COMINCO LTD.

EXPLORATION

WESTERN CANADA

NTS: 82G/5

GEOPHYSICAL REPORT

ON A UTEM SURVEY

ON THE ST. EUGENE PROPERTY

FORT STEELE M.D., B.C.

- ASSESSMENT REPORT -

Latitude : 49°17'N

Longitude : 115°50'W

Work Performed by : R.W. Holroyd, J.J. Lajoie & D. Holcombe

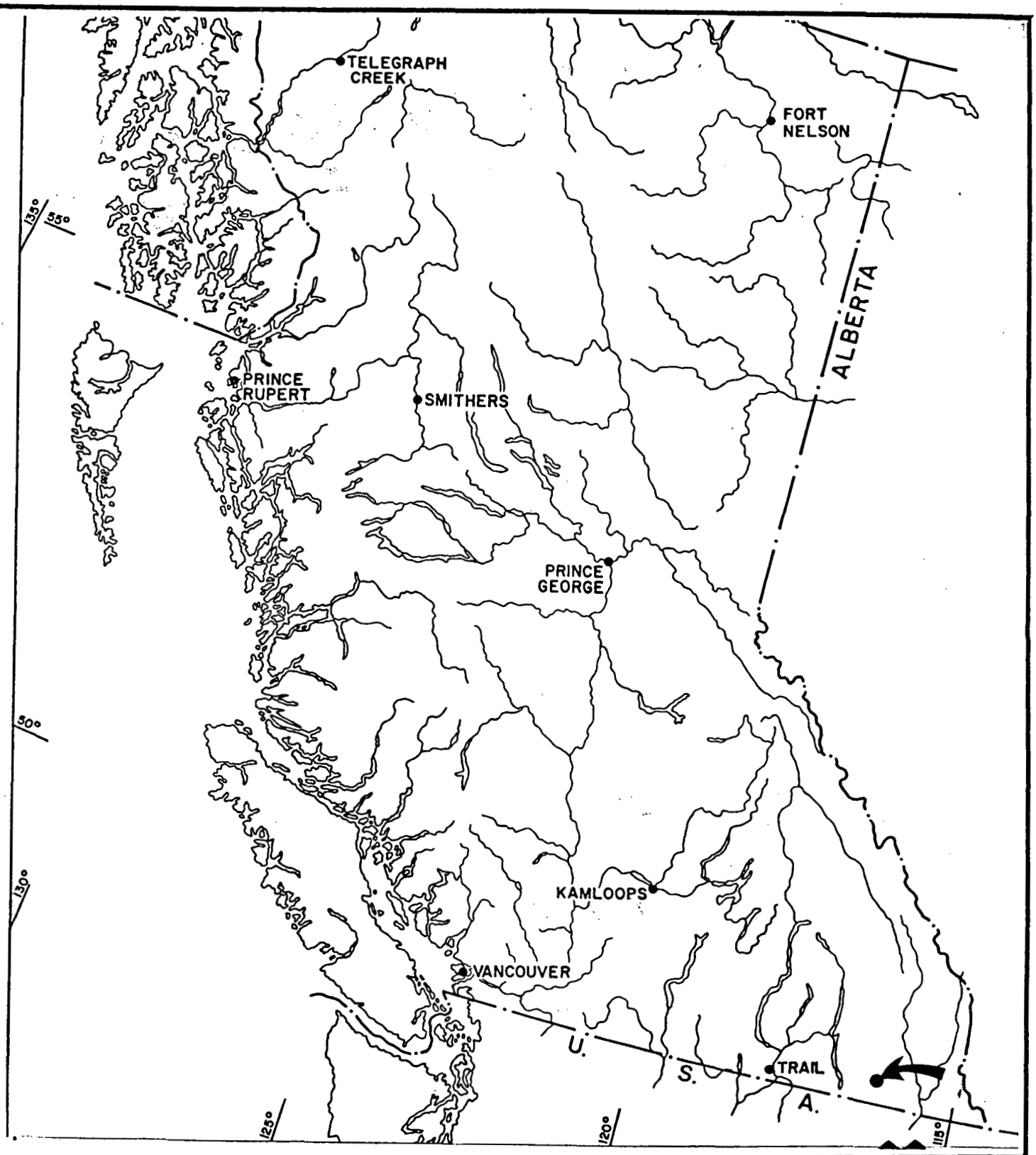
Time Interval of Field Work : August 11 to August 18, 1990

Claims Covered : L-665 to L-668, L-2167, L-3545, L-3546, L-4405, L-4413 to L-4415, L-4419, L-6126, L-6127, L-6131 to L-6134, L-7004, L7005, L-7015, L-7017, L-7022, L-7756, L-9805 to L-9807, L-12467, L-15376, L-15347 to L-15349, L-15352 to L-15356, L-15364 to L-15366

Claim Operator: COMINCO LTD.

NOVEMBER 1990

I. JACKISCH



ST. EUGENE PROPERTY

Cominco

NTS 82G/5

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

LOCATION MAP

Scale:

Date: NOV. 1990

Plate: 384-90-1

210-0620

TABLE OF CONTENTS

COMINCO LTD.

EXPLORATION WESTERN CANADA

NTS: 82G/5

GEOPHYSICAL REPORT ON AN UTEM SURVEY ON THE ST. EUGENE PROPERTY FORT STEELE M.D., B.C.

- ASSESSMENT REPORT -

INTRODUCTION

A UTEM survey totalling 16.5 kms was carried out on the St. Eugene Property from August 11 to 18, 1990, by a Cominco geophysical crew under the direction of geophysicists, J.J. Lajoie, R.W. Holroyd and D.J. Holcombe.

The purpose of the survey was to explore for a massive sulphide deposit at depth in the immediate area of the St. Eugene Mine.

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

LIST OF CLAIMS SURVEYED

The following is a list of claims covered by the UTEM surveying:

L-665 to L-668
L-2167, L-3545, L-3546, L-4405, L-4413 to L-4415, L-4419
L-6126, L-6127, L-6131 to L-6134, L-7004, L-7005, L-7015
L-7017, L-7022, L-7756, L-9805 to L-9807, L-12467, L-15376
L-15347 to L-15349, L-15352 to L-15356, L-15364 to L-15366

LOCATION AND ACCESS

The survey area was centered around the town of Moyie, B.C., located on Highway 3/95, 20 kms south of Cranbrook, B.C. and 70 kms east-northeast of Creston, B.C. The body of water at Moyie Lake divides the grid into an eastern and western part, with no data collected over the lake.

Access to Moyie, B.C. is along a well-paved 2-lane highway. Abundant dirt roads around Moyie Lake and to the east of the town of Moyie exist for easy loop and line access.

DESCRIPTION OF UTEM SYSTEM AND FIELD PROCEDURE

UTEM is an acronym for "University of Toronto ElectroMagnetometer". The system was developed by Dr. Y. Lamontagne (1975) while he was a graduate student of that University.

The field procedure consists of first laying out a large loop of single strand insulated wire and energizing it with current from a transmitter which is powered by a 2.2 kW motor generator. The loop is generally square shaped, wherever possible, with sides between 500 metres and 1,500 metres long. In this survey, the loop dimensions were 1,800 m x 1,300 m. Survey lines are generally oriented perpendicular to one side of the loop and surveying can be performed both inside and outside the loop. The field procedure is similar to Turam, a better known electromagnetic surveying method.

The transmitter loop is energized with a precise triangular current waveform at a carefully controlled frequency (30.9 Hz for this survey). The receiver system includes a sensor coil and backpack portable receiver module which has a digital recording facility both on cassette magnetic tape and in solid state memory. The time synchronization between transmitter and receiver is achieved through quartz crystal clocks in both units which must be accurate to about one second in 50 years.

The receiver sensor coil measures the vertical magnetic component of the electromagnetic field and responds to its time derivative. Since the transmitter current waveform is triangular, the receiver coil will sense a perfect square wave in the absence of geologic conductors. Deviations from a 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 UTEM receiver gathers and records 9 channels of data at each station. The higher number channels (7-8-9) correspond to short time or high frequency while the lower number channels (1-2-3) correspond to long time or low frequency. Therefore, poor and/or small conductors will respond on channels 9, 8, 7 and 6. Progressively better and/or larger conductors will give responses on progressively lower numbered channels as well. For example, massive, highly conducting sulphides or graphite will produce a response on all nine channels.

The UTEM receiver records data in solid state memory. The memory is dumped on to a field computer at the base camp. The mini computer processes the data and controls the plotting on a graphics plotter. Data are portrayed as profiles of each of the nine channels, shown for each survey line of each transmitter loop. These profiles are appended to this report.

The magnetic field amplitudes from both the transmitter loop (primary field) and from the electric currents induced in the ground (secondary field) vary considerably from the beginning of a line (near the transmitter loop) to the end of the survey line (far away from the transmitter loop). In order to present such data, a normalizing scheme must be used. In this survey, the primary field from the loop is used for normalizing and presenting the data.

Continuously normalized plots.

This is the standard normalization scheme.

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) For the remaining channels (n=2 to 9)

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

where Ch.n is the observed amplitude of Channel n (2 to 9).

The above normalizing procedures result in chaining errors displayed in Channel 1 only, since all other channels are normalized to Channel 1.

DISCUSSION OF RESULTS

Loops 1 and 2 are located as shown in Plate 384-90-2.

The Loop 1 data covers the area directly over the St. Eugene Mine. Measurements on the westernmost lines are affected by numerous cultural effects such as railway tracks, power lines, underground pipes, and the town of Moyie. Line 3000W is influenced the most, resulting in high positive readings on Channels 2 to 6 (caused by the survey lines heading sub-parallel to these man-made conductors). This influence diminishes to the east as seen by a progressive negative shift in Channels 2 to 6 in this direction. The erratic measurements on Channels 7 to 9 caused by the power line also diminish to the east.

Crossover anomalies, responding up to Channel 2, occur at Line 2600W (D.S. 5), Stations 2325N and 2625N, and at Line 2200W (D.S. 4), Stations 2275N and 2775N.

No significant conductors were found on Loop 2.

CONCLUSIONS

16.5 kms of UTEM surveying was performed on the St. Eugene Property. Two crossover anomalies spanning two lines were found.

Report by : Ingo Jackisch

Ingo Jackisch
Geophysicist
Cominco Ltd.

Approved
for Release : W. J. Wolfe

W. J. Wolfe
Manager, Exploration
Western Canada
Cominco Ltd.

Distribution:

Mining Recorder	(2)
Kootenay Expl. Office	(1)
St. Eugene Mining Corp.	(1)
Western District Files	(1)
Geophysics Files	(1)

SUMMARY GEOLOGY (lithology, age, structure, alteration, mineralization, size, and attitude):

Property is underlain by Helikian age Middle Aldridge sediments. The sediments are predominantly quartzitic wacke turbidites + finer-grained interturbidite argillaceous packages. This sequence has been intruded by Moyie gabbro intrusive sills and dykes. The major structure is a major, open, gently north-plunging antidine.

REFERENCE

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

A P P E N D I X I

IN THE MATTER OF THE B.C. MINERAL ACT

AND THE MATTER OF A GEOPHYSICAL PROGRAMME

CARRIED OUT ON THE ST. EUGENE PROPERTY

LOCATED 20 KMS SOUTH OF CRANBROOK, B.C.

IN THE FORT STEELE MINING DIVISION OF THE

PROVINCE OF BRITISH COLUMBIA,

MORE PARTICULARLY

N.T.S. 82G/5

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 ST. EUGENE Property;

3. THAT the said expenditures were incurred from August 11 to August 18, 1990 for the purpose of mineral exploration on the above-noted property.

Ingo Jackisch

Ingo Jackisch
Geophysicist, Cominco Ltd.

Dated this 23 day of November, 1990
at Vancouver, B.C.

APPENDIX II

EXHIBIT "A"

STATEMENT OF EXPENDITURES

ST. EUGENE PROPERTY - August 11 to August 18, 1989

1. STAFF COSTS

a)	C. Schultz, geologist 5 days @ $180/day	900.00	
b)	J.J. Lajoie, geophysicist 4.5 days @ $480/day	2,160.00	
c)	R.W. Holroyd, geophysicist 5.5 days @ $390/day	2,145.00	
d)	D.J. Holcombe, geophysicist 8.5 days @ $155/day	1,317.50	
e)	J.V. Bjelica, helper 8 days @ $ 105/day	840.00	
f)	G. Joki, helper 7 days @ $ 92.70/day	648.90	
g)	M. Davies, contractor 6.5 days @ $200/day	1,300.00	9,311.40

2. OPERATING DAY CHARGES

Note: This charge is applied for those days on which useful field data are acquired, to cover the cost of data compilation, drafting, and report writing.

10.5 days @ $390/day		4,095.00

3. EQUIPMENT RENTAL

UTEM 3 System	1,425.00	
Two 4x4 Rental Trucks	1,688.00	3,113.00

4. EXPENSE ACCOUNTS

J.J. Lajoie	392.50	
R.W. Holroyd	337.00	
D.J. Holcombe	403.89	
J.V. Bjelica	141.11	
G. Joki	143.00	
M.J. Davies	403.97	1,821.47

Carried Forward $ 18,340.87

STATEMENT OF EXPENDITURES cont'd

ST. EUGENE PROPERTY - August 11 to August 18, 1990

	Carried Forward	$ 18,340.87
5. MISCELLANEOUS		
Linecutting	$ 10,054.41	
UTEM Wire Charge	120.00	
Geophysical Freight Charges (Mob/Demob)	485.74	10,660.15
TOTAL		$ 29,001.02

A P P E N D I X III

CERTIFICATE OF QUALIFICATIONS

I, INGO JACKISCH, of 424 Somerset Street, in the City of North Vancouver, 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 have been practising Geophysics from 1975 to 1990, and have been an employee of Cominco Ltd. from 1980 to 1990.

Ingo Jackisch

Ingo Jackisch, B.Sc.
Geophysicist, Cominco Ltd.

NOVEMBER 1990

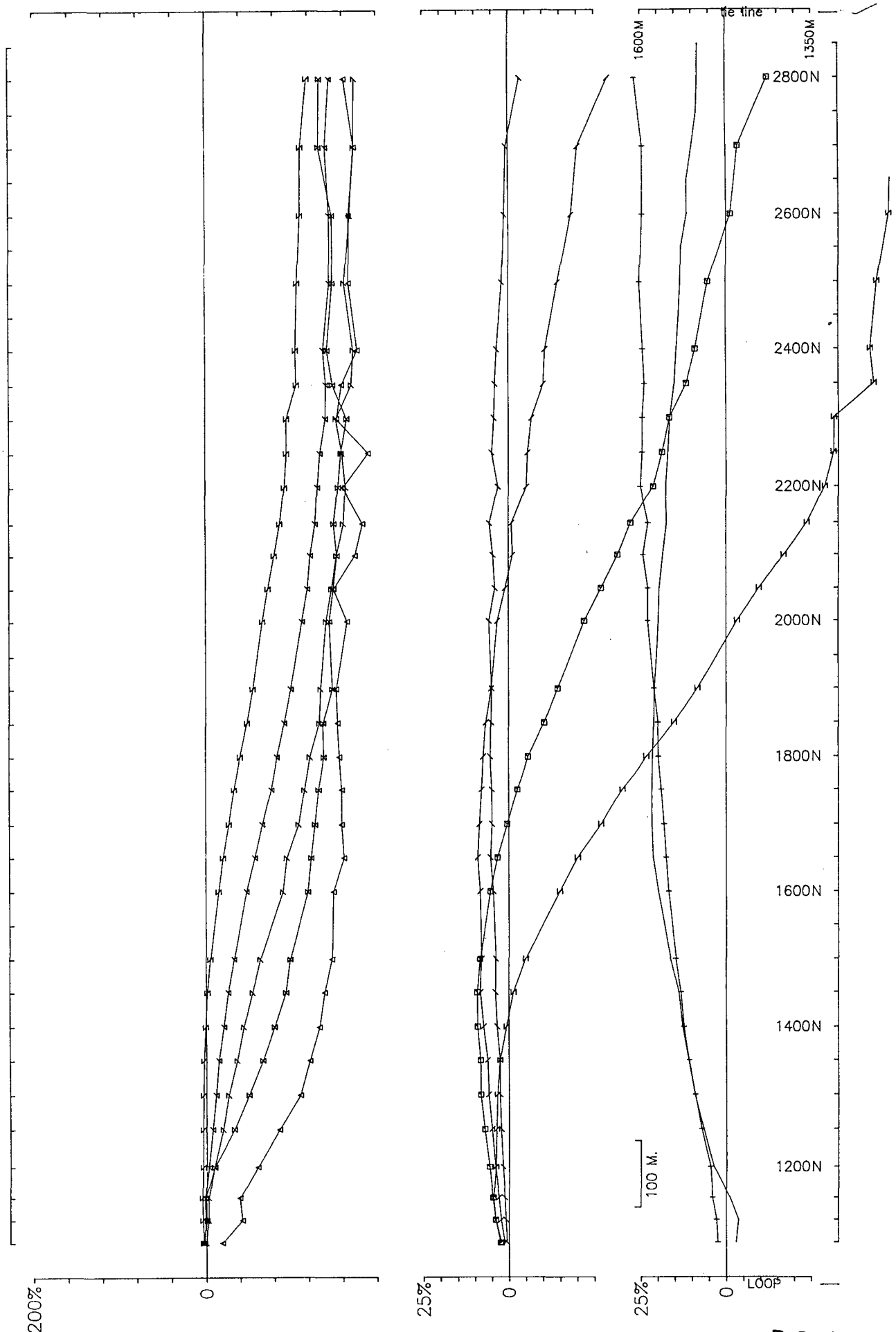
LEGEND

UTEM DATA SECTIONS

ORDINATE: Amplitude scale is given in %

ABSCISSA: Station or Picket Numbers in Hundreds of Meters

SYMBOL	CHANNEL	MEAN DELAY TIME	
		15 Hz	30 Hz
	1	25.6 ms	12.8 ms
	2	12.8	6.4
	3	6.4	3.2
	4	3.2	1.6
	5	1.6	0.8
	6	0.8	0.4
	7	0.4	0.2
	8	0.2	0.1
	9	0.1	0.05
	10	0.05	0.025

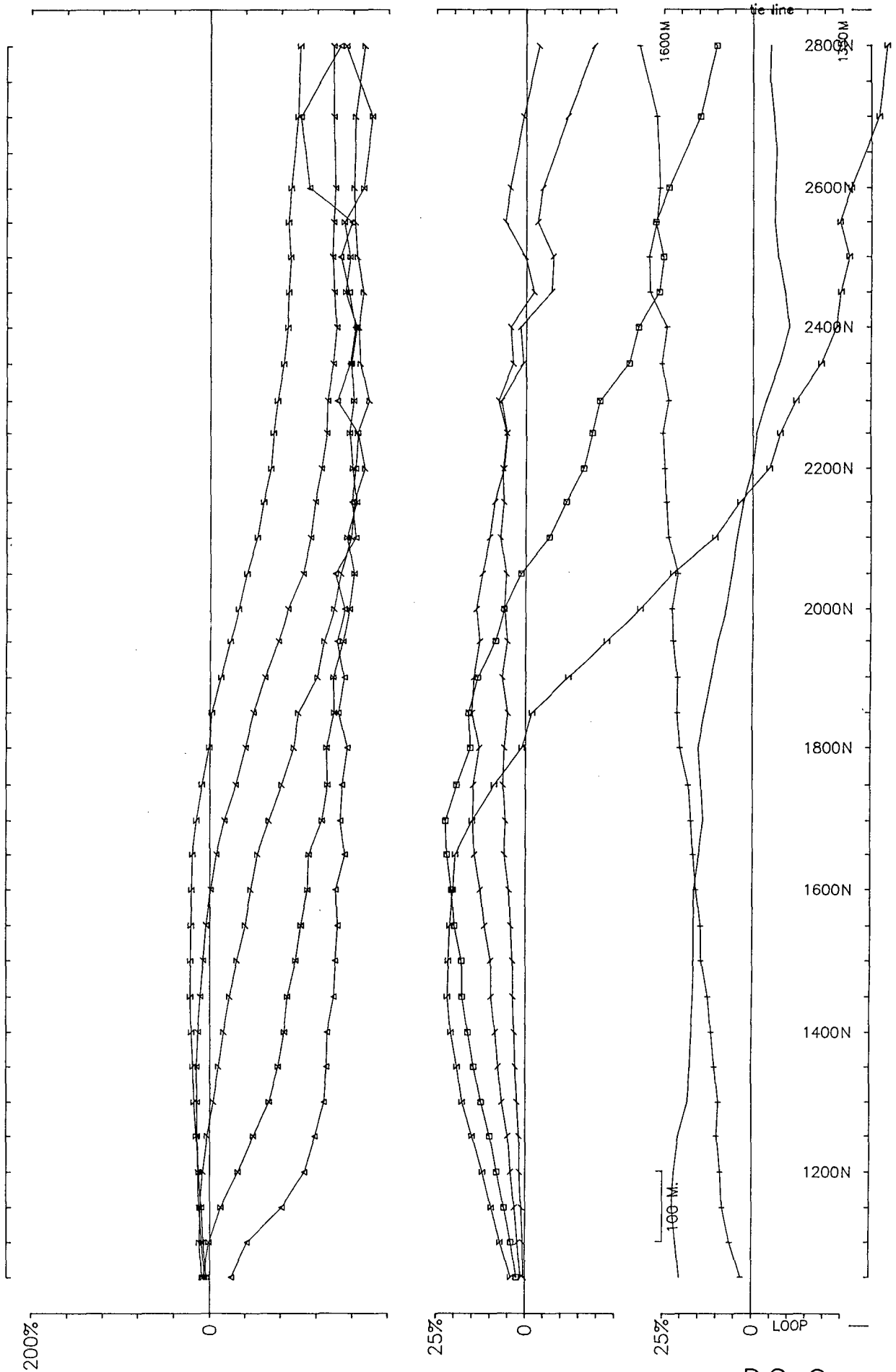


DS I

ST. EUGENE COMINCO Hz

Op: JJL,DH,MD Freq(Hz): 30.974 Loop: 1 Line: 1000W

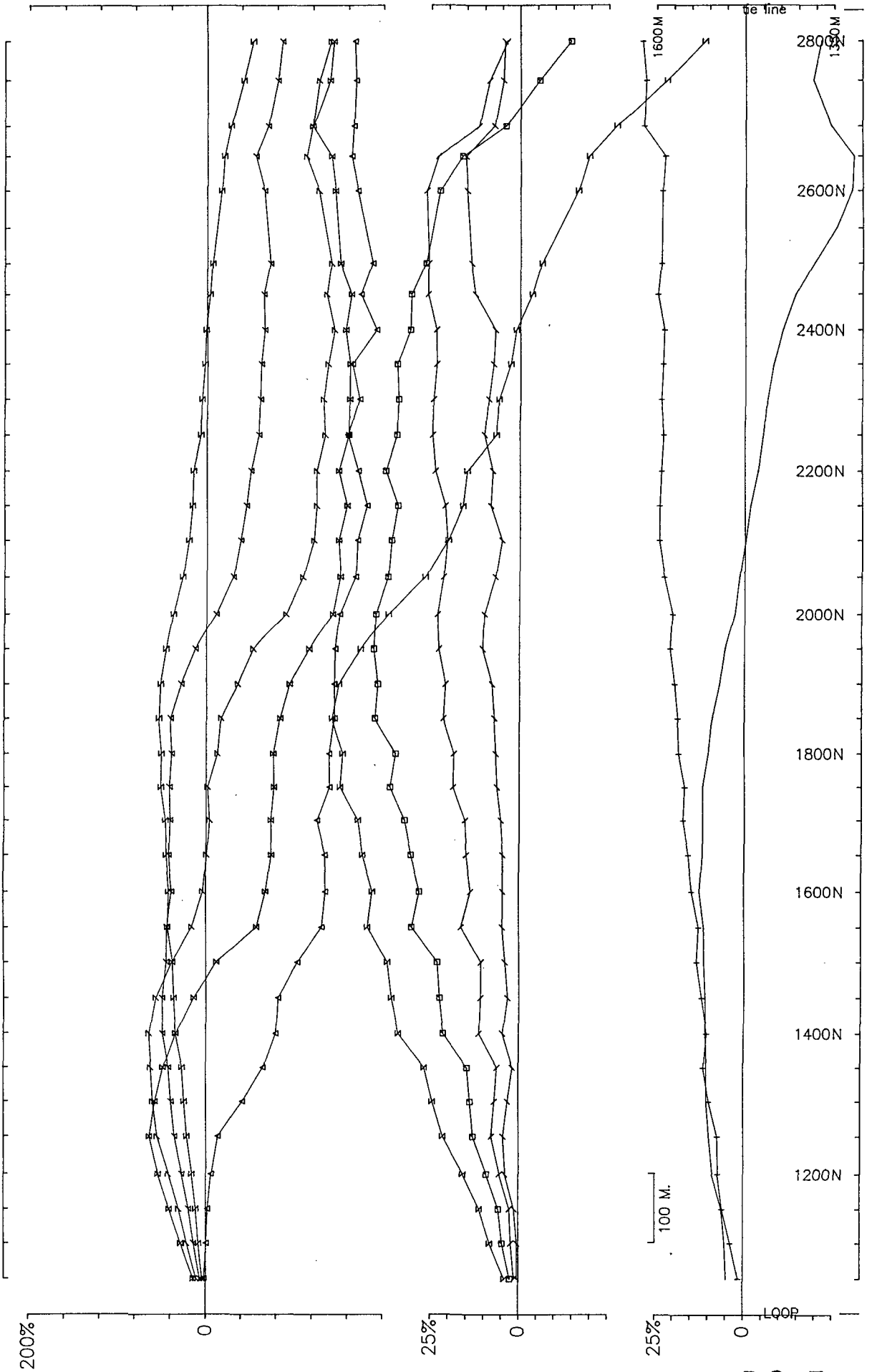
Ch1 reduced, Ch1 normalized. Totals:P- 1720M. /L- 1769M. Line Azim.: 30 . Rx Label: 10



ST. EUGENE COMINCO Hz

Op: JJL,DH,MD Freq(Hz): 30.974 Loop: 1 Line: 1400W

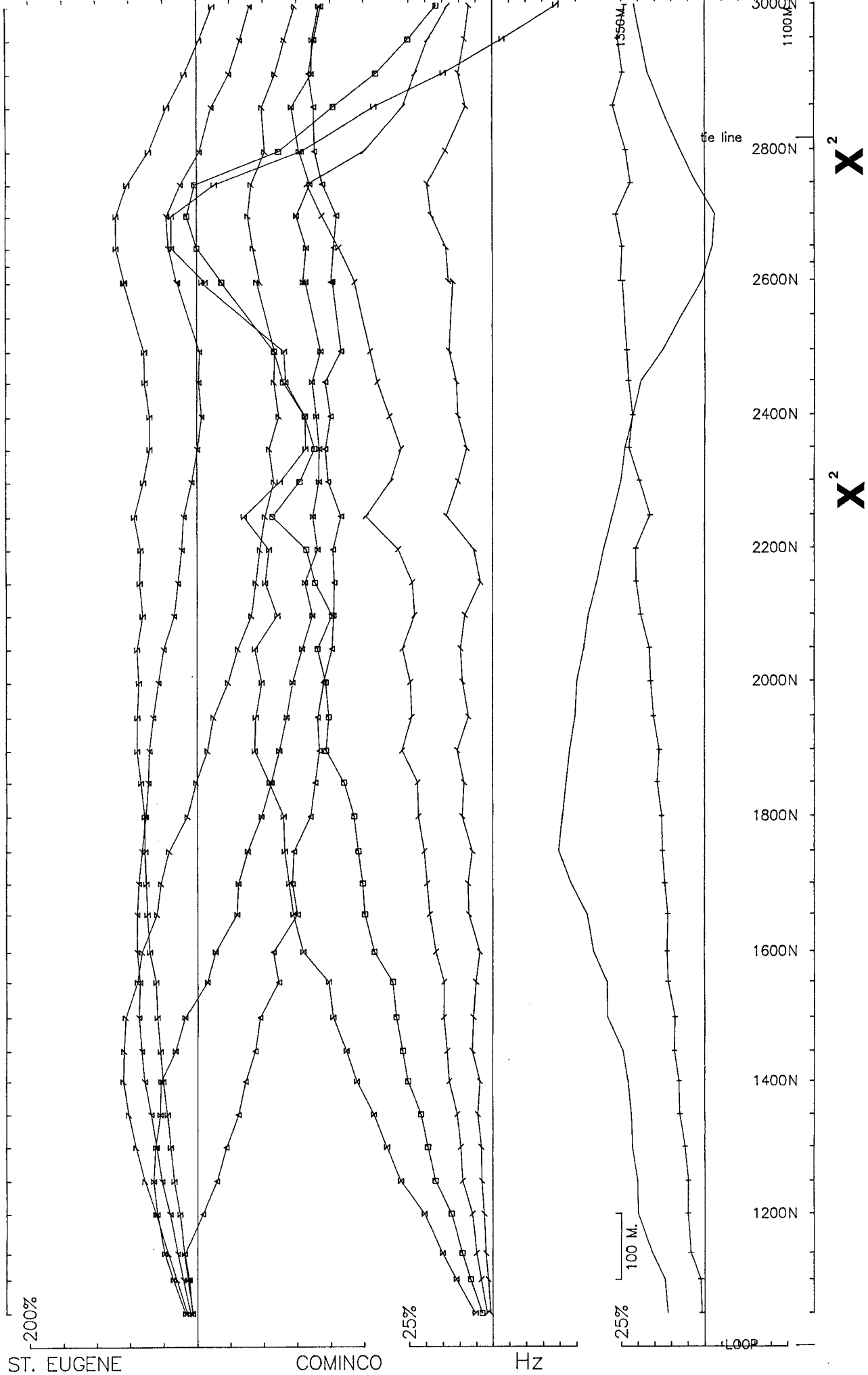
Ch1 reduced. Ch1 normalized. Totals:P- 1742M./L- 1742M. Line Azim.: 30 . Rx Label: 14



ST. EUGENE COMINCO Hz

Op: JJL,DH,MD Freq(Hz): 30.974 Loop: 1 Line: 1800W

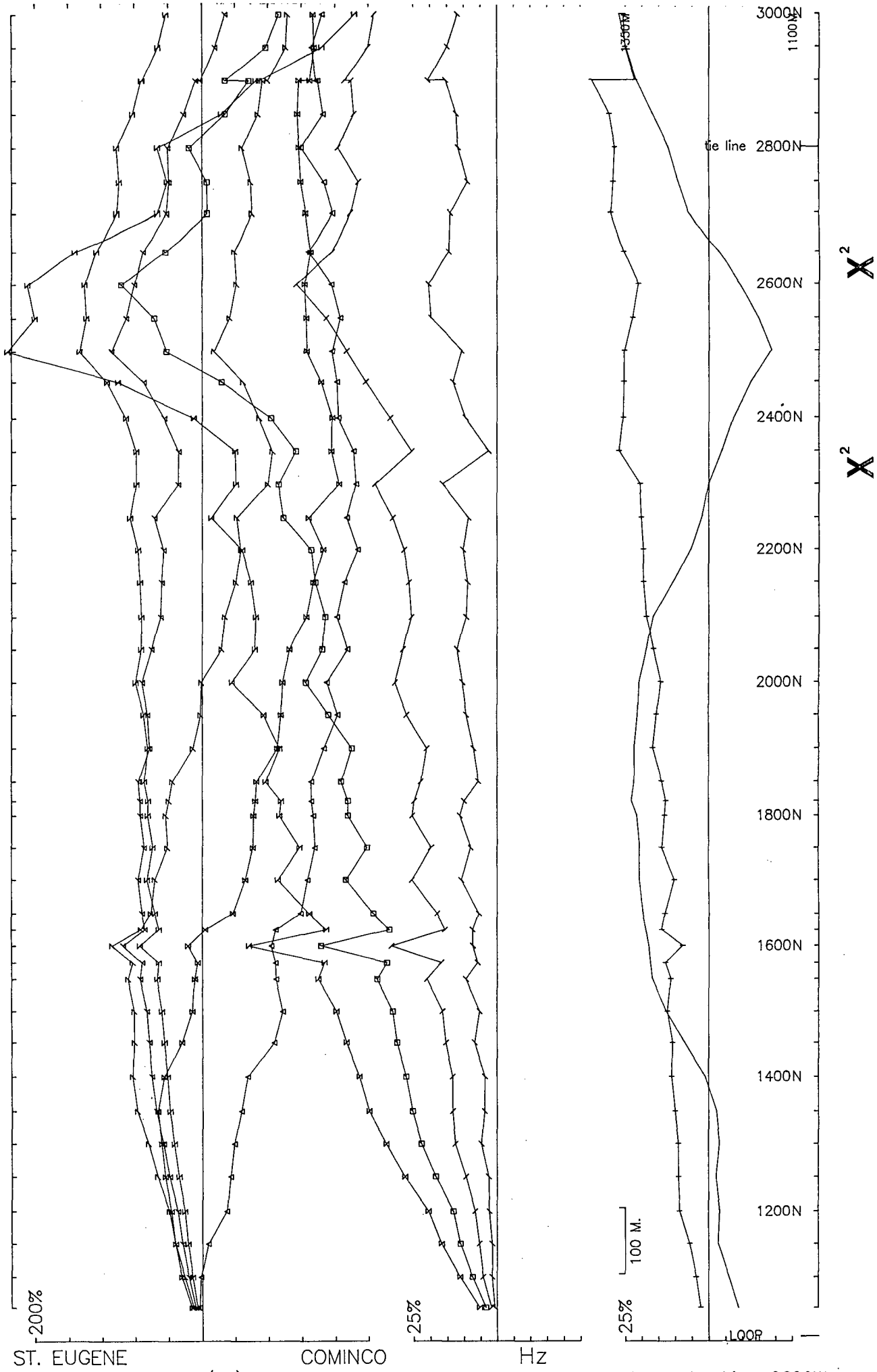
Ch1 reduced. Ch1 normalized. Totals:P– 1766M. /L– 1766M. Line Azim.: 30 . Rx Label: 18



Op: JJL,DH,MD Freq(Hz): 30.974 Loop: 1 Line: 2200W

Ch1 reduced. Ch1 normalized. Totals:P– 1960M. /L– 1963M. Line Azim.: 30 . Rx Label: 22

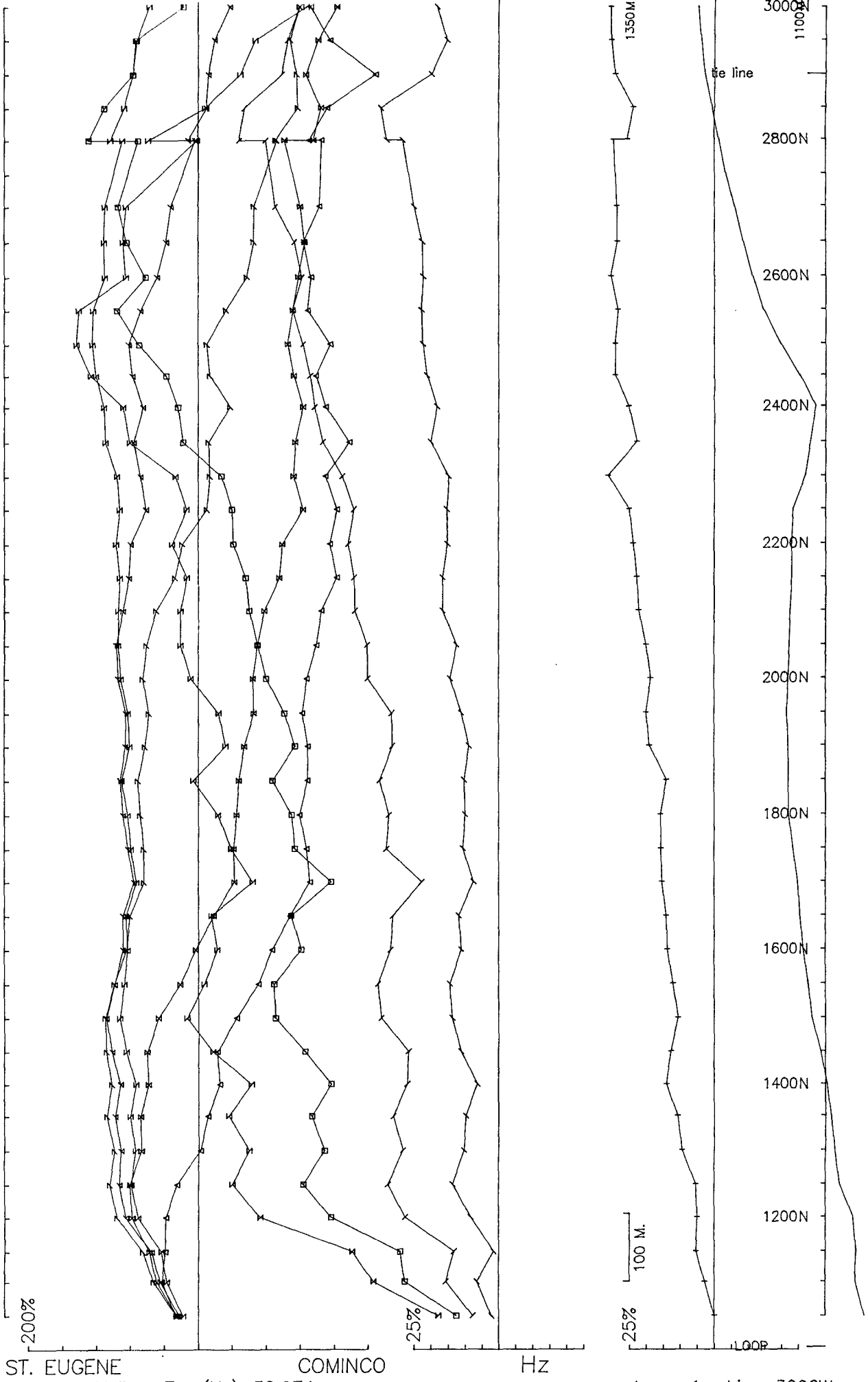
DS 4



Op: JJL,DH,MD Freq(Hz): 30.974 Loop: 1 Line: 2600W

Ch1 reduced. Ch1 normalized. Totals:P– 1949M. /L– 1949M. Line Azim.: 30 . Rx Label: 26

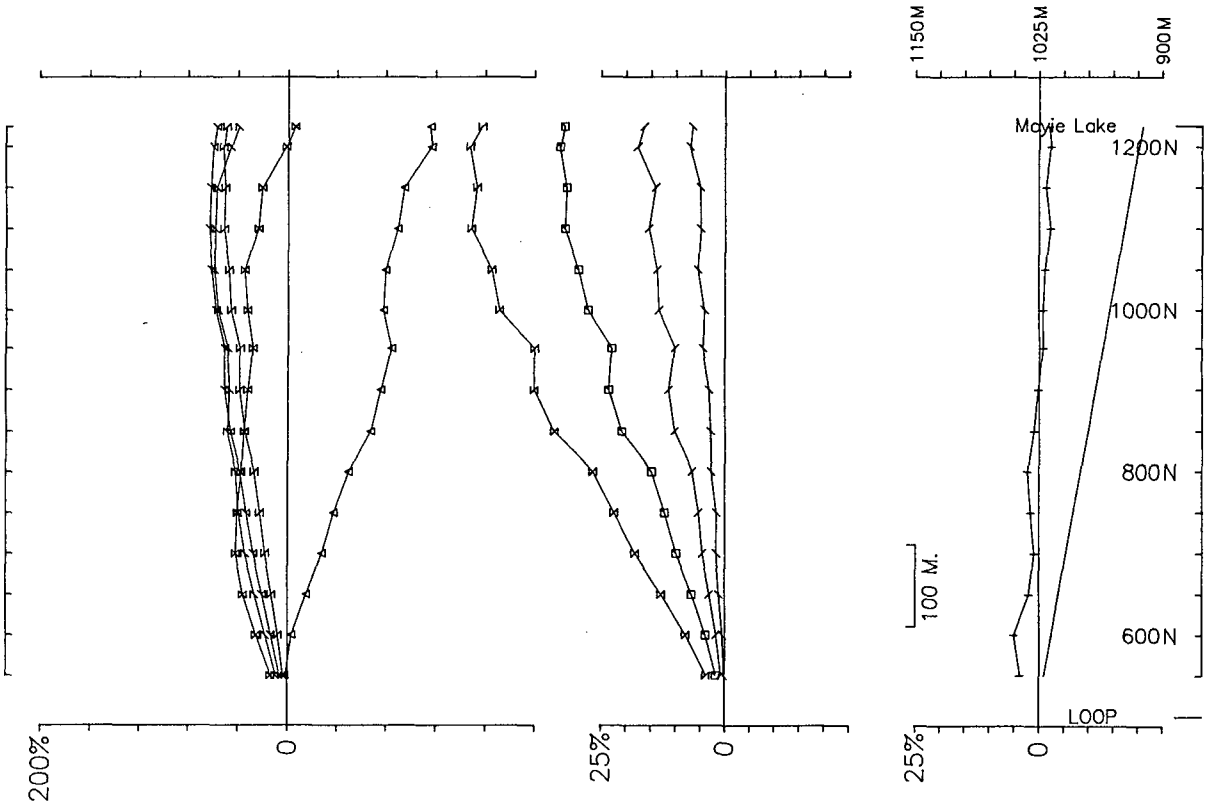
DS 5



Op: JJL,DH,MD Freq(Hz): 30.974 Loop: 1 Line: 3000W

Ch1 reduced. Ch1 normalized. Totals:P— 1935M. /L— 1935M. Line Azim.: 30 . Rx Label: 30

DS 6

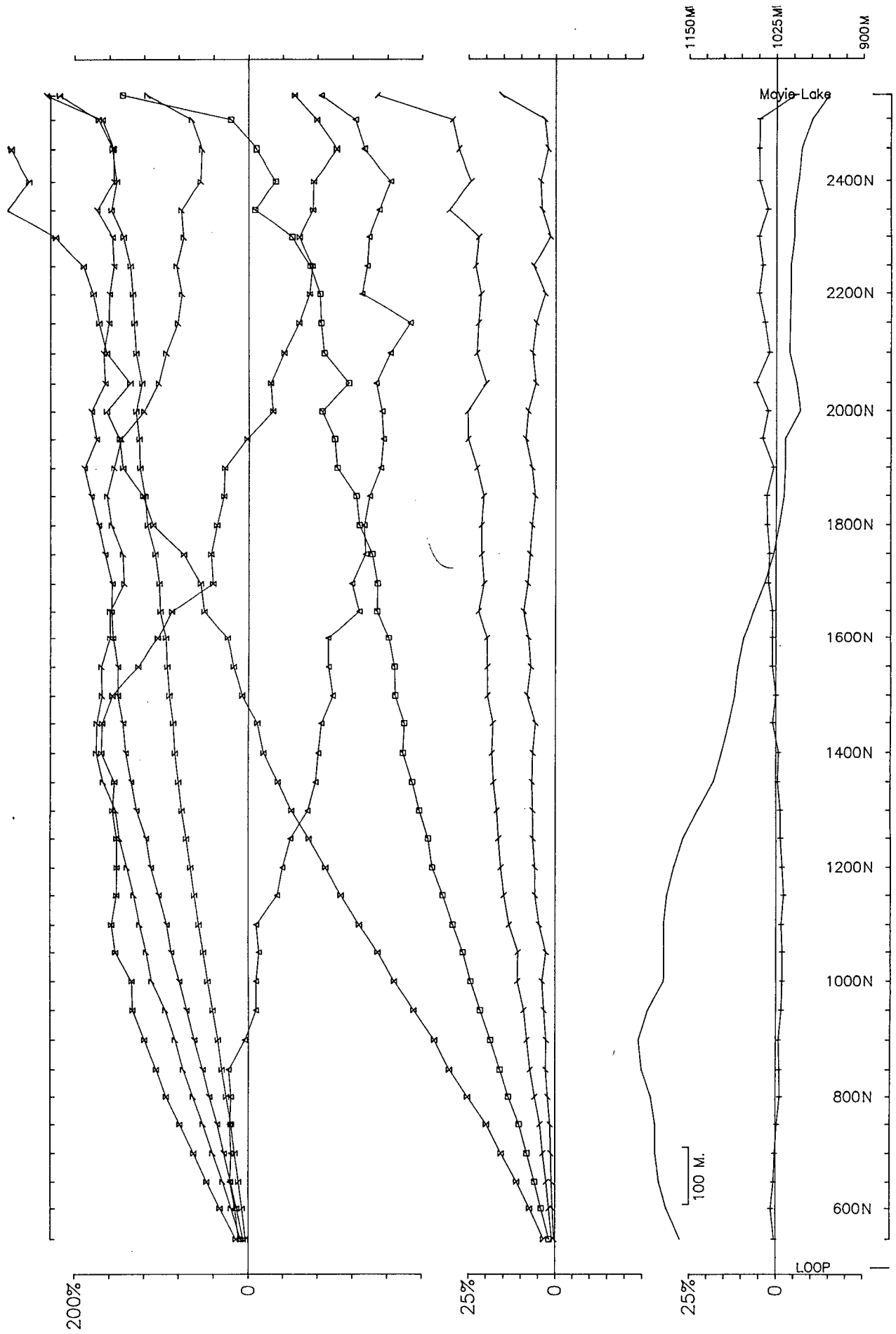


ST. EUGENE COMINCO Hz

Op: RWH & DH Freq(Hz): 30.974 Loop: 2 Line: 4400W

Ch1 reduced. Ch1 normalized. Totals:P-675M./L-675M. Line Azim.: 30 . Rx Label: 44

DS 7

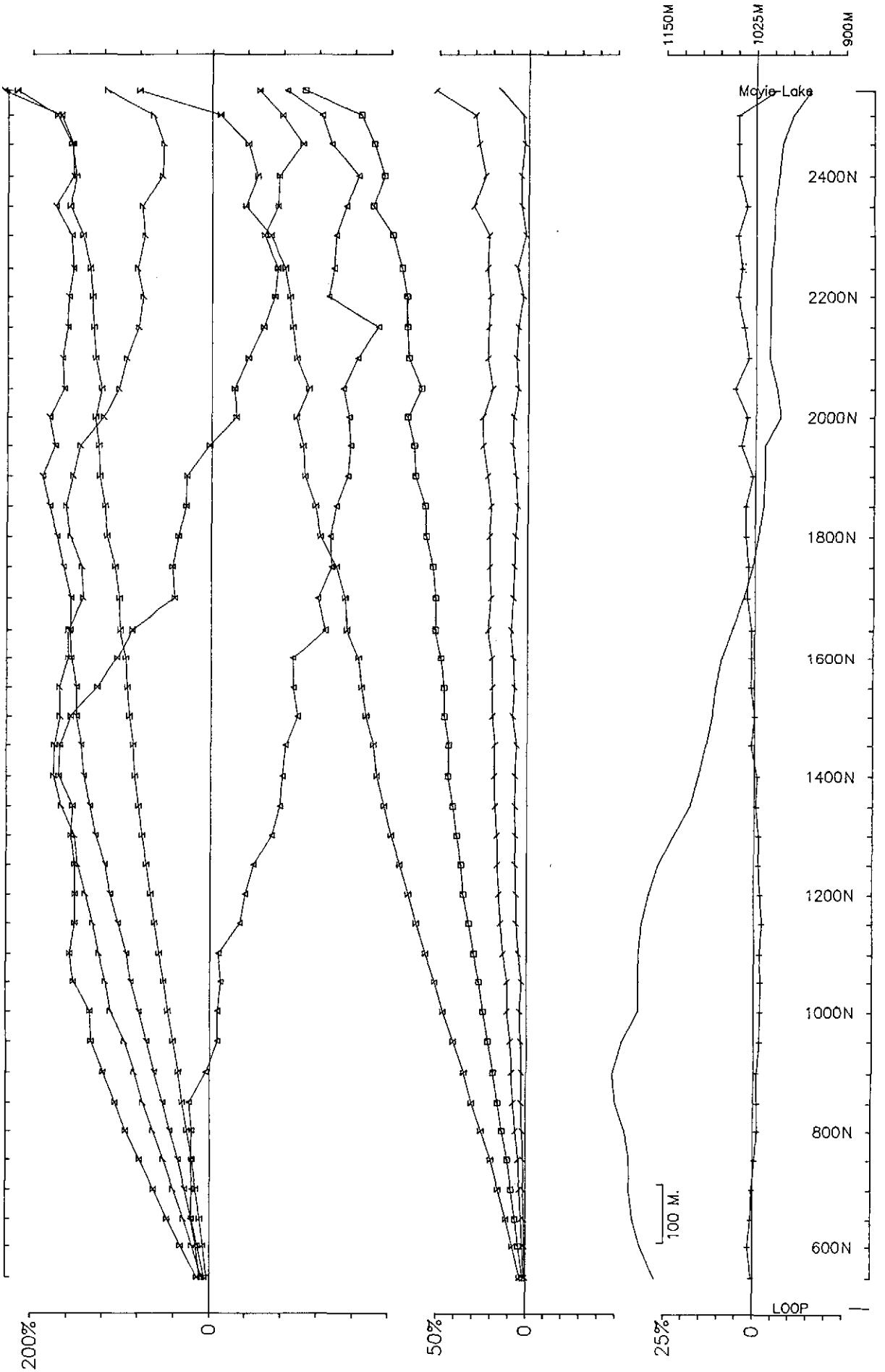


ST. EUGENE COMINCO Hz

Op: RWH & DH Freq(Hz): 30.974 Loop: 2 Line: 4800W

Ch1 reduced. Ch1 normalized. Totals:P– 1990M. /L– 1990M. Line Azim.: 30 . Rx Label: 48

DS 8a

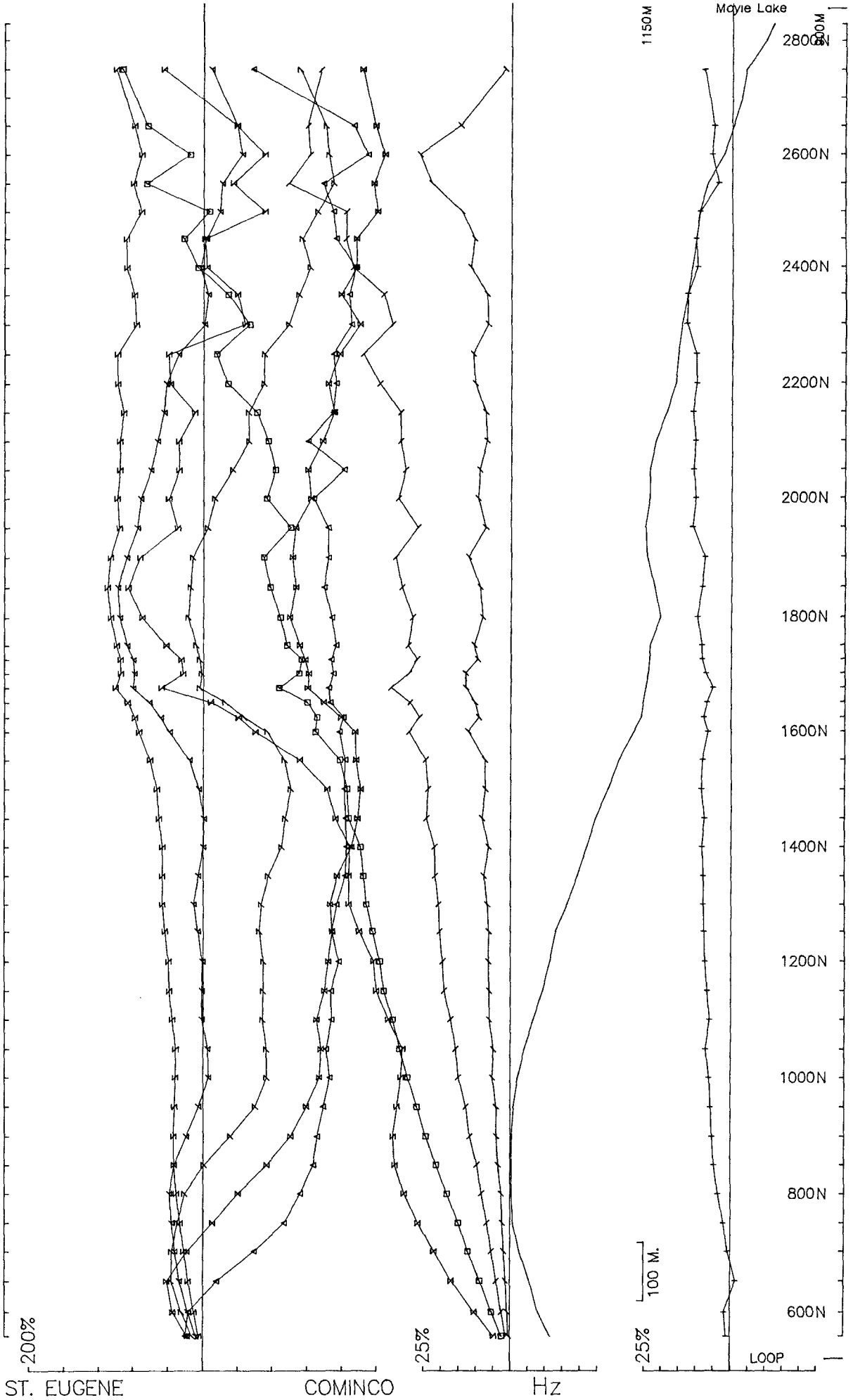


ST. EUGENE COMINCO Hz

Op: RWH & DH Freq(Hz): 30.974 Loop: 2 Line: 4800W

Ch1 reduced. Ch1 normalized. Totals:P- 1990M. /L- 1990M. Line Azim.: 30 . Rx Label: 48

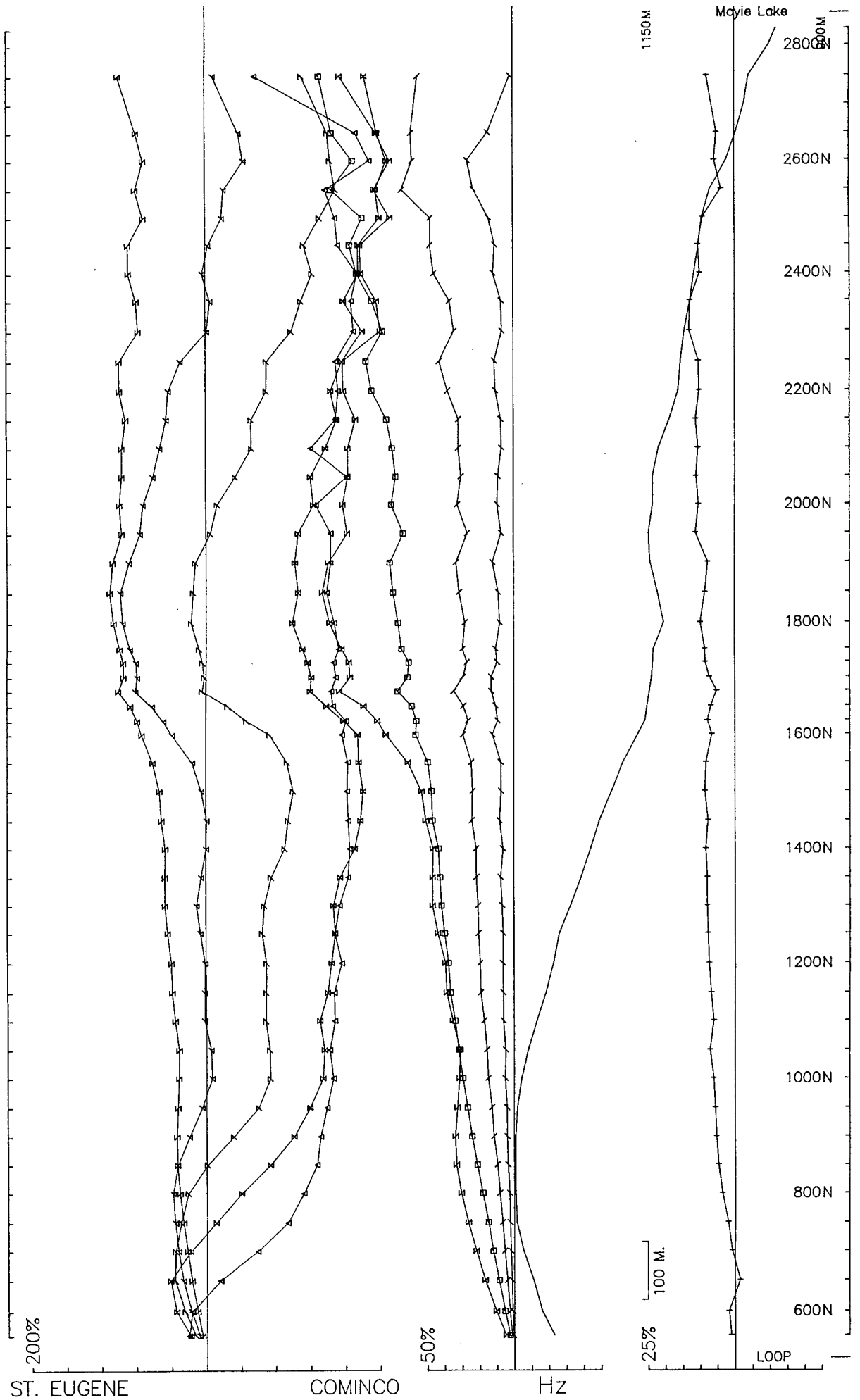
DS 8b



Op: RWH & DH Freq(Hz): 30.974 Loop: 2 Line: 5200W

Ch1 reduced. Ch1 normalized. Totals:P– 2194M./L– 2276M. Line Azim.: 30 . Rx Label: 52

DS 9a



Op: RWH & DH Freq(Hz): 30.974 Loop: 2 Line: 5200W

Ch1 reduced. Ch1 normalized. Totals:P-2194M./L-2276M. Line Azim.: 30 . Rx Label: 52

DS 9b

LEGEND

Transmitter Loop and Loop Number

Survey Line and Line Number

L - 3500 S.

0 200 400 600 800 1000 metres

Contour Interval 20 Metres

GEOLOGICAL BRANCH ASSESSMENT REPORT

20,705

ST. EUGENE PROPERTY				Cominco 82G/5
Drawn by: D.J.H.		Traced by: a.m.a		CLAIM & GRID MAP
Revised by	Date	Revised by	Date	
Scale: 1:20,000		Date: OCT. 1990		Plate: 384-90-2

FORM 210-0620