of crossover conductor
- A1 — Conductor Name [for major features only]
- ▶ Resistivity Contact [arrow points in direction of low resistivity zone]
- R Reverse crossover conductor



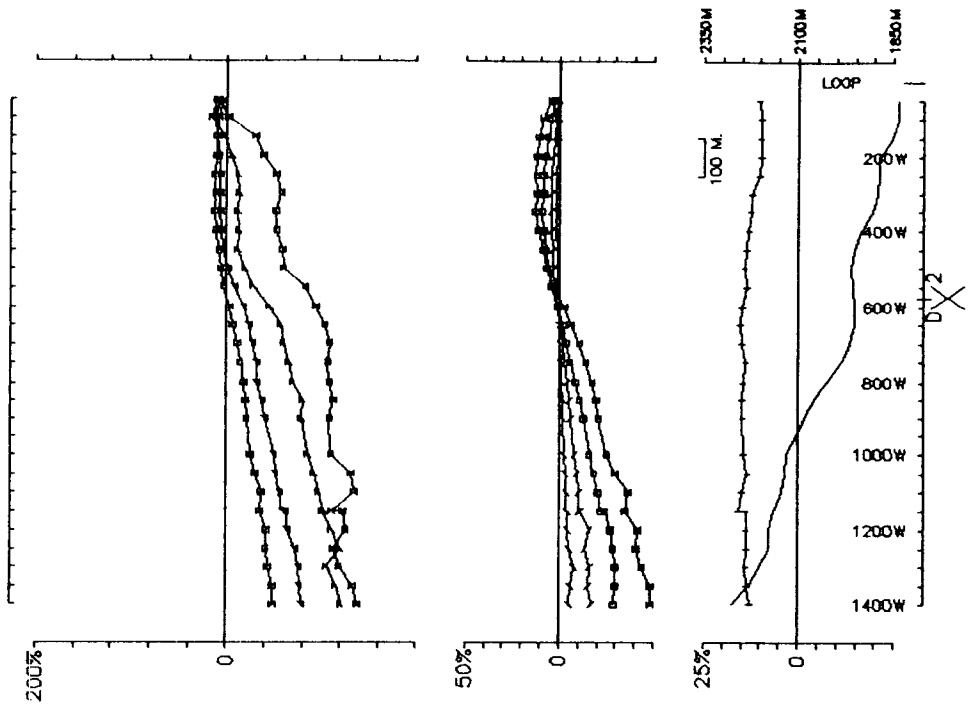
ROAR /Area n COMINCO LTD Hz
Op: W,DH Freq(Hz): 30.974 #Stns: 10 Loop: 3 Line: 6200N DS: 1
Ch1 reduced. Ch1 normalized. Totals: P--451M. /L--752M. Line Azim.: 270 . Rx Label: 62



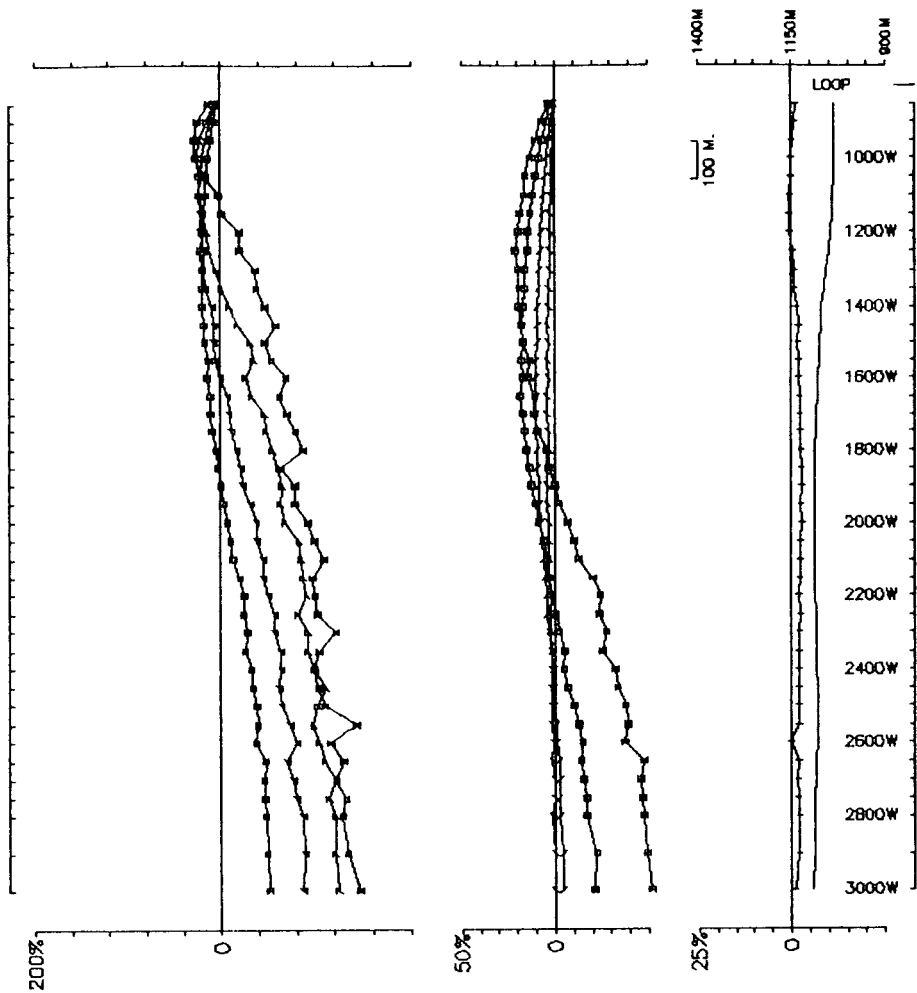
ROAR /Area n COMINCO LTD Hz DS:2
Op: U,DH Freq(Hz): 30.974 #Stns: 26 Loop: 3 Line: 5500N
Ch1 reduced. Ch1 normalized. Totals:P-1252M./L-1252M. Line Azim.: 270 . Rx Label: 55



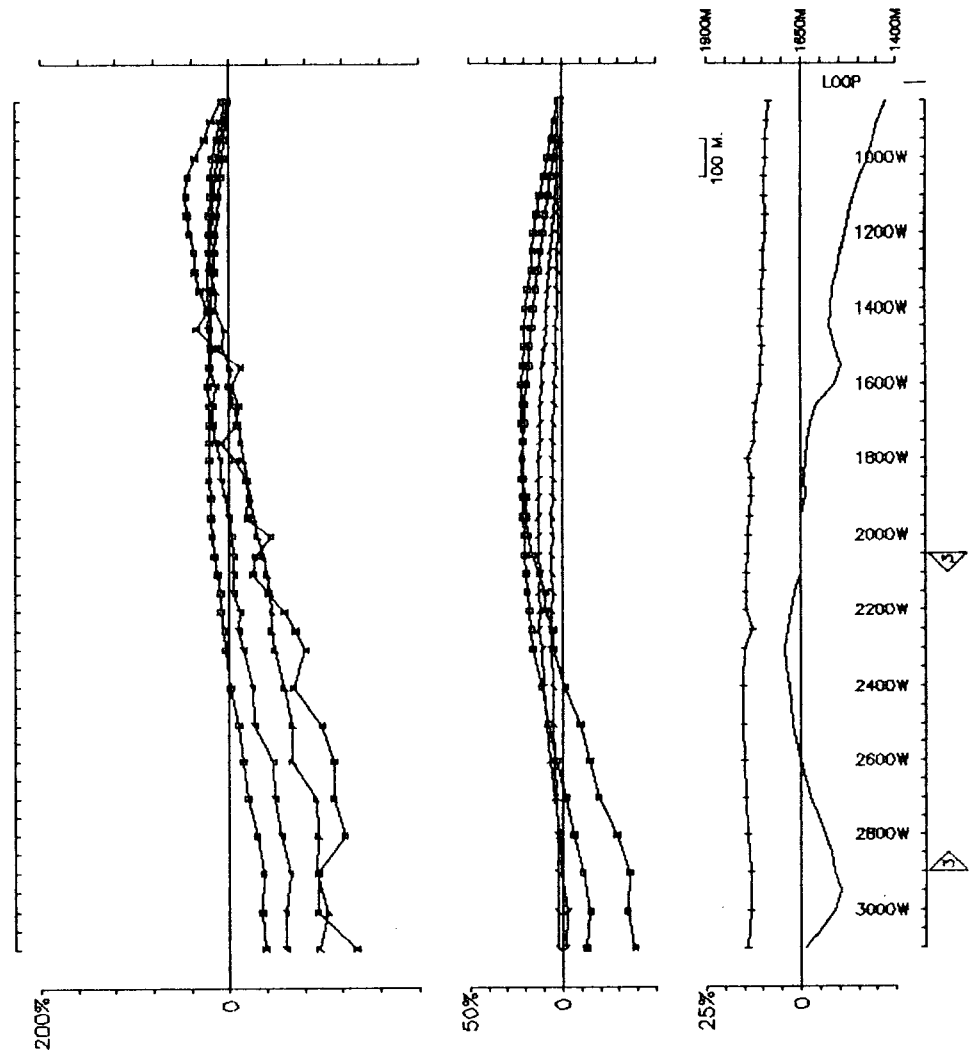
ROAR /Area n COMINCO LTD Hz
Op: W,DH Freq(Hz): 30.974 #Stns: 26 Loop: 3 Line: 5000N DS:3
Ch1 reduced. Ch1 normalized. Totals:P-1291M./L-1291M. Line Azim.: 270 . Rx Label: 50



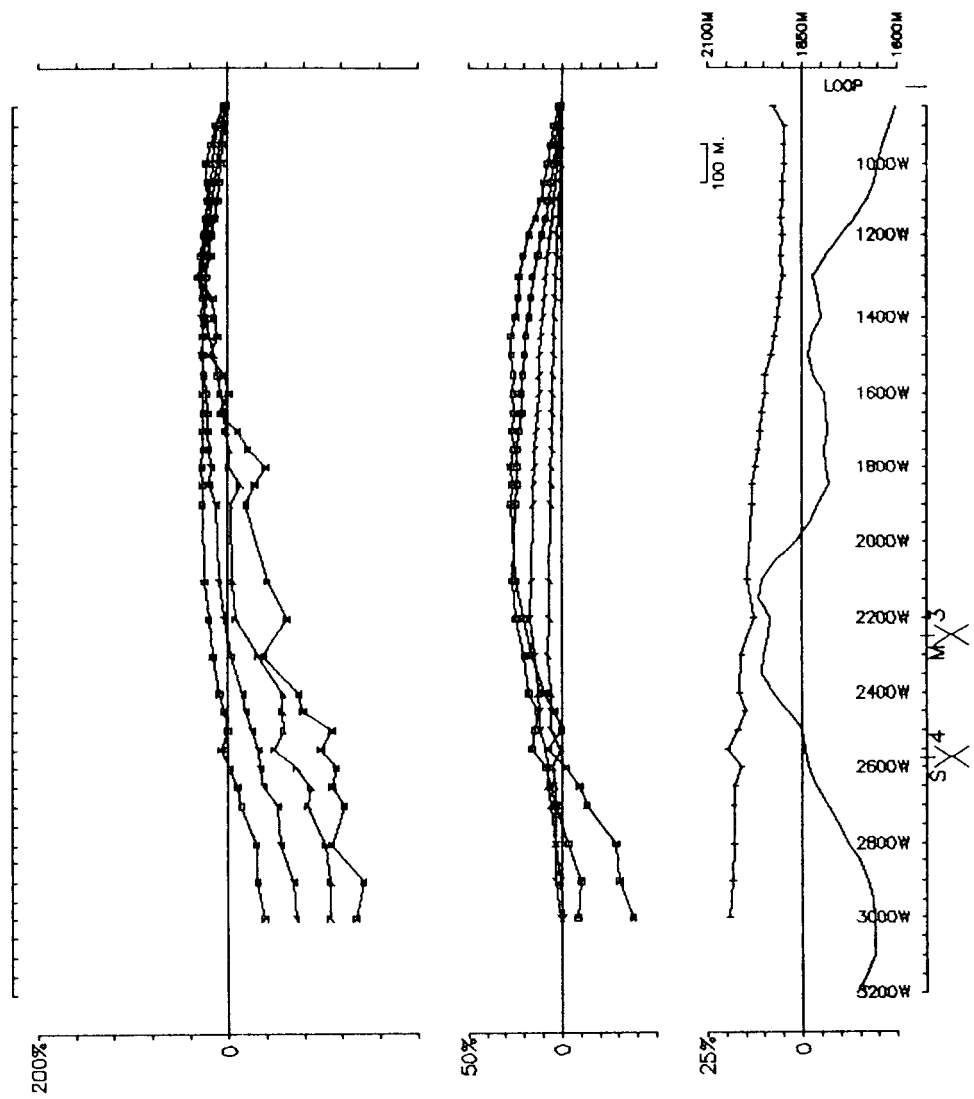
ROAR /Area n COMINCO LTD Hz
Op: U,DH Freq(Hz): 30.974 #Stns: 28 Loop: 3 Line: 4500N DS:4
Ch1 reduced. Ch1 normalized. Totals:P-1347M/L-1347M. Line Azim.: 270 . Rx Label: 45



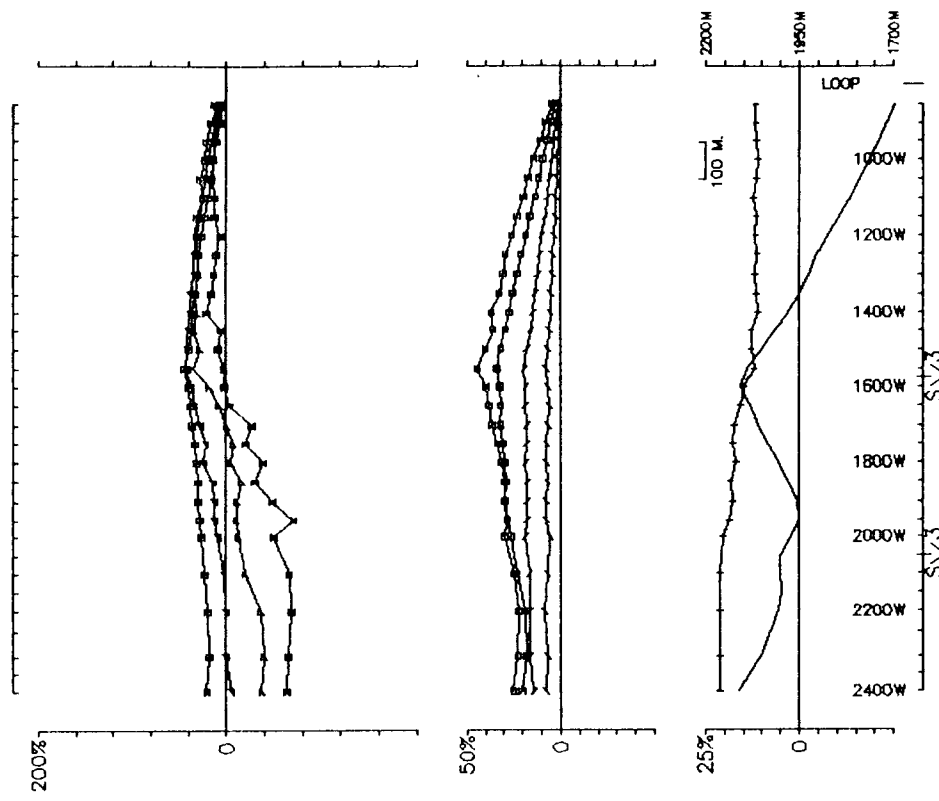
ROAR /Area n COMINCO LTD Hz
Op: W,DH Freq(Hz): 30.974 #Stns: 42 Loop: 4 Line: 8600N DS:5
Ch1 reduced. Ch1 normalized. Totals:P-2092M. L-2151M. Line Azim.: 247 . Rx Label 86



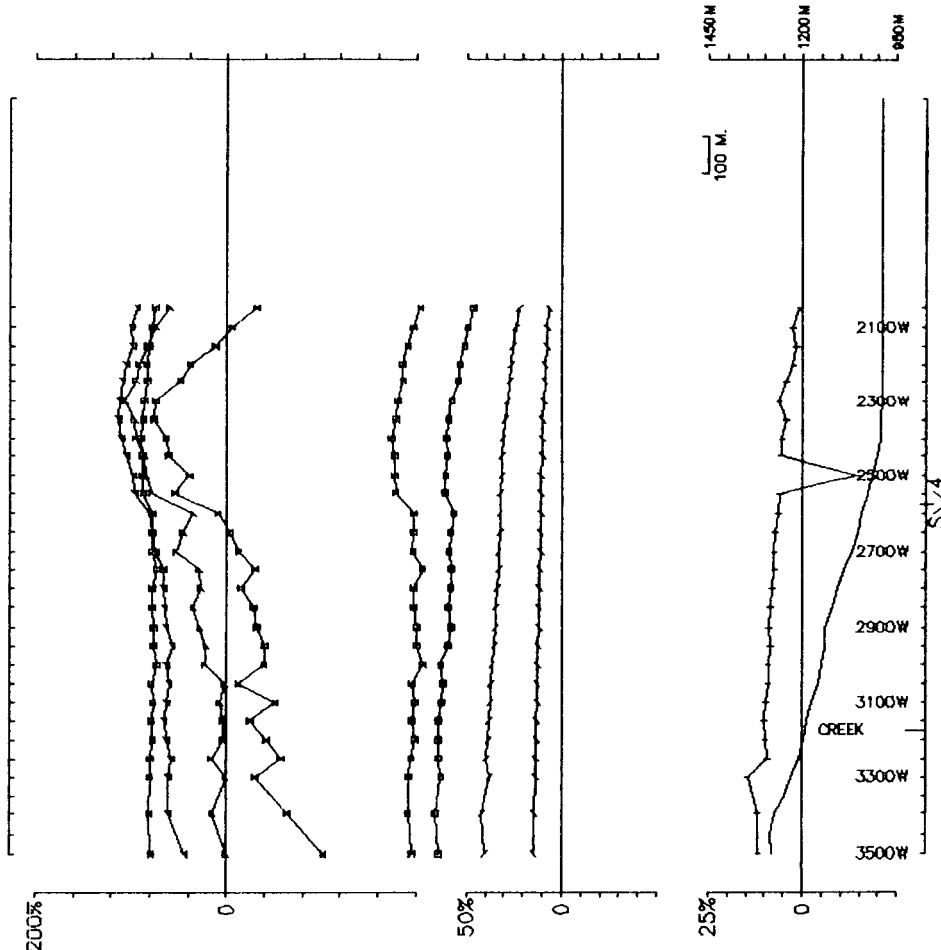
ROAR /Area n COMINCO LTD Hz
Op: U,DH Freq(Hz): 30.974 #Stns: 38 Loop: 4 Line: 8000N DS:6
Ch1 reduced. Ch1 normalized. Totals:P-2251M./L-2251M. Line Azim.: 247 . Rx Label: B0



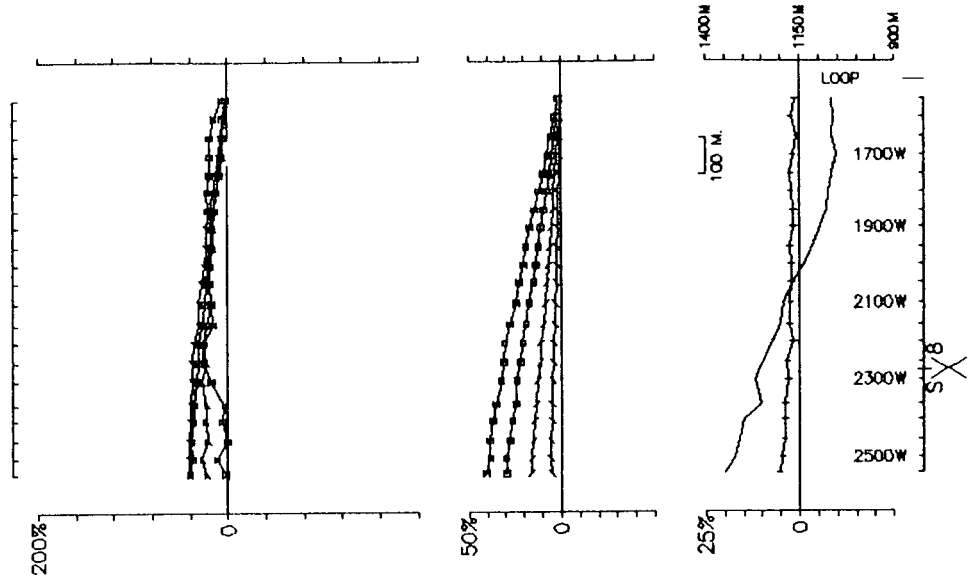
ROAR /Area n COMINCO LTD Hz
Op: W,DH Freq(Hz): 30.974 #Stns: 35 Loop: 4 Line: 7500N DS:7
ChI reduced. ChI normalized. Totals:P-2162M. L-2363M. Line Azim.: 247 . Rx Label: 75



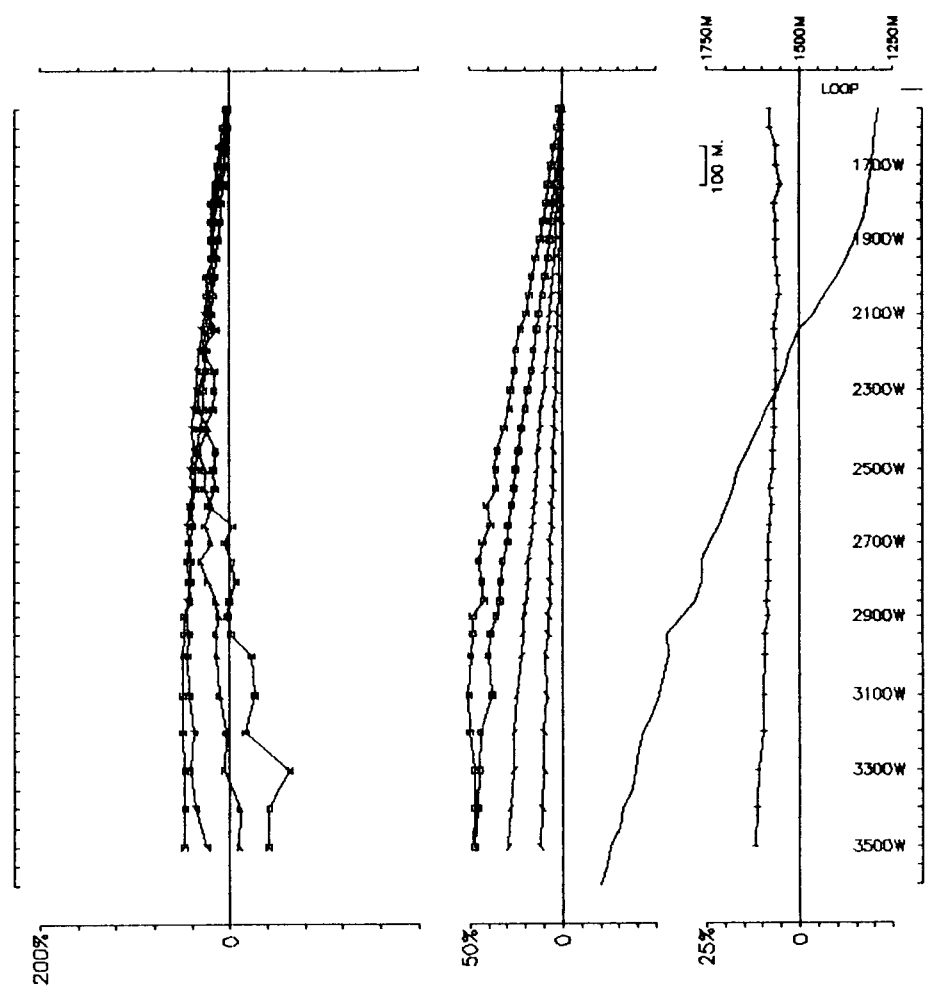
ROAR / Area n COMINCO LTD Hz
Op: W,DH Freq(Hz): 30.974 #Stns: 28 Loop: 4 Line: 7000N DS:8
Ch1 reduced. Ch1 normalized. Totals: P- 1565M, L- 1567M. Line Azim.: 247 . Rx Label: 70



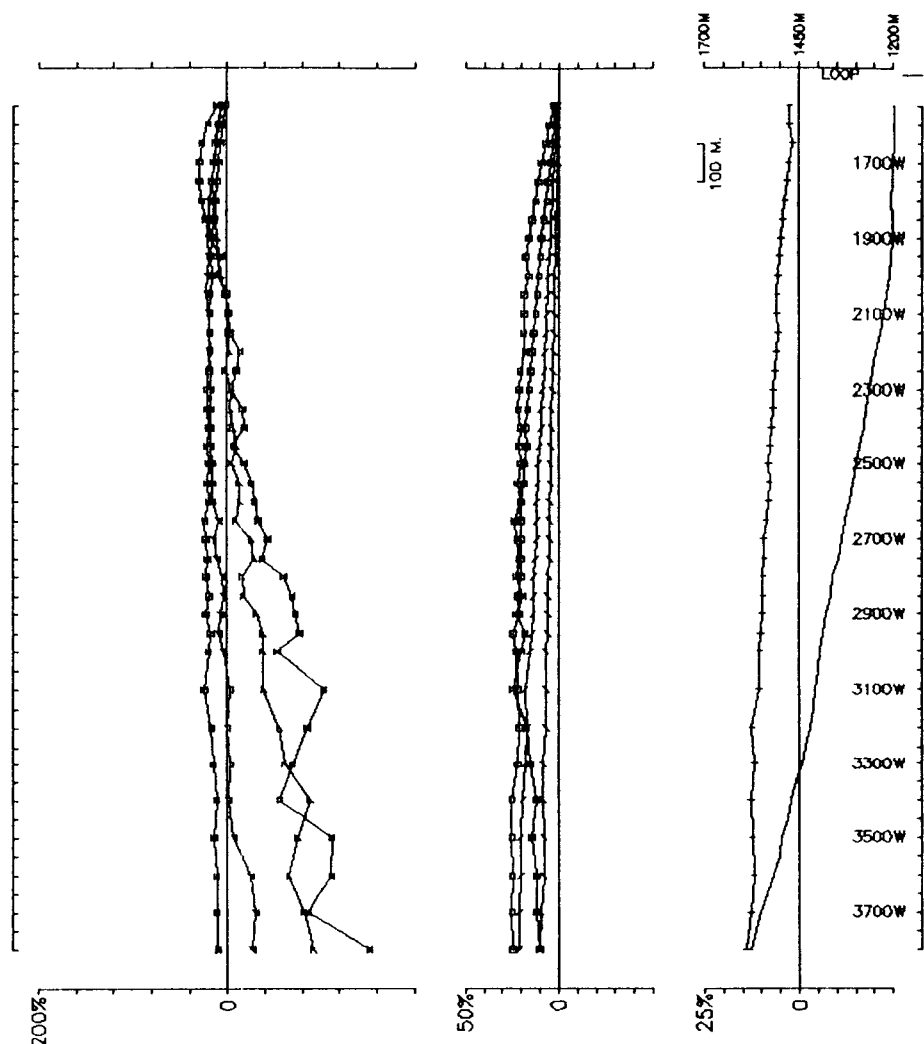
ROAR / Area n COMINCO LTD Hz
Dp: U,DH Freq(Hz): 30.974 #Stns: 28 Loop: 5 Line: 11200N DS:9
Ch1 reduced. Ch1 normalized. Totals:P-1450M/L-2010M. Line Azim.: 270 . Rx Label 12



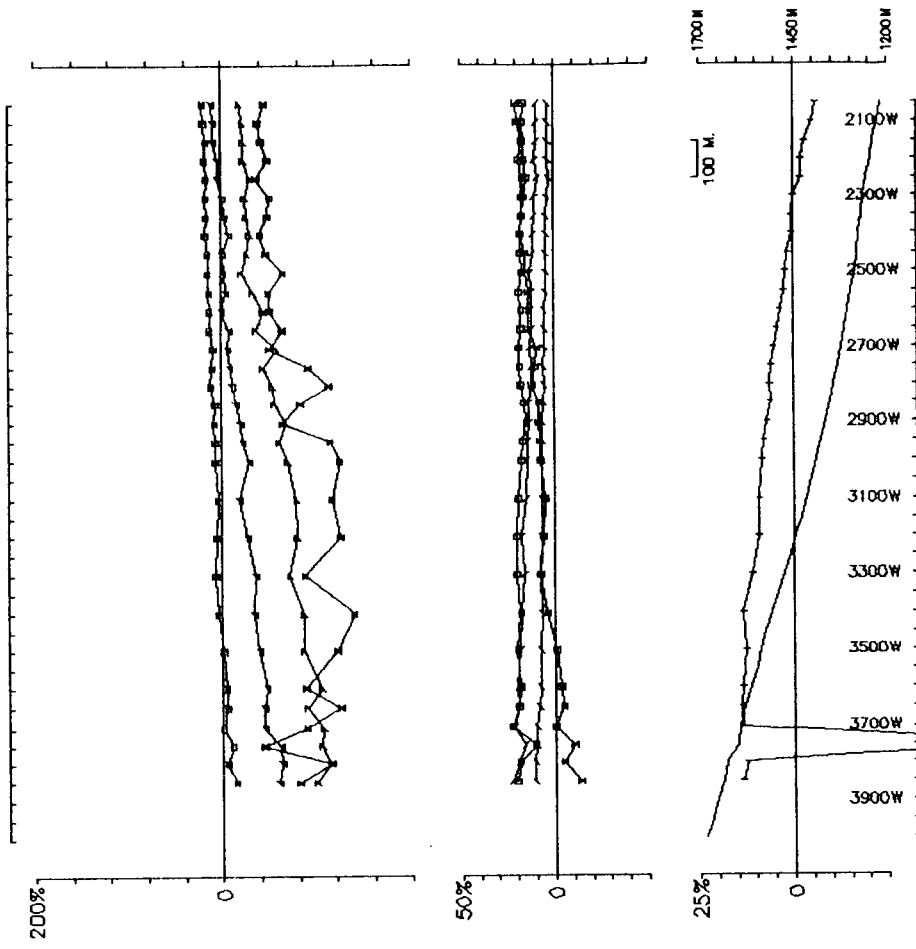
ROAR /Area n COMINCO LTD HZ
Op: W,DH Freq(Hz): 30.974 #Stns: 21 Loop: 5 Line: 10700N DS:10
Ch1 reduced. Ch1 normalized. Totals:P-996M, L-996M. Line Azim.: 270 . Rx Label: 7



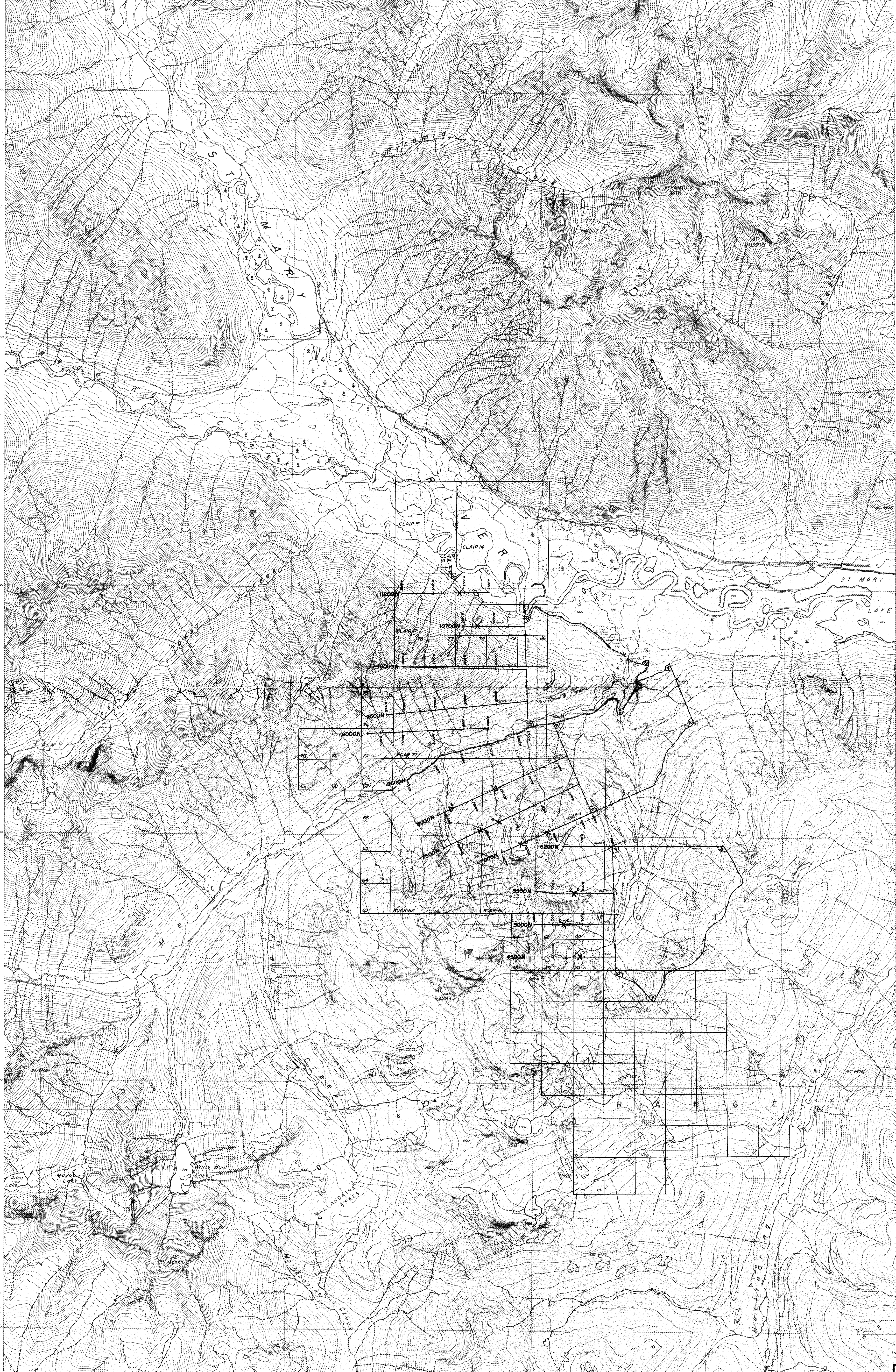
ROAR /Area n COMINCO LTD Hz DS:11
Op: UJ,DH Freq(Hz): 30.974 #Stns: 35 Loop: 5 Line: 10000N
ChI reduced. ChI normalized. Totals:P- 1959M./L-2058M. Line Azim.: 270 . Rx Label: 10



ROAR /Area n COMINCO LTD Hz
Op: U,DH Freq(Hz): 30.974 #Stns: 38 Loop: 5 Line: 9500N DS:12
Ch1 reduced. Ch1 normalized. Totals:P-2242M, L-2242M. Line Azim.: 265 . Rx Label: 95



ROAR /Area n COMINCO LTD Hz
Dp: W,DH Freq(Hz): 30.974 #Strs: 31 Loop: 5 Line: 9000N DS:13
Ch1 reduced. Ch1 normalized. Totals: P-1802M, L-1953M. Line Azim.: 270 . Rx Label: 90



LEGEND

Transportation

- Road, paved
- Road, loose surface
- Road, loop
- Trail, foot
- Trail, horse
- Trail, pack
- Railway, double track
- Railway, single track
- Railway, multi-track
- Railway, abandoned
- Maritime wharf
- Cut-off
- Bridge, to scale, not to scale
- Tunnel, to scale, not to scale

Landmark features

- Building, to scale, symbolised
- Built up area
- Fence
- Transmission line
- Tower, grain

Drainage and related features

- High water mark, water course details
- High water mark, water course meanders
- Stream, intermittent
- Stream, split
- Over
- Flooded land
- Swamp/marsh
- Water dam
- Pier
- Rock/land less than 20m water level

Relief features

- Contour, index
- Contour, intermediate
- Contour, median
- Contour, depression
- Spot elevation

Vegetation

- Wooded area

Control data

- Monumented horizontal control point
- Monumented vertical control point

Cadastral

- Survey of Federal and Provincial Crown Land
- Sub-division of Provincial Crown Land
- Rights of way
- Township boundary
- District lot Township section line
- Indian reserve, Township lot
- Mineral claim, Coal lease, Coal licence
- 1/4 section line in a Township, Ledge or Crown acquisition, Rights of way
- Surveyed Cadastral, The Power

GEOLOGICAL BRANCH ASSESSMENT REPORT

23,622

Notes

Digital data and additional copies of this map are available through MAPS-BC, Ministry of Environment and Parks, Victoria.

Errors and omissions should be brought to the attention of the Director, Survey and Resource Mapping Branch, Ministry of Environment and Parks, Parliament Buildings, Victoria, B.C. V8V 1X5.

Approximate Mean Destination 1989
to Centre of Map
Decreasing 1/4 degree

437 018	437 019	437 020
437 024	437 025	437 026
437 030	437 031	437 032

Adding sheet index in the
Bottom corners of this sheet.

LEGEND

Transportation

- Road, paved
- Road, loose surface
- Road, loop
- Trail, foot
- Trail, horse
- Trail, pack
- Railway, double track
- Railway, single track
- Railway, multi-track
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- Tunnel, to scale, not to scale

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Relief features

- Contour, index
- Contour, intermediate
- Contour, median
- Contour, depression
- Spot elevation

Vegetation

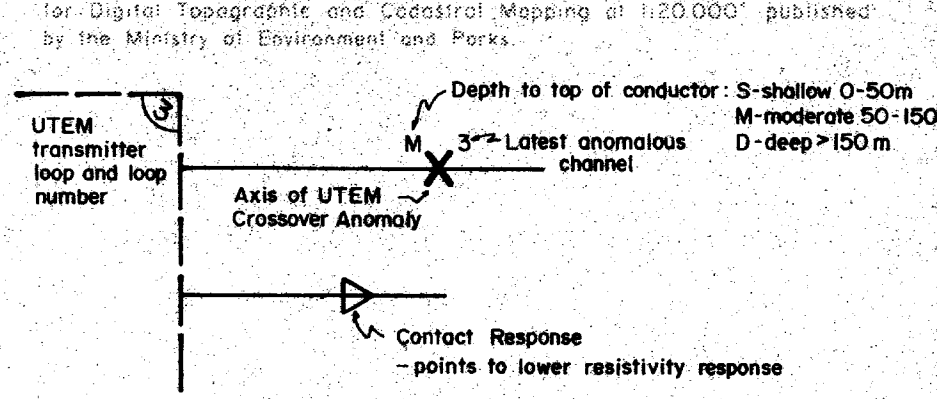
- Wooded area

Control data

- Monumented horizontal control point
- Monumented vertical control point

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Approximate Mean Destination 1989
to Centre of Map
Decreasing 1/4 degree

437 028	437 029	437 030
437 034	437 035	437 036
437 040	437 041	437 042