85-989 - 14180

COMINCO LTD.

EXPLORATION

WESTERN DISTRICT

NTS: 82 F/1

GEOPHYSICAL REPORT

ON

UTEM ELECTROMAGNETIC SURVEY ON THE

SUN 5, 6, 7, 8, 9 AND 10 CLAIMS

NELSON MINING DIVISION, B.C.

- ASSESSMENT REPORT -

Latitude	:	49°08'N
Longitude	:	116°19'W
Work Performed by	:	J.J. Lajoie, and A.P. O'Hara
Claim Owner & Operator	:	COMINCO LTD.

NOVEMBER 1985

JULES J. LAJOIE

TABLE OF CONTENTS

COMINCO LTD.

EXPLORATION WESTERN DISTRICT

N.T.S.: 82 F/1

GEOPHYSICAL REPORT FOR THE UTEM ELECTROMAGNETIC SURVEY ON THE SUN 5, 6, 7, 8, 9 and 10 CLAIMS NELSON MINING DIVISION, B.C.

- ASSESSMENT REPORT -

INTRODUCTION

The SUN Claims, on NTS Sheet 82 F/1, are located immediately southeast of McConnell (Kitchener P.O.), B.C. at latitude 49°08'N, longitude 116°19'W, and about 15 kilometres northeast of Creston, B.C. Plate 290-85-1 shows the location of the UTEM geophysical grid on these claims. Elevation on the grid varies from about 800 metres a.s.l. to about 1,700 metres a.s.l. with very steep and difficult terrain on one west-facing slope. Access to the claims is provided by a gravel road which heads south from McConnell, along Russell Creek.

The claims are underlain by Proterozoic sediments of the Aldridge Formation which are known to host the Sullivan orebody near Kimberley, B.C.

This report describes a UTEM electromagnetic survey whose objective was to locate geologic conductors which may be caused by economic mineralization. 13.6 line kilometres of survey were completed.

FIELD WORK

The field work was performed by geophysicists, Jules J. Lajoie and Austin P. O'Hara between August 23rd and September 2nd , 1985 inclusive. Assistance was provided by Jeff Allen and Kevin Paterson.

The grid is shown in Plate 290-85-2. Eight lines (2000N to 5600N) were surveyed from two transmitter loops. A power line directly east of the survey area caused noise which necessitated greater averaging time than normal. Access, terrain, and noise conditions dictated that it was only practical to survey one line of 1.7 km per day. Two days were required at the beginning to move into the area and to install the first loop. One day was required at the end to retrieve transmitter wire, pack the equipment and leave the area.

DESCRIPTION OF UTEM SYSTEM

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 1.7 kW motor generator. 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 Hz for this survey). The receiver system includes a sensor coil and backpack portable receiver module which has a digital recording facility on cassette magnetic tape. 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 or weak conductors will respond on channels 9, 8, 7 and 6. Progressively better conductors will give responses on progressively lower number channels as well. For example, massive, highly conducting sulphides or graphite will produce a response on all nine channels.

It was mentioned above that the UTEM receiver records data digitally on a cassette. This tape is played back into a computer at the base camp. The computer processes the data and controls the plotting on an 11" x 15" graphics plotter. Data are portrayed on data sections (D.S.) as profiles of each of the nine channels, one section for each survey line.

DATA PRESENTATION

The results of the survey are presented in one location map, nine data sections and one UTEM compilation map.

The maps are listed as follows:-

Plate 290-85-1 (in text)	Location Map Scale 1:50,000
Plate 290-85-2 (in envelope)	UTEM Compilation Map Scale 1:20,000

A legend for both the UTEM compilation map and the data sections is included. The data sections are arranged in order of Line Number from south to north.

The magnetic field amplitudes from both the transmitter loop (primary field) and from the electric currents induced in the ground (secondary field) vary by a few orders of magnitude from the beginning of a line near the transmitter loop to the end of the survey line far from the transmitter loop. To present such data, a normalized scheme must be used. In this survey, the primary field from the loop is used for normalizing and presenting the data according to the following 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 (n = 2 to 9)

This normalization procedure results in chaining errors displayed in Channel 1 only.

INTERPRETATION

The grid lines are shown in Plate 290-85-2. The UTEM responses on Data Sections (D.S.) 1 to 8 are typical of a uniform resistive halfspace. The regional resistivity is estimated to be of the order of 10,000 ohmm. No anomalies of geologic interest have been detected, and so none are indicated in Plate 290-85-2.

As the northern part of the grid is approached, the late time channels (5 - 2) in the centre graph of the data sections are seen to be more positive. This is interpreted to be caused by proximity to large and highly conducting cultural features near McConnell such as the railroad and power lines.

On Line 5600N, the earliest time channels (9 and 8) do not cross over from positive to negative as they did on other lines to the south. This is the result of a slight time shift or mis-synchronization between transmitter and receiver clocks, so that these channels were actually recording at later time than normal. The later time channels are not affected because their windows are much larger and the EM response at later times varies more slowly. The problem was only detected after completion of this first line of the survey, and was traced to a poor connection in the synchronization cable. It was repaired for the remainder of the surveying. D.S. 8A shows the last three stations at the east end of Line 5600N measured after having repaired the synchronization cable; the late time channels, 5 to 1, are close to what they were before, while the earliest time channels are now negative as would be expected at this distance from the loop. In essence, then, the first two or three channels on Line 5600N were lost. This is not important, however, and does not alter the interpretation.

CONCLUSIONS

13.6 line kilometres of UTEM electromagnetic surveying were completed on the SUN claims. No conductors of geologic interest were detected.

Report by:

Jules J. Lajoie, Ph.D., P.Eng.
Geophysicist
Cominco Ltd.

Approved for Release:

John M. Hamilton, P.Eng.
Manager, Exploration
Cominco Ltd.

Distribution:

Mining Recorder	(2)
Kootenay Exploration	(1)
W.D. Exploration	(1)
Expl. Administration	(1)
Geophysics	(1)

REFERENCE

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

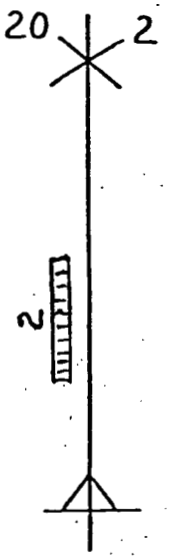
APPENDIX I

LEGEND

UTEM COMPILATION MAP AND DATA SECTIONS

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

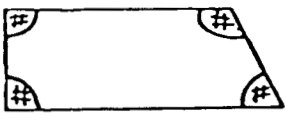
In the data sections, the upper graph contains Channels 9 to 5, the centre graph contains Channels 5 to 2, and the lower graph contains Channel 1. Station numbers are indicated along the abscissa. Elevations along the survey line are shown by the solid profile in the lower graph, the scale for which is the ordinate on the right hand side of the graph.



Axis of a crossover anomaly. The right superscript indicates the latest anomalous channel. The left superscript indicates depth to current axis in metres.

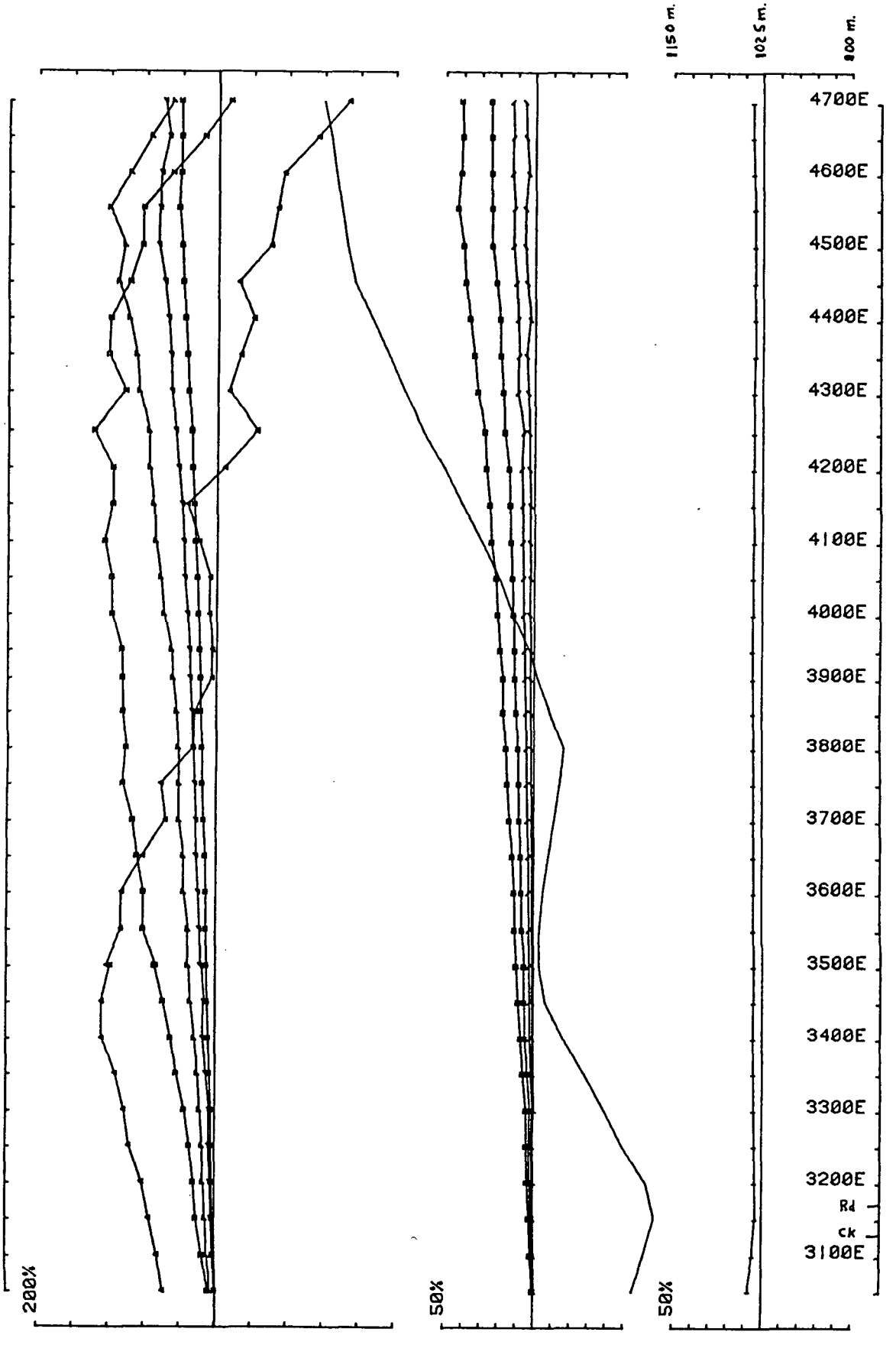
Indicates a negative anomaly of width shown by the dash. The latest anomalous channel is shown. Can sometimes be confused with the negative part of a crossover anomaly.

Indicates contact between two regions of differing resistivity. Arrow points to low resistivity zone.



Outline of a transmitter loop

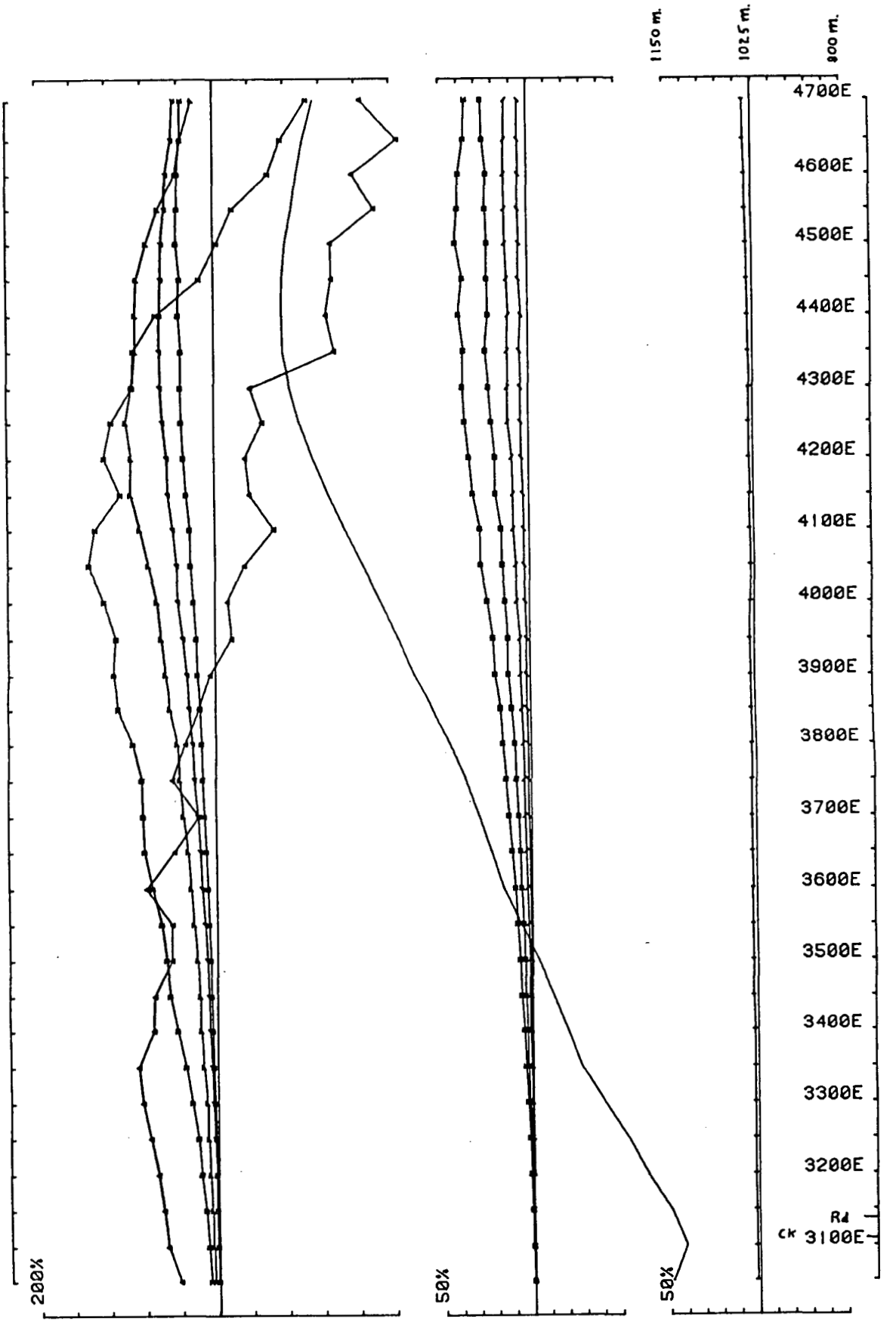
DATA SECTIONS



Area SUN Cominco operator JJL&AOH freq(hz) 30.974

Loopno 2 Line 2000N component Hz secondary Ch I normalized Ch I reduced

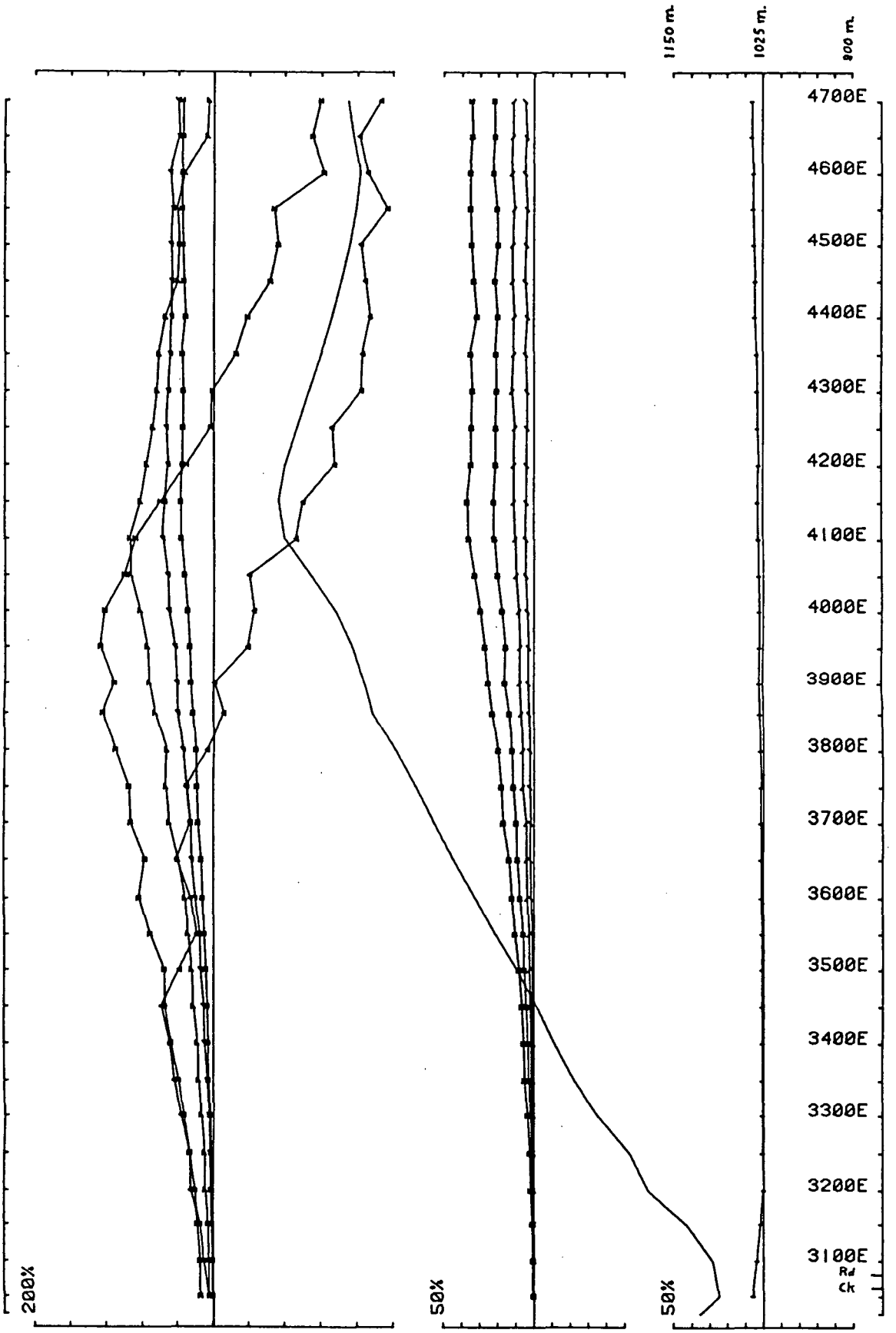
DS I



Area SUN Cominco operator JJL&AOH freq(hz) 30.974

Loopno 2 Line 2500N component Hz secondary Ch I normalized Ch I reduced

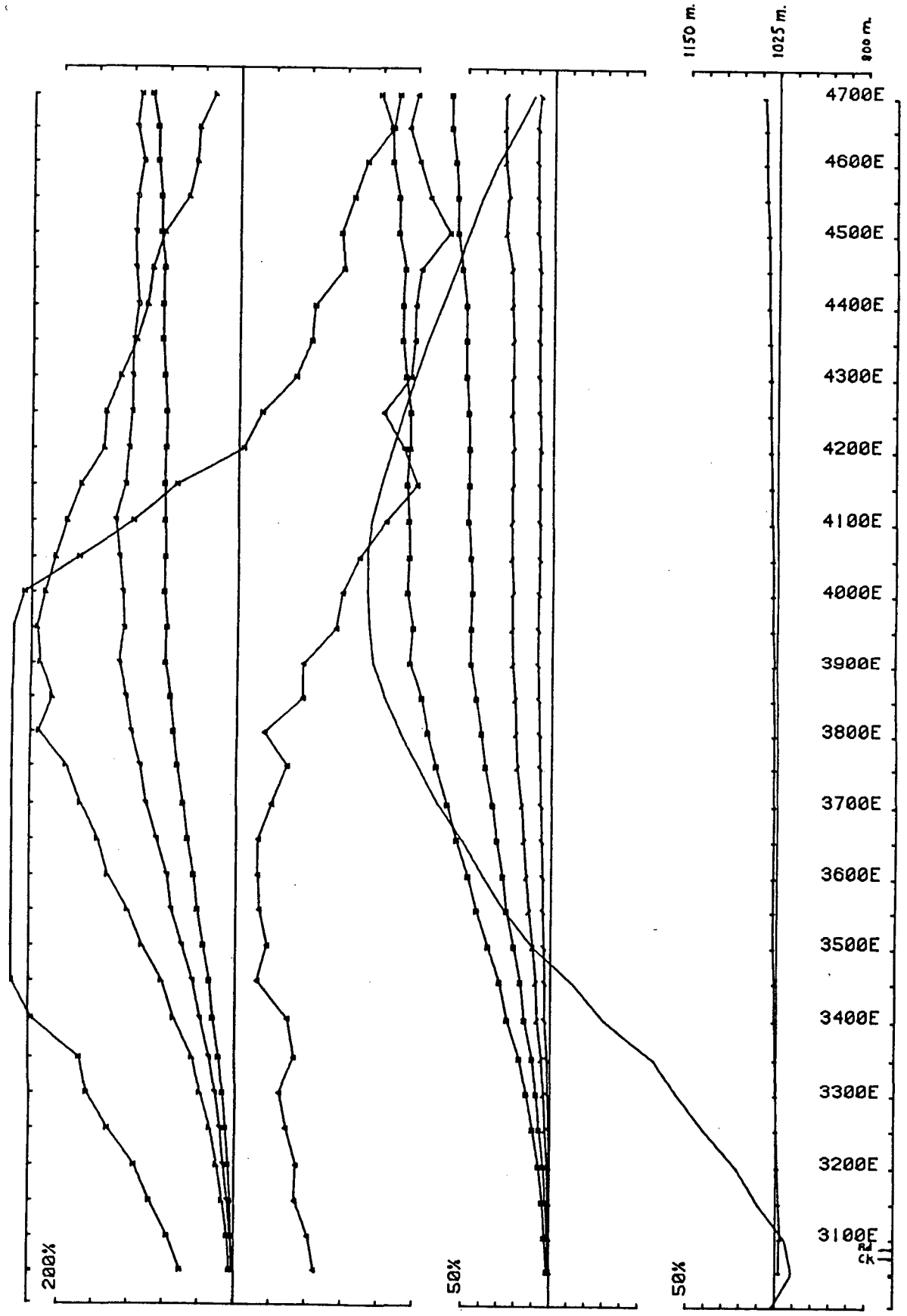
DS 2



Area SUN Cominco operator JJL&AOH freq(hz) 30.974

Loopno 2 Line 3000N component Hz secondary Ch I normalized Ch I reduced

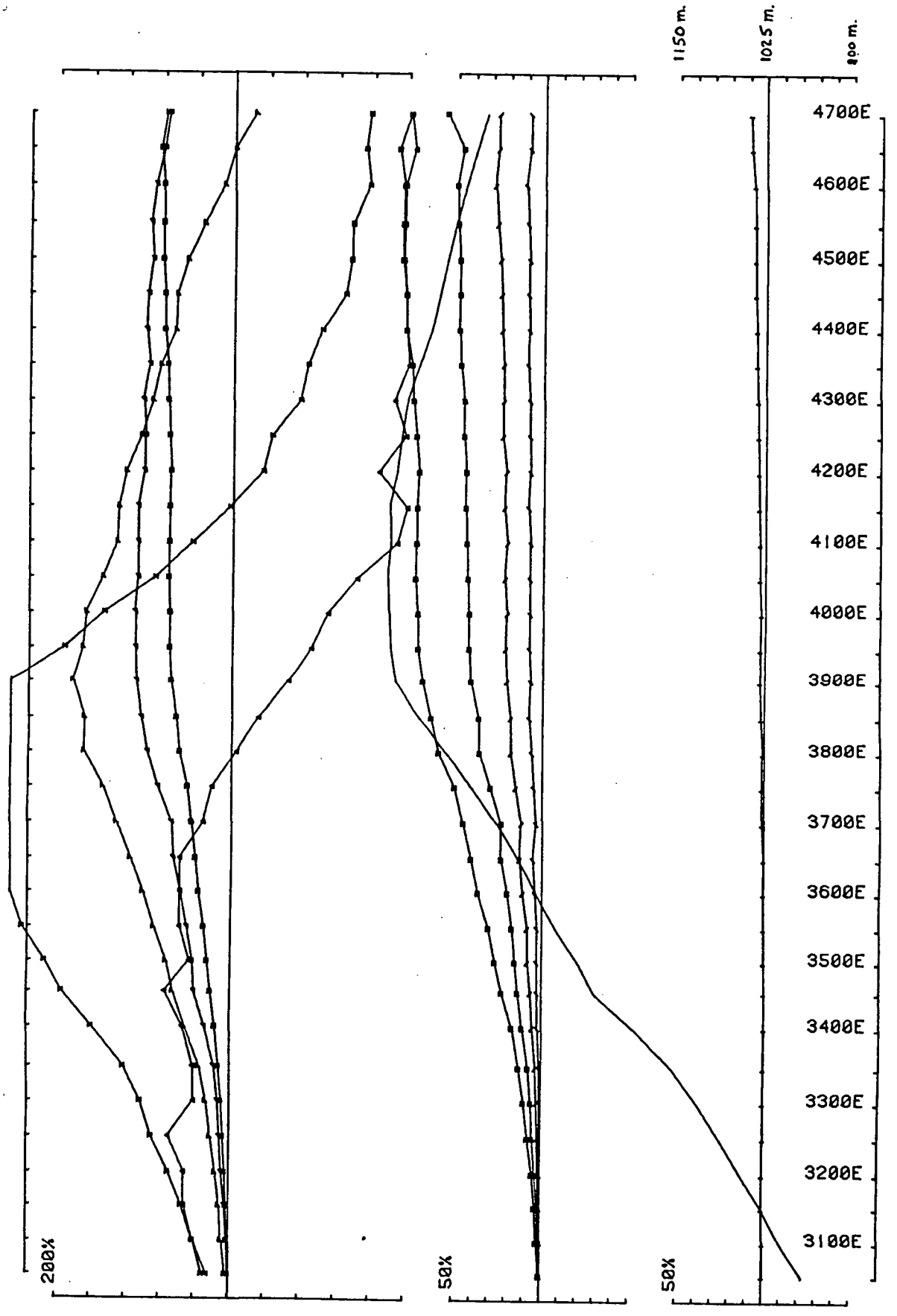
DS 3



Area SUN Cominco operator JJL&AOH freq(hz) 30.974

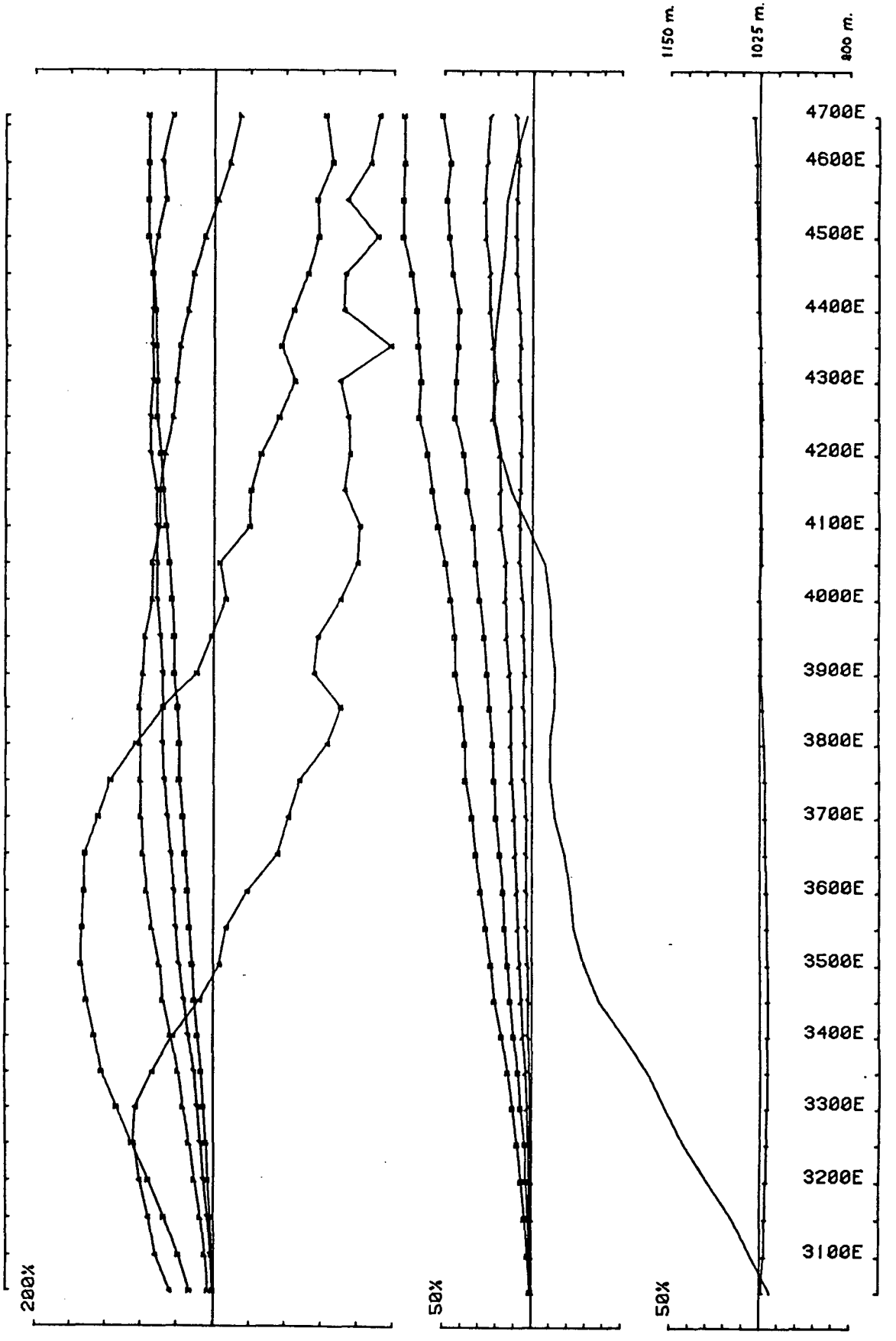
Loopno 1 Line 3800N component Hz secondary Ch 1 normalized Ch 1 reduced

DS 4



Area SUN Cominco operator JJL&AOH freq(hz) 30.974

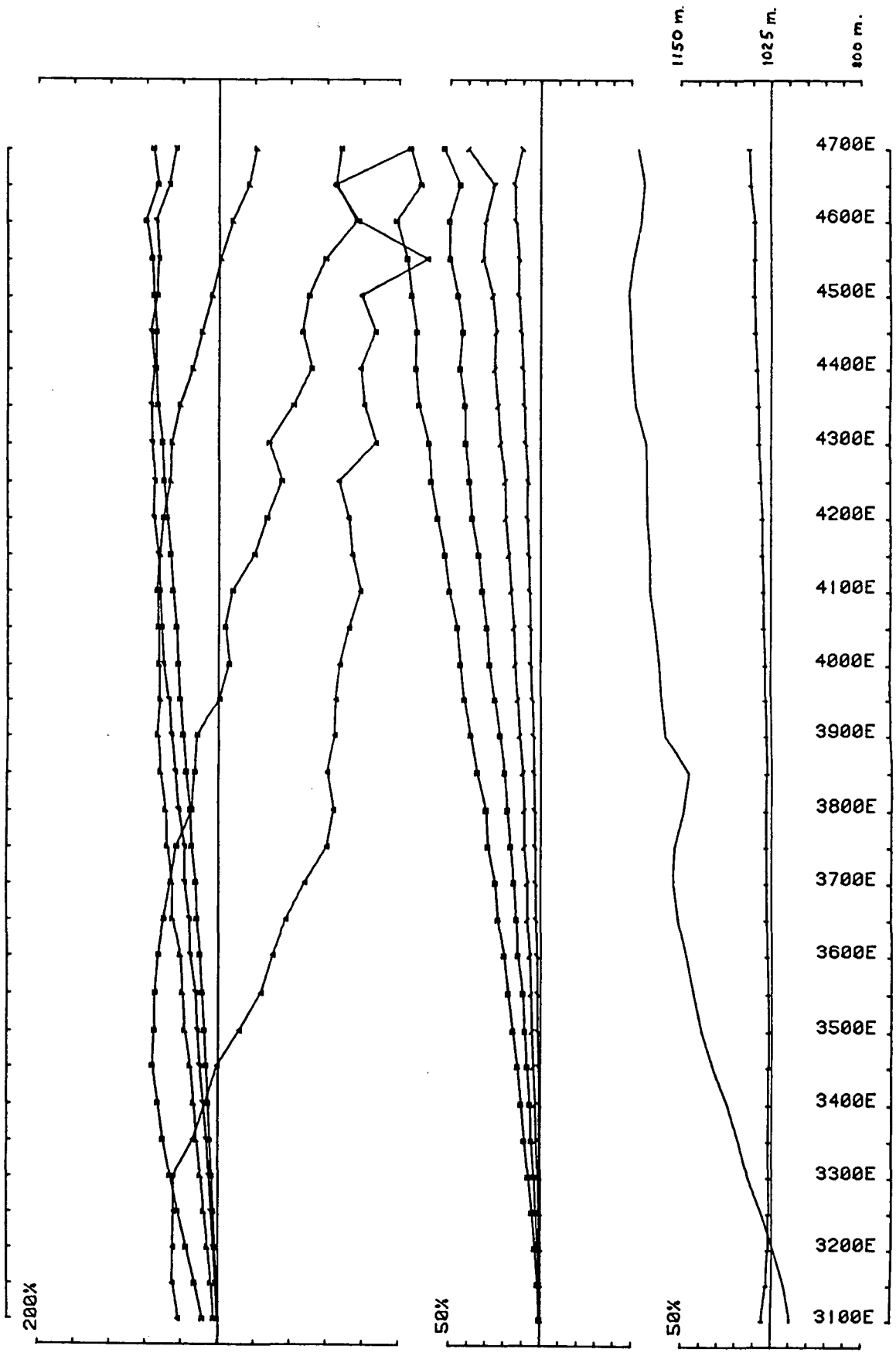
Loopno 1 Line 4200N component Hz secondary Ch 1 normalized Ch 1 reduced



Area SUN Cominco operator JJL&AOH freq(hz) 30.974

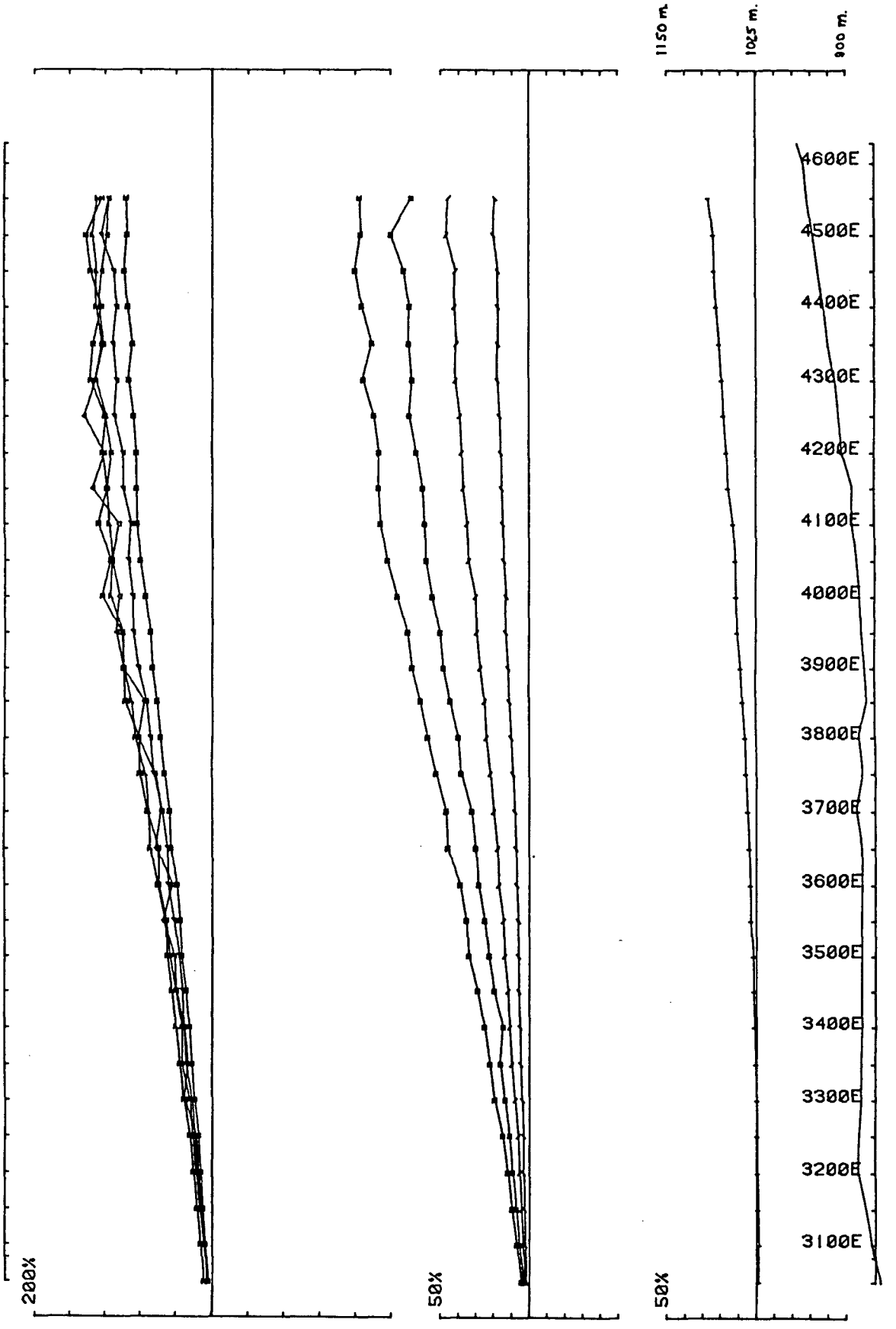
Loopno 1 Line 4800N component Hz secondary Ch 1 normalized Ch 1 reduced

DS 6



Area SUN Cominco operator JJL&AOH freq(hz) 30.974

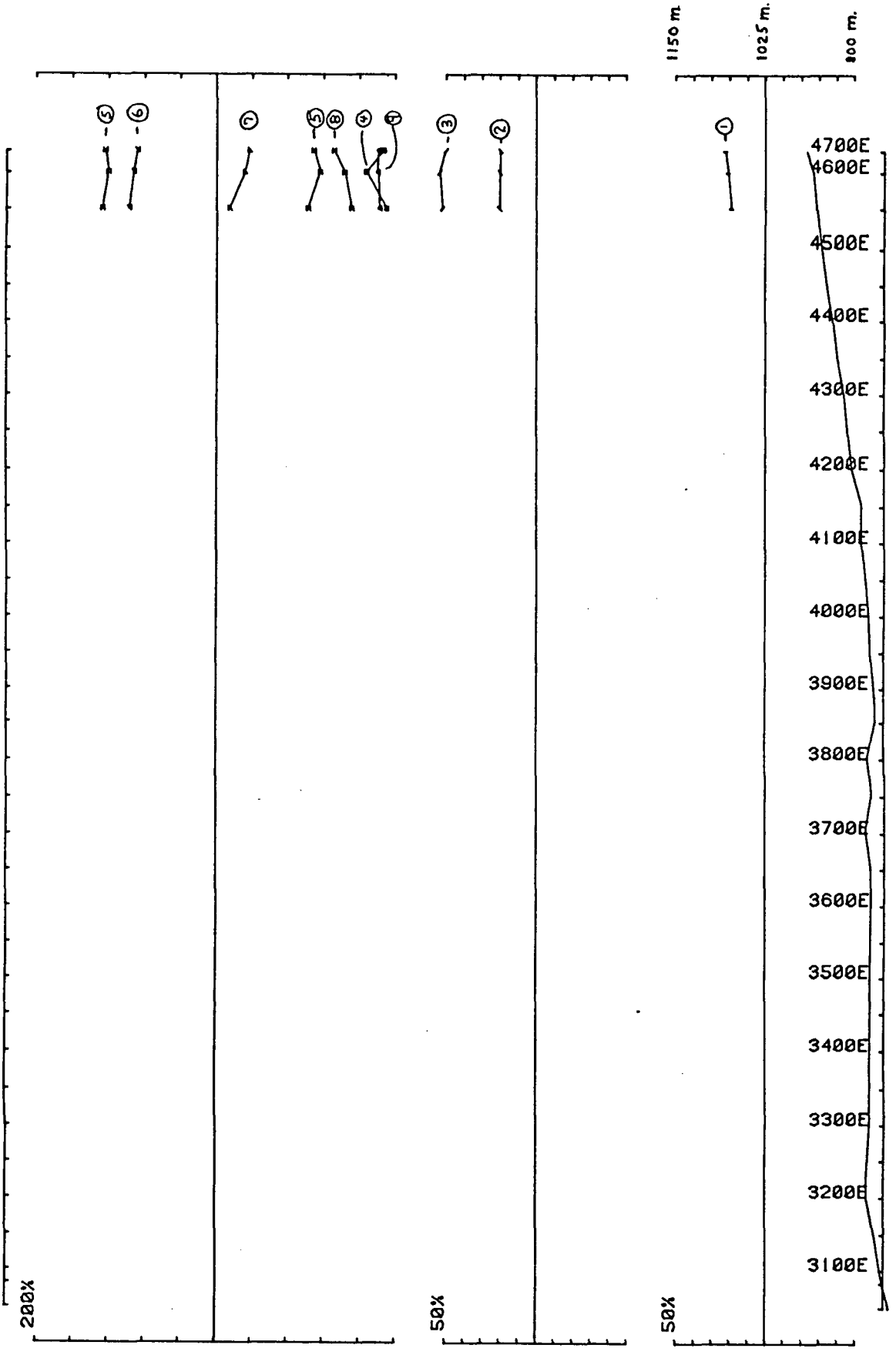
Loopno 1 Line 5100N component Hz secondary Ch 1 normalized Ch 1 reduced



Area SUN Cominco operator JJL&AOH freq(hz) 30.974

Loopno 1 Line 5600N component Hz secondary Ch 1 normalized Ch 1 reduced

DS 8a



Area SUN Cominco operator JJL&AOH freq(hz) 30.974

Loopno 1 Line 5600N component Hz secondary Ch 1 normalized Ch 1 reduced

DS 8b

APPENDIX III

IN THE MATTER OF THE B.C. MINERAL ACT

AND IN THE MATTER OF A GEOPHYSICAL PROGRAMME

CARRIED OUT ON THE SUN CLAIMS

LOCATED 15 KM N.E. OF CRESTON, B.C.

IN THE NELSON MINING DIVISION OF THE

PROVINCE OF BRITISH COLUMBIA, MORE PARTICULARLY,

N.T.S. 82 F/1

S T A T E M E N T

I, JULES J. LAJOIE of the City of West 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 geophysical survey on the SUN mineral claims;

3. THAT the said expenditures were incurred between August 23rd and September 2nd, 1985, for the purpose of mineral exploration of the above-noted claims.

Jules J. Lajoie, Ph.D., P.Eng.
Geophysicist, Cominco Ltd.

EXHIBIT "A"

STATEMENT OF GEOPHYSICAL EXPENDITURES (1985)

SUN 5, 6, 7, 8, 9 AND 10 CLAIMS

1. Salaries

Geophysicists			
J.J. Lajoie	11 days @ $280/day	3,080.00	
A.P. O'Hara	11 days @ $150/day	1,650.00	
Assistants			
J.S. Allen	11 days @ $82/day	902.00	
K.B. Paterson	8 days @ $82/day	656.00	
			6,288.00

2. Operating Day Charges
(Charged for those days when useful data is acquired, to cover costs of interpretation, drafting and report)

8 days @ $250/day — 2,000.00

3. Equipment Rental

UTEM 9.5 days @ $150/day — 1,425.00

4. Expense Accounts

J.J. Lajoie (incl. J.S. Allen & K.B. Paterson)	1,412.07	
A.P. O'Hara	600.46	2,012.53

5. Miscellaneous

Wire Usage — 75.00

TOTAL — $ 11,800.53

I certify this to be a true statement of expenditures for the UTEM geophysical survey on the SUN 5, 6, 7, 8, 9 and 10 Claims in 1985.

Jules J. Lajoie, Ph.D., P.Eng.
Geophysicist, Cominco Ltd.

APPENDIX IV

CERTIFICATION

I, JULES J. LAJOIE, of 5655 Keith Road, in the City of West Vancouver, in the Province of British Columbia, do hereby certify that:-

1. I graduated from the University of Ottawa in 1968 with an Honours B.Sc. in Physics, from the University of British Columbia in 1970 with a M.Sc. in Geophysics, and from the University of Toronto in 1973 with a Ph.D. in Geophysics.

2. I am a registered member of the Association of Professional Engineers of the Province of British Columbia, the Society of Exploration Geophysicists, and the British Columbia Geophysical Society.

3. I have been practicing my profession for the past twelve years.

Jules J. Lajoie, Ph.D., P. Eng.
Geophysicist, Cominco Ltd.

SHA 26

SHA 27

SHA 24

SHA 25

SUN 13

SUN 14

SUN 7

SUN 6

SHA 1

SUN 5

SHA 2

SUN 8

SHA 3

SHA 4

SHA 5

SHA 9

SHA 10

SHA 6

SHA 7

SHA 12

SHA 11

SHA 8

SHA 14

SHA 15

SHA 16

SHA 17

SHA 18

SHA 19

SHA 20

SHA 21

SHA 22

SHA 23

SURVEY AREA

IRON RANGE

MOUNT NICHOLAS

PURCELL MOUNTAINS

Creston

Erickson

BRITISH COLUMBIA

IDAHO

UNITED STATES OF AMERICA

GEOLOGICAL BRANCH
ASSESSMENT REPORT

14,180

0 0.5 1 2 3 4 5
kilometres

SUN CLAIMS

NTS 82-F/1

LOCATION MAP
UTEM GEOPHYSICS GRID

NELSON M.D.; B.C.

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

Scale: 1 : 50,000

Date: NOVEMBER 1985

Plate: 290-85-1

HIGHWAY 3

McCONNEL (Kitchener P.O.)

CANADIAN PACIFIC RAILROAD

B.C. HYDRO HIGH VOLTAGE POWER LINE

1985 UTEM GRID

1300 E
3000 E
4200 E
5600 N
5100 N
4800 N
4200 N
3600 N
3000 N
2500 N
2000 N

OUTLINE OF UTEM LOOP AND LOOP NUMBER

0 300 500 750 1000 1500 2000
METRES

SUN CLAIMS

NTS 82-F/1

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

COMPILATION MAP
UTEM GEOPHYSICS GRID

NELSON M.D.; B.C.

Scale: 1 : 20,000 | Date: NOVEMBER 1985 | Plate: 290-85-2