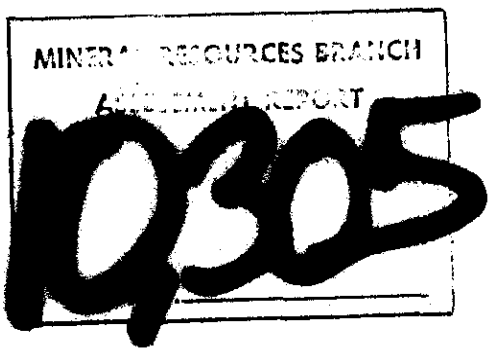
82-241-10305

COMINCO LTD.

EXPLORATION

NTS: 82F/8

WESTERN DISTRICT



GEOPHYSICAL REPORT

UTEM SURVEY ON THE

L E W C L A I M S

Fort Steele Mining Division

Latitude: 49°17'N; Longitude: 116°04'W

Work Performed By: Dr. J. J. Lajoie, E. Tom Eadie and Syd J. Visser

Claim Owner and Operator: COMINCO LTD.

NOVEMBER 1981

SYD J. VISSER

TABLE OF CONTENTS

COMINCO LTD.

EXPLORATION WESTERN DISTRICT

GEOPHYSICAL REPORT

UTEM SURVEY ON THE LEWIS CREEK CLAIMS

List of Claims

Cominco Interest = 100%

Adjoining Cominco's "VINE GROUP" to the west, Fort Steele M.D., B.C.:

Property:- 20 claims (342 units)

Name	Number of Units	Record Numbers	Date Recorded	Assessment Work Due
LEW 1	16	906	May 5, 1980	May 5, 1981
LEW 2	16	907	May 5, 1980	May 5, 1981
LEW 3	20	908	May 5, 1980	May 5, 1981
LEW 4	20	909	May 5, 1980	May 5, 1981
LEW 5	20	910	May 5, 1980	May 5, 1981
LEW 6	20	911	May 5, 1980	May 5, 1981
LEW 7	20	912	May 5, 1980	May 5, 1981
LEW 8	20	913	May 5, 1980	May 5, 1981
LEW 9	20	914	May 5, 1980	May 5, 1981
LEW 10	15	915	May 5, 1980	May 5, 1981
LEW 11	16	916	May 5, 1980	May 5, 1981
LEW 12	20	917	May 5, 1980	May 5, 1981
LEW 13	20	918	May 5, 1980	May 5, 1981
LEW 14	10	919	May 5, 1980	May 5, 1981
LEW 15	20	920	May 5, 1980	May 5, 1981
LEW 16	20	921	May 5, 1980	May 5, 1981
LEW 17	10	922	May 5, 1980	May 5, 1981
LEW 18	9	923	May 5, 1980	May 5, 1981
LEW 19	10	924	May 5, 1980	May 5, 1981
LEW 20	20	925	May 5, 1980	May 5, 1981

INTRODUCTION

The Lewis Creek claims are located about 32 km S.W. of Cranbrook, B.C. (see Plate 219-81-1). The access to the west of the grid is along Highway 3 from Cranbrook and then along the Lumberton Road, the Moyie River Road, and then the Lewis Creek Road. Access to east end is via Highway 3, turning off to go through the Moyie Lake Provincial Park and then following the Lamb Creek and Rabbit Foot Creek roads.

All of the lines to the northwest are accessible by a myriad of logging roads. The lines to the south are reached only by foot.

The Lewis Creek claims were staked in 1980 by Cominco Ltd. They are underlain by the clastic sediments of the Middle and Lower Aldridge Formation of Proterozoic age. These rocks have been intruded by the Moyie gabbros. The sediments of the Aldridge Formation are known to host the Sullivan orebody near Kimberley, B.C.

This report describes a UTEM electromagnetic survey which had the objective of locating electrical anomalies which may be caused by economic mineralization.

DESCRIPTION OF THE 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 at that University.

The field procedure consists of laying out a large loop of single-strand insulated wire and energizing it with a transmitter powered by a motor generator. The loop is generally square shaped, wherever possible, with sides between 500 meters and 1,500 meters long. In this survey, the loop dimensions were 1,500 x 1,000 meters. Survey lines are located outside the loop and are generally oriented perpendicular to the side of the loop. The field procedure is very similar to Turam, a better known electromagnetic surveying method.

The UTEM survey, described in this report, is a continuation of the survey carried out in 1980 on the grid cut during the same year (Tom Eadie, 1980). The area covered by the survey is 2.5 km by 2.2 km on the southeast end of the grid and 1.5 km by 1.2 km on the southwest side of the grid, with lines every 500 m (Plate 219-81-2). A total of 15 km of wire was laid out and retrieved in three transmitter loops (1.5 km by 1.0 km).

The station interval was 50 m for a total of 336 stations. Nine channels of information were acquired and plotted at each station for a total of 3,024 data entries.

The transmitter loop is energized with a triangular current at a carefully controlled frequency (30.496 Hz for this survey). The receiver consists of one sensor coil, associated electronics, and a facility for digital recording on a cassette magnetic tape. The time synchronization between transmitter and receiver is achieved through quartz crystal clocks in both units.

The receiver sensor coil measures the vertical component of the magnetic field and it responds to the time derivative of the magnetic field. Since the transmitter current wave form 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 UTEM receiver gathers and records nine channels of data at each station. The later number channels (7-8-9) correspond to short time or high frequency while the lower numbered 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 mini computer at the base camp. The mini computer processes the data and controls the plotting on a small (11" x 15") graphics plotter. Data are portrayed as profiles of each of the nine channels, shown for each survey line of each transmitter loop. These profiles, and an interpretive plan are appended to this report.

FIELD WORK

A field report including Personnel is in Appendix I. All surveying was done in the period from June 29 to August 13, 1981. Equipment breakdown (due mainly to faulty circuit boards in new equipment) caused the field work to proceed at a very slow rate.

The grid is in the metric system. Therefore, 30N, 20E means for example 3,000 meters north, and station 2,000 meters east.

DATA PRESENTATION

The results of the survey are presented in one location map, one compilation map and 30 data sections.

The maps are listed as follows:-

Plate 219-81-1 (in envelope)	Location Map Scale 1:50,000
Plate 219-81-2 (in envelope)	UTEM Compilation Sheet Scale 1:20,000

Legends for both the UTEM compilation map and the data sections are also attached.

The data sections are arranged in order of loop number (Loop 805, 807, 808).

In order to reduce the field data, the theoretical primary field of the loop must be computed at each station. The normalization of the data is as follows:-

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 of Channel 1

b) For 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)

INTERPRETATION

All of the field results are displayed in the data section on 14 diagrams, with a compilation of all of the relative points on Plate 219-81-2. The transmitter loop is positioned on the east side of the lines for all of the diagrams.

Since the UTEM system measures during the transmitter ON time, the measurements are susceptible to errors in chaining and station location. However, because all readings are normalized to channel 1, the noise from orientation errors is seen only on this channel. Because channel 1 responds only to highly conductive bodies and because there were none of these bodies found in this survey, the extra noise in channel 1 is not a problem in this case.

The data sections show typical background response. This is a gradual increase in response with increasing distance from the loop. Depending on the background conductivity, the early channels (first 9, then 8 and so on) reach a maximum and then begin to decrease and go negative, one by one. The later channels (1 to 4) do not reach this maximum unless the host rock and/or overburden are very conductive. A comparison of the data with model studies indicate the host rock in the survey area is very resistive with a resistivity of about 500 ohm meters.

A typical anomaly from a steeply dipping conductor is characterized by a crossover type of anomaly with the positive shoulder on the loop side and the negative shoulder on the side away from the loop. All channels affected by the anomaly cross over from the positive to the negative (taking background into account) at the same location. No anomalies were found in the data.

CONCLUSION

A UTEM electromagnetic survey was completed on the LEW claims in 1981. No conductive targets were found. The resistivity of the host rock is estimated to be 500 ohm meters.

Based on the geophysics alone, no further work is recommended on the lines surveyed in this area.

Report by:

Syd J. Visser, B.Sc.
Geophysicist
Cominco Ltd.

Endorsed by:

Jules J. Lajoie, PhD., P.Eng.
Research Geophysicist
Cominco Ltd.

Approved by:

John M. Hamilton, P.Eng.
Chief Geologist
Sullivan Mine

DISTRIBUTION:

Mining Recorder, Cranbrook (2)
Kootenay Exploration
Western District, Exploration
Exploration Administration
Technical Support Group

REFERENCES

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

2) Eadie, E. Tom, 1980 — Geophysical Report on UTEM Survey on the LEW Claims, December 1980, Assessment Report Submitted to Mining Recorder in Cranbrook

APPENDIX I

APPENDIX I

FIELD REPORT FOR: LEWIS CREEK 1981

DR - Data Reduction

LF - Loop Fixing: quoted below when this activity cut into survey time

LL - Loop Laying: quoted when this activity cut into survey time. Loop laying & retrieving was continuously carried out during the survey by helpers.

ODC - Operating Day Charge: for days when useful data is acquired which will be subsequently drafted and reported on.

BKDN - Equipment Breakdown: Rx-receiver; Tx-transmitter; MG-motor generator

LP-237 LN-90N, 100NP: indicates that line 90N and Part of line 100N were surveyed from Loop 237

Note: field crew normally consisted of one geophysicist and two helpers (one on the coil and the other wire) while the other geophysicist worked on data reduction.

1981 Date	ODC	Field	Computer	Remarks
June 29	1	ETE, RSY	SJV	LL
		RF		LP-808, LN-30S
30	1	ETE, SJV		LP-808, LN-25S
		RSY, RF		LL
July 1	1	ETE, SJV		LP-808, LN-20S
		RSY, RF		LL
2	1	ETE, SJV		LP-808, LN-15S
		RSY, RF		LL
3	1	ETE, SJV		LP-808, LN-5S
		RSY, RF		LF
4	1	ETE, SJV		LP-808, LN-10S
		RF		LF
5			SJV	Equipment Repair
6	1	ETE, SJV		LP-807, LN-10S
		RSY, RF		LF

1981 Date		ODC	Field	Computer	Remarks
July	7	1	ETE, SJV		LP-805, LN-10S
			RSY, RF		LF
	8			SJV	Equipment Repairs
	9	1	JJL, ETE		LF
			SJV, RSY		LP-805, LN-5S LL
	10-30				Equipment Repairs
	31	1	ETE, RSY		LP-807, LN-5S
Aug.	1	1	ETE, RSY		LF
			RF		LP-807, LN-15S
	2-3				Equipment Repair
	4	1	ETE, RSY		LF
			RF		LP-807, LN-20S
	5-11				Equipment Repairs
	12	1	ETE, SJV		LF
					LP-807, LN-25S
	13	1	ETE, SJV		LF
					LP-807, LN-30S

****

JJL	Dr. Jules J. Lajoie	Research Geophysicist Cominco Ltd. 853 - 409 Granville St. VANCOUVER, B.C. V6C 1T2
ETE	E. Tom Eadie	Geophysicist Cominco Ltd. 853 - 409 Granville St. VANCOUVER, B.C. V6C 1T2
SJV	Syd J. Visser	Geophysicist Cominco Ltd. 853 - 409 Granville St. VANCOUVER, B.C. V6C 1T2
RSY	Robin S. Young	Helper 1074 Skana Drive DELTA, B.C. V4M 2L3
RF	Ray Fregin	Helper c/o Kootenay Exploration Cominco Ltd. #1051 Industrial Road No. 2 CRANBROOK, B.C. V1C 4K7

APPENDIX II

APPENDIX II

LEGEND

UTEM DATA SECTIONS

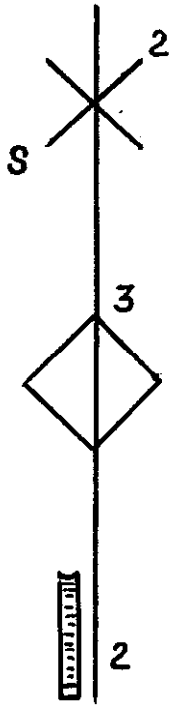
ORDINATE: Amplitude scale is given in %

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	

LEGEND

UTEM COMPILATION MAPS

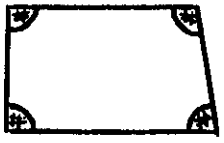


Axis of a crossover anomaly. The number indicates the latest anomalous channel.

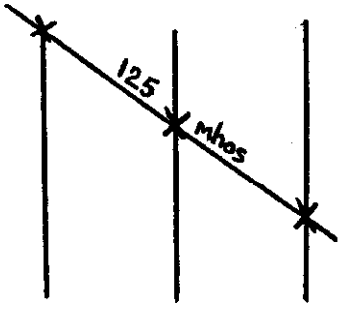
Depth indicated by: S - Shallow (30m)
M - Moderate (30-75m)
D - Deep (75m)

Axis of reversed crossover anomaly produced when a small conductor dips at less than 70° towards the transmitter. In normal crossover the positive response is towards the transmitter; reversed one, it is away from the transmitter.

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.



Outline of a transmitter loop.



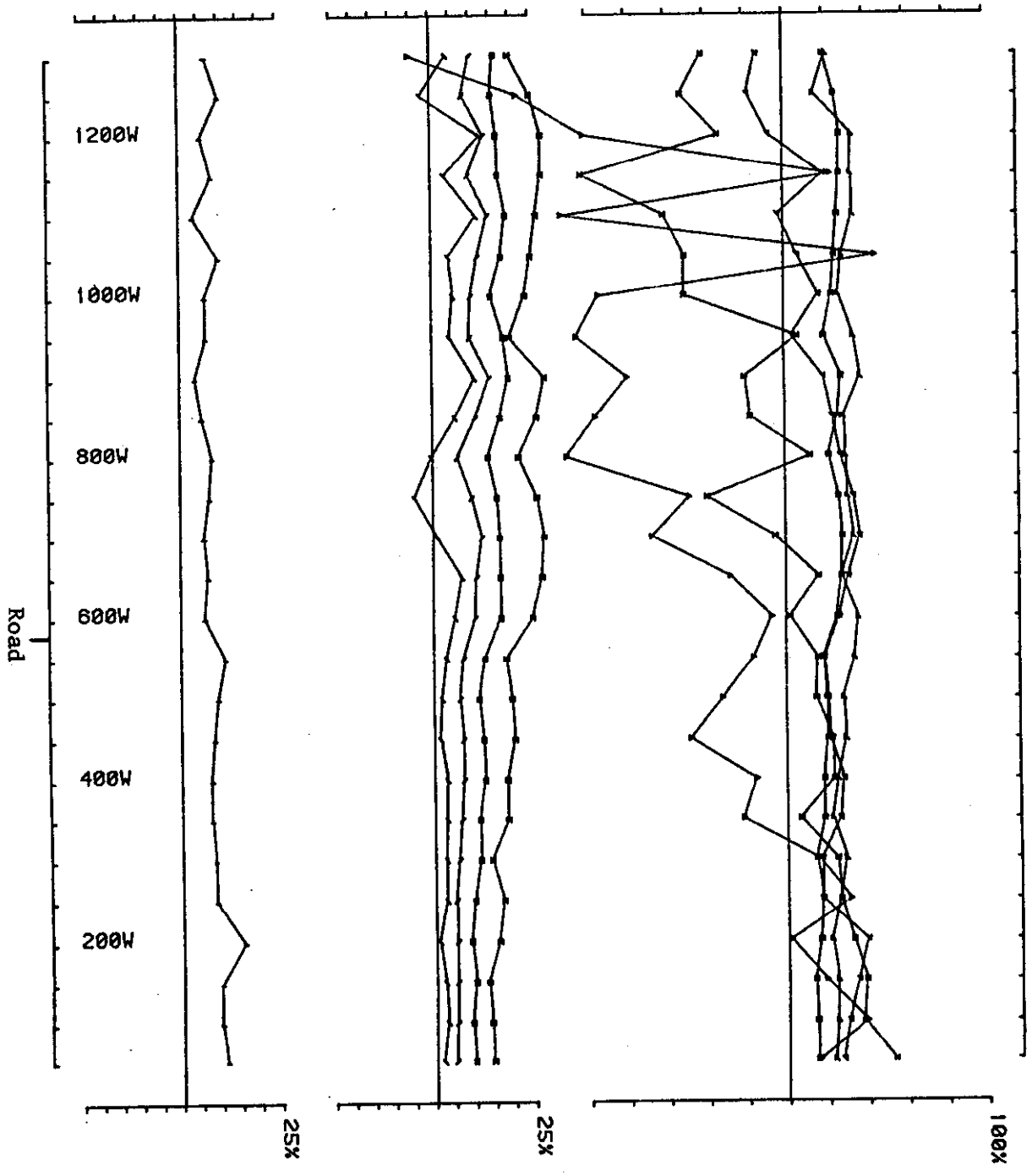
Conductor axis located by crossover anomalies with a conductance determination. The conductance is the interpreted conductivity x thickness of the conductor in mhos (same as Siemens).

Only the principal crossovers are indicated.

A P P E N D I X III

DATA SECTIONS

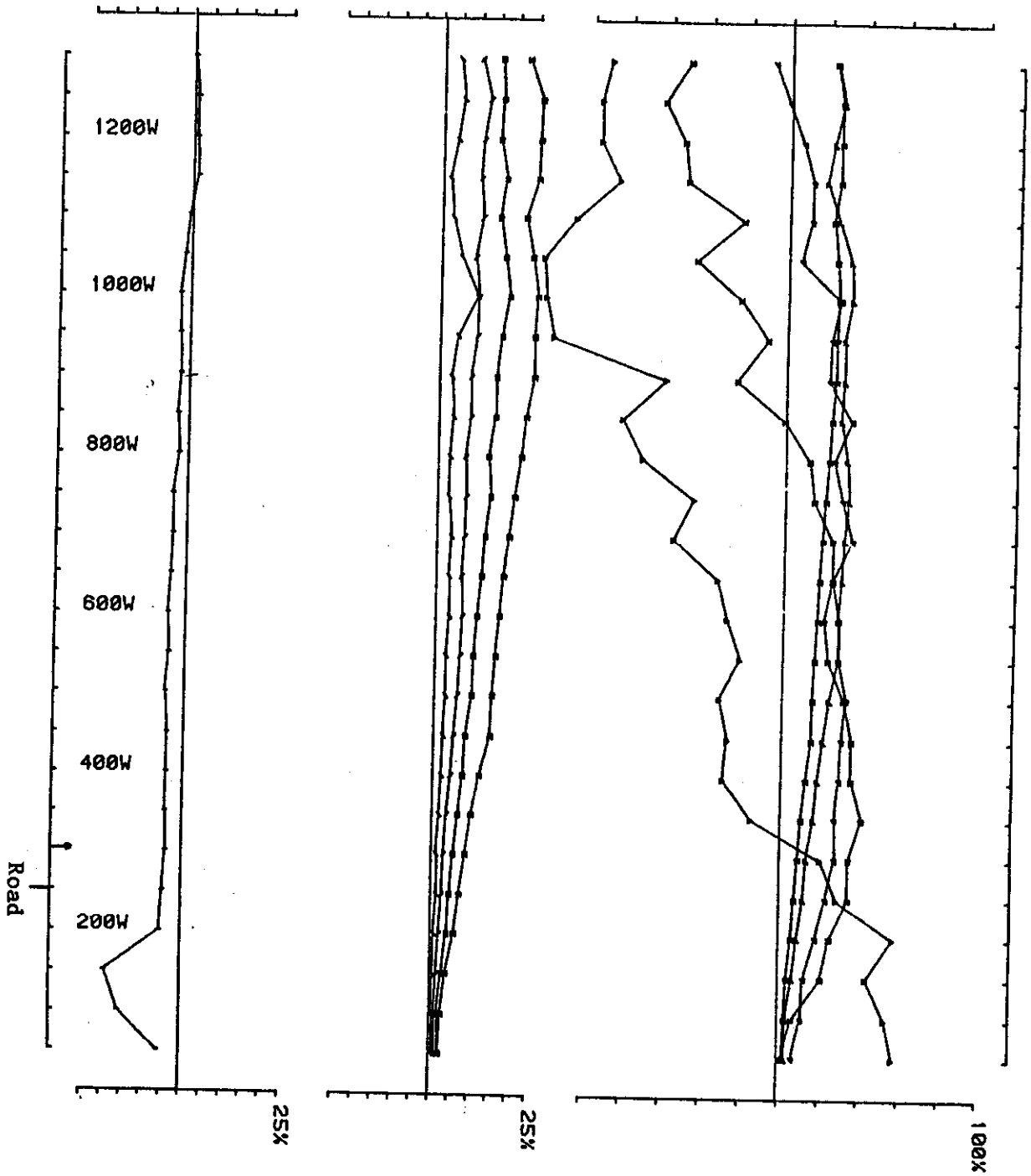
D.S. 1 - 14



Area Law 81 Cominco Job 805 freq(hz) 30.974

Loopno 0805 Line 500S component Hz secondary Ch 1 normalized

D.S. 1



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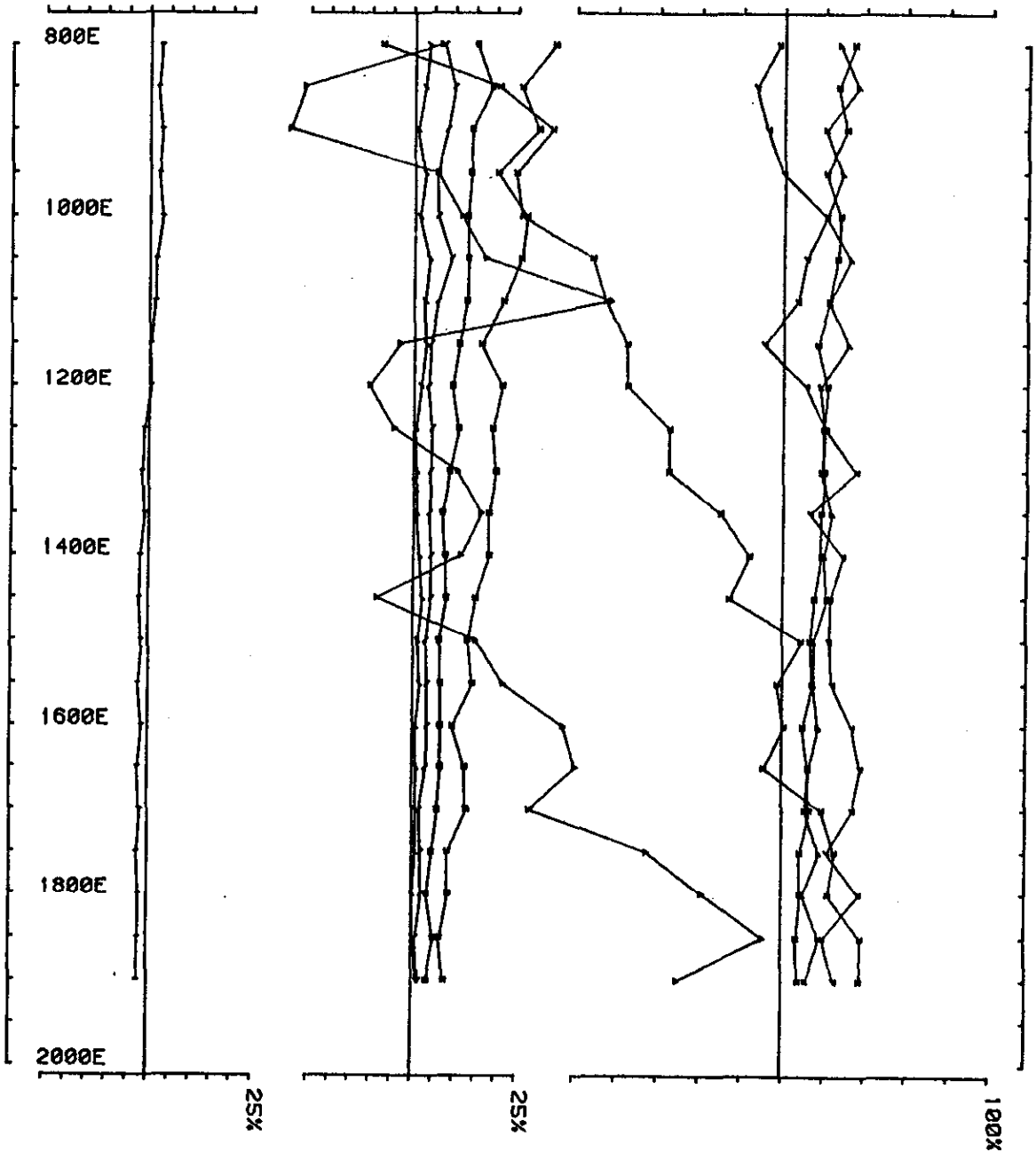
Loopno 0805 Line 1000S component Hz secondary Ch 1 normalized

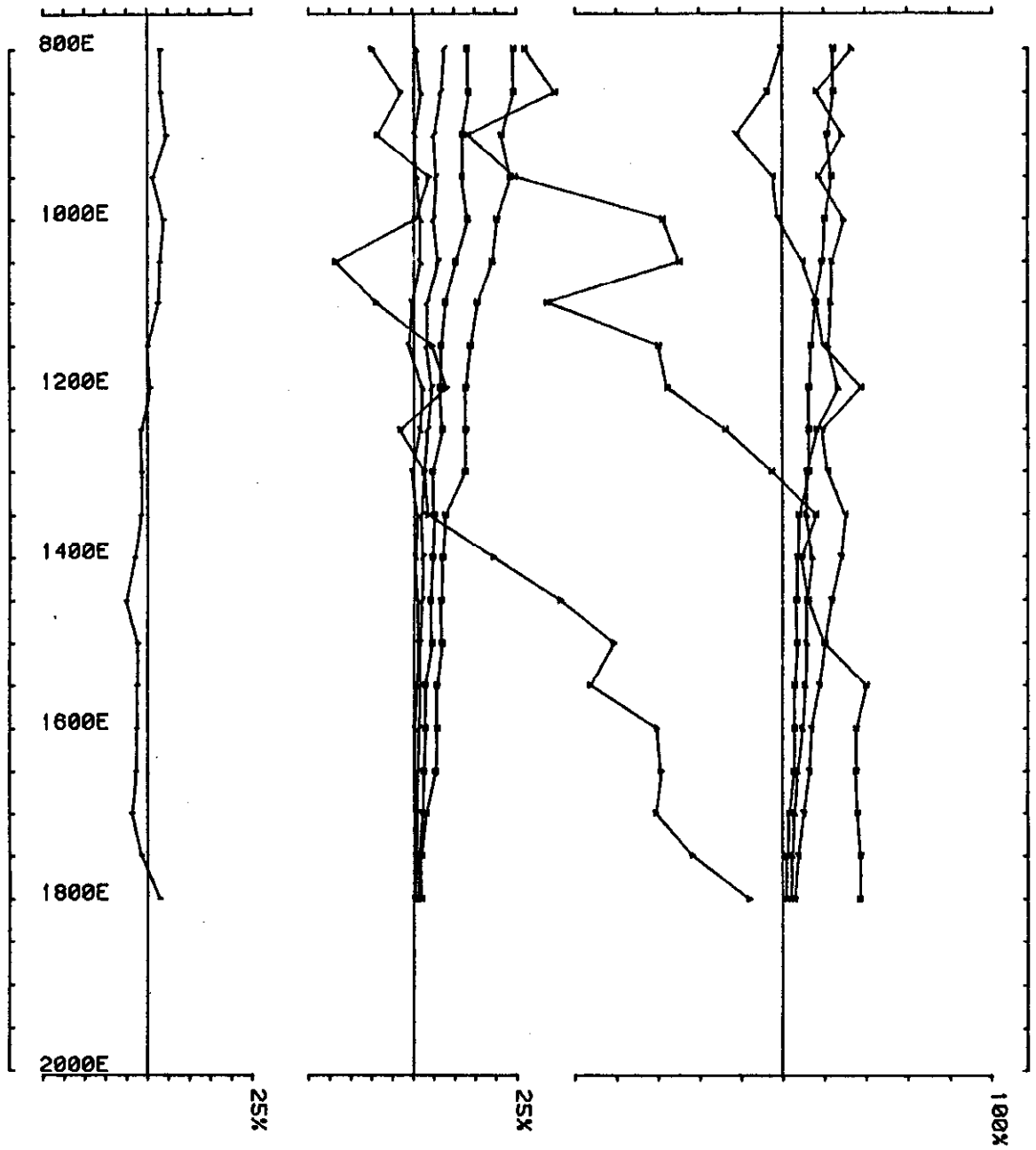
D.S. 2



Area Law 81 Cominco Job 807 freq(hz) 30.496

Loopno 0807 Line 500S component Hz secondary Ch 1 normalized

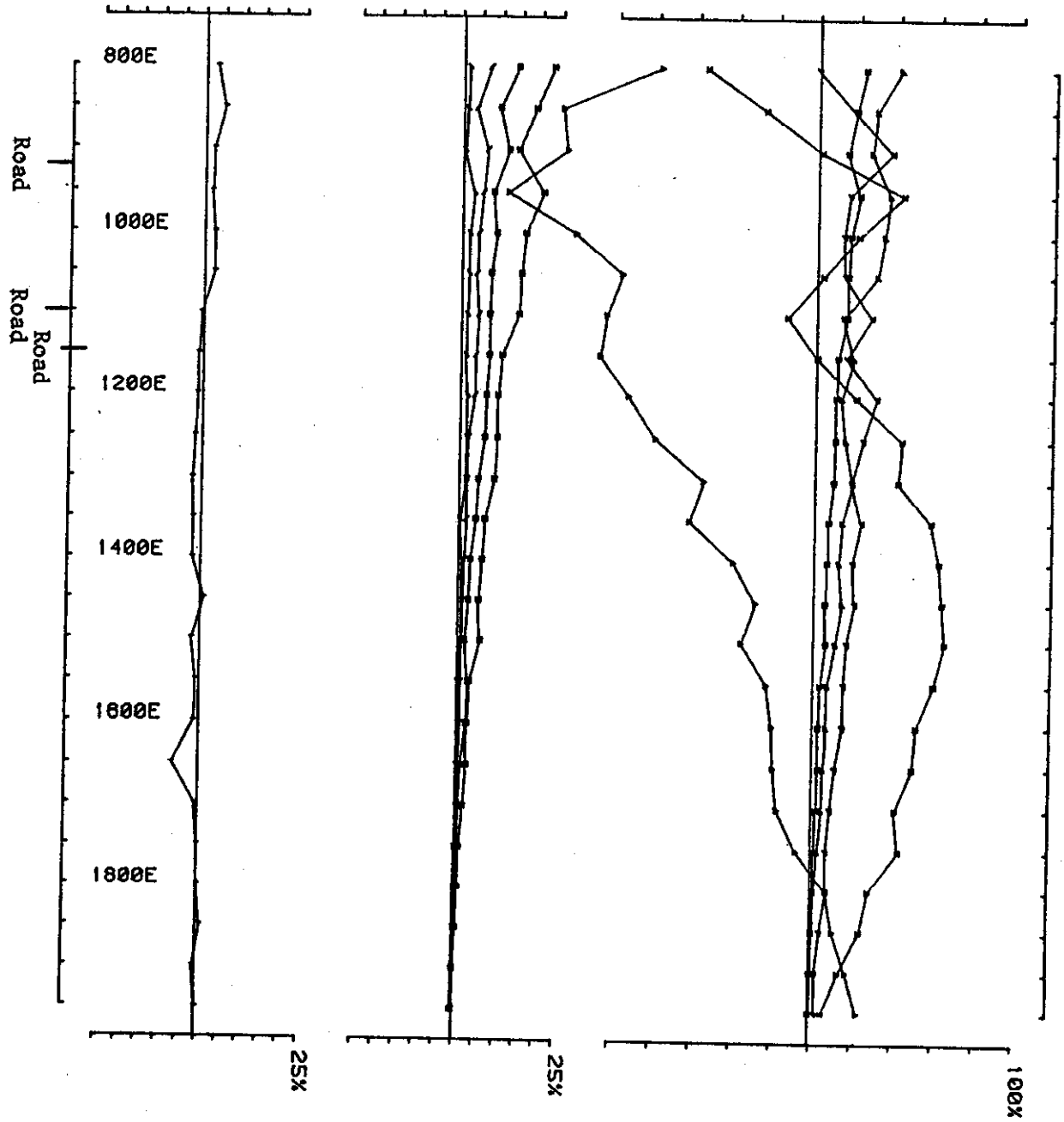
D.S. 3



Area Dew 81 Cominco Job 807 freq(hz) 30.496

Loopno 0007 Line 1000S component Hz secondary Ch 1 normalized

D.S. 4



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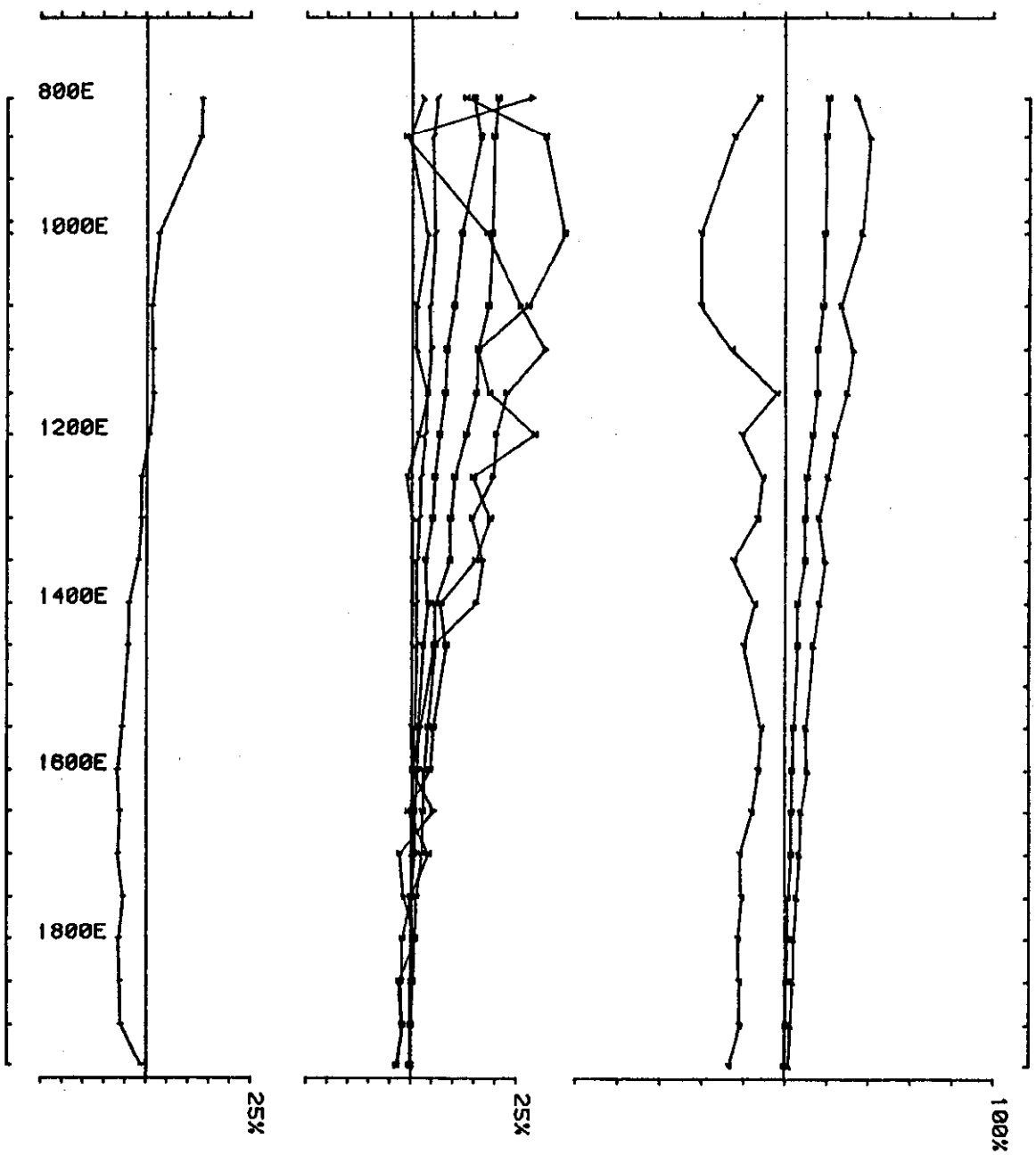
Loopno 0807 Line 1500S component Hz secondary Ch 1 normalized

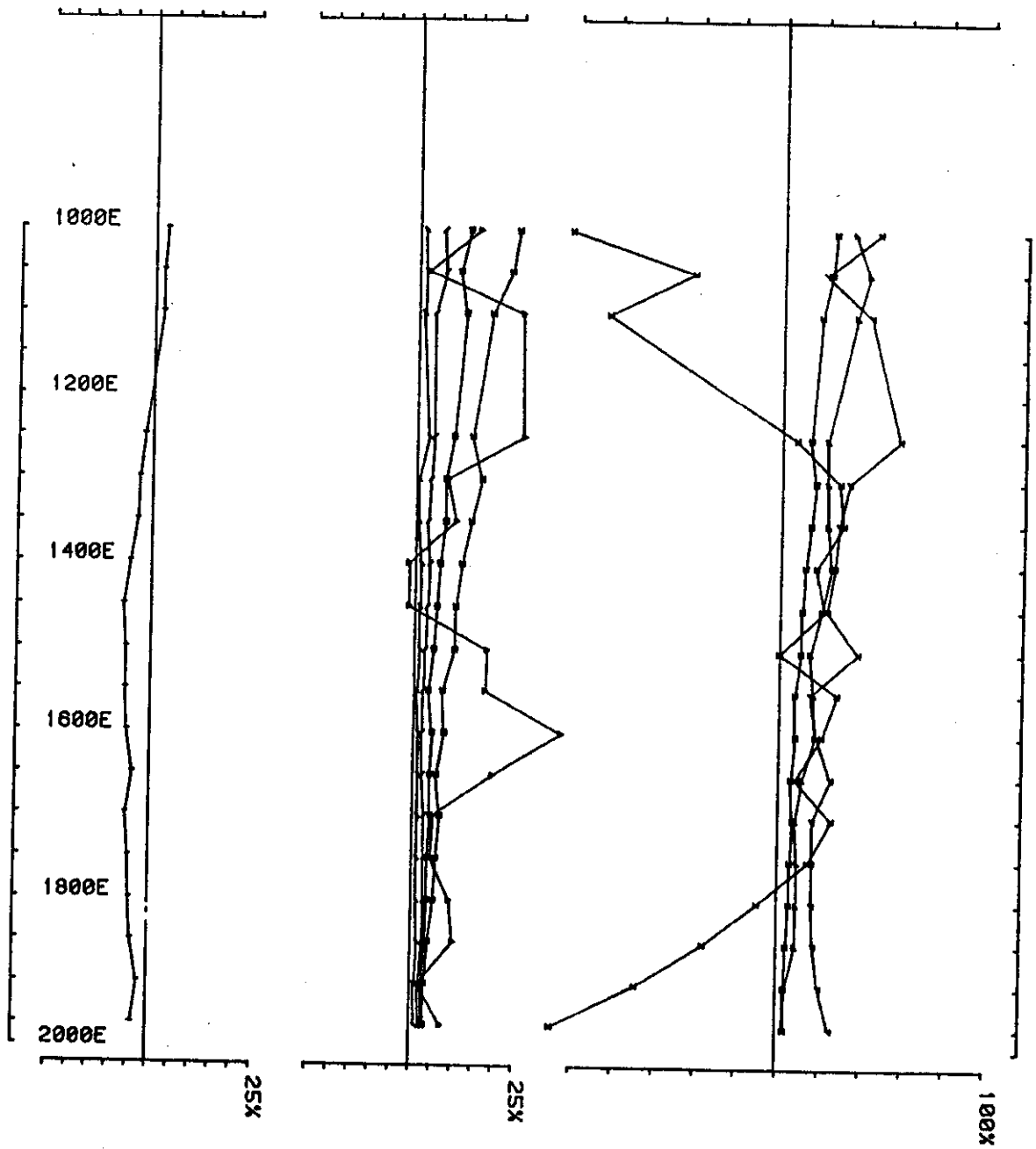
D.S. 5



Area L81 Cominco Job 807 freq(hz) 30.974

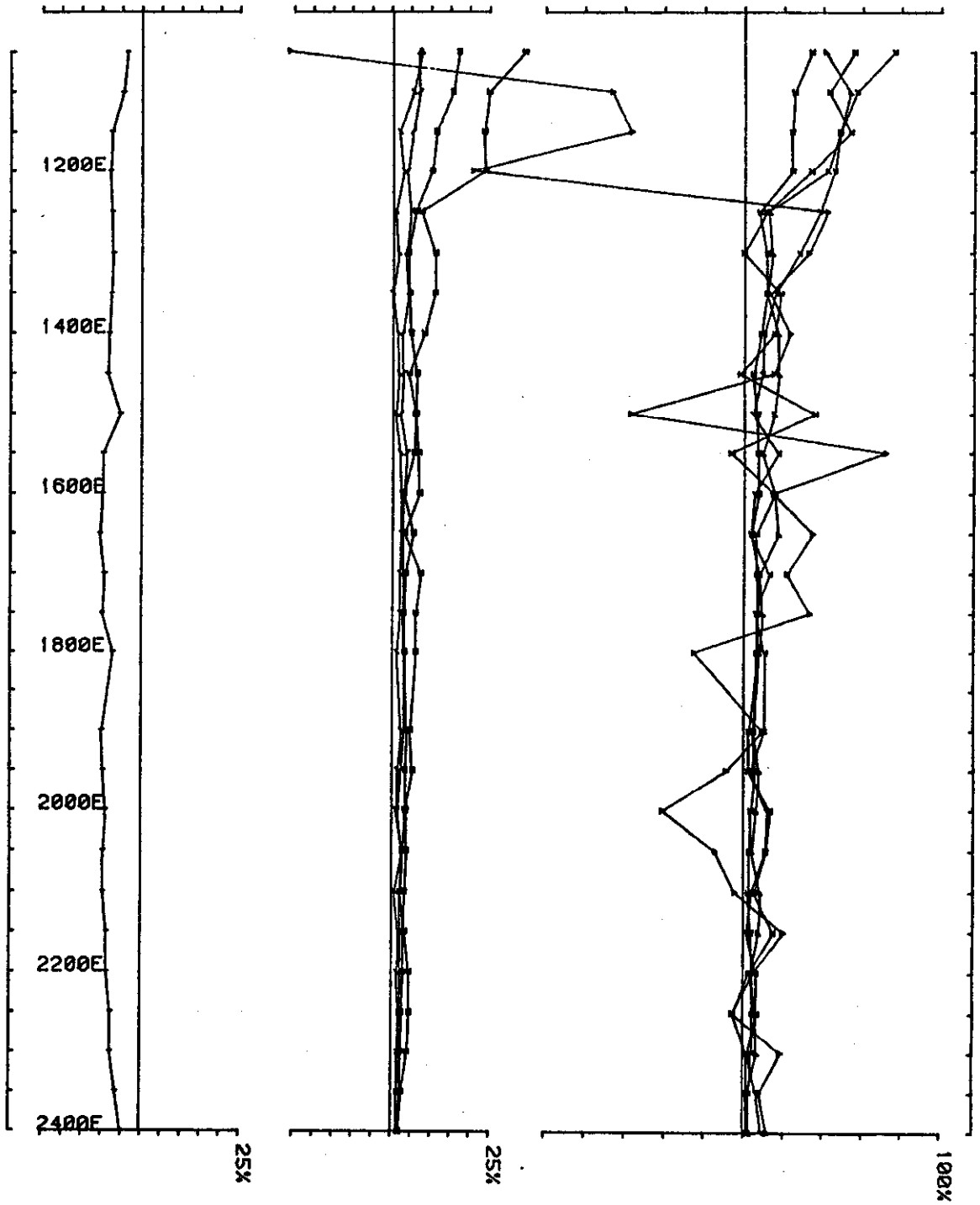
Loopno 0807 Line 2000S component Hz secondary Ch 1 normalized

D.S. 6



Area Lew 81 Cominco Job 807 freq(hz) 30.496
Loopno 0807 Line 2500S component Hz secondary Ch 1 normalized

D.S. 7



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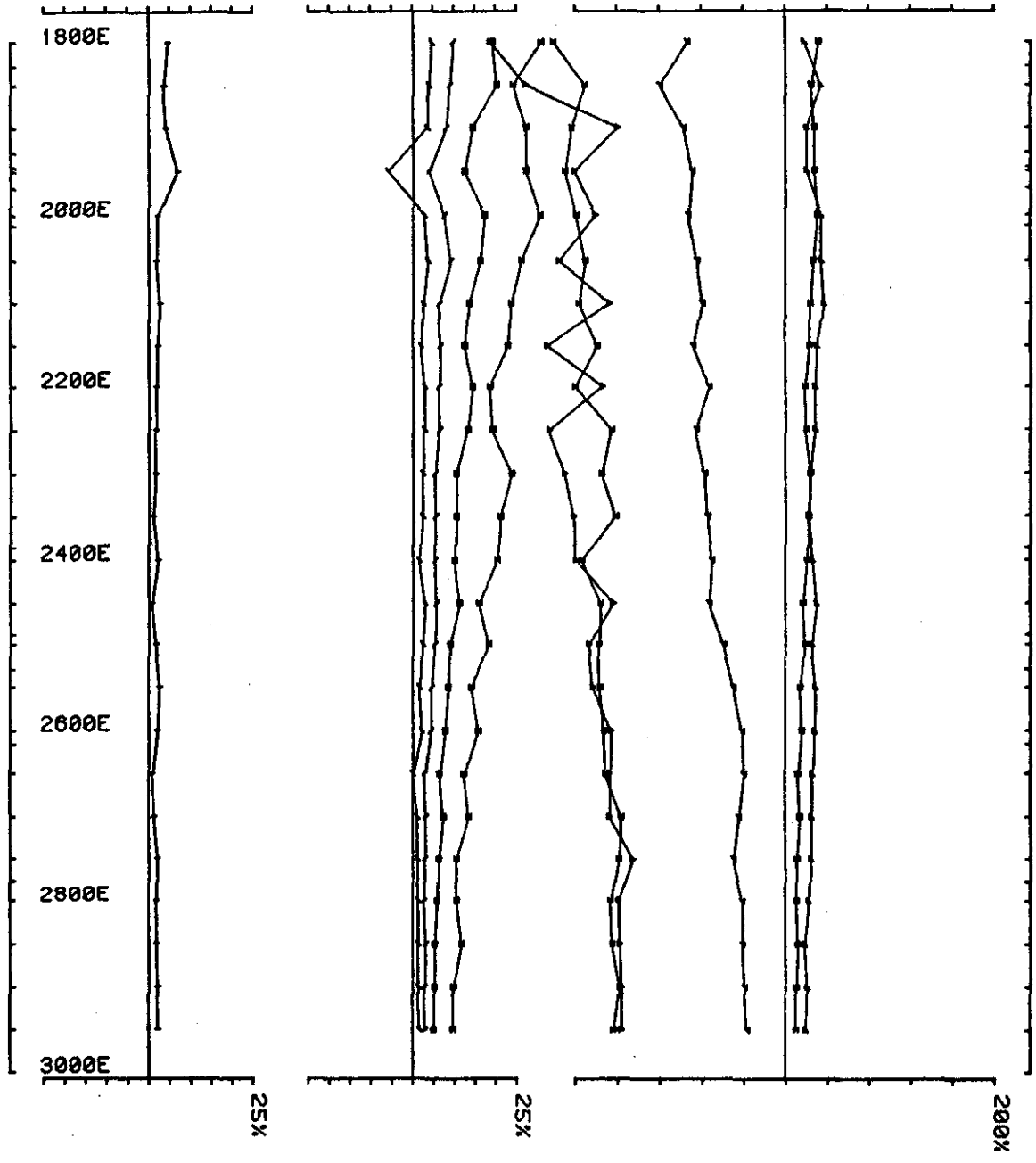
Loopno 0807 Line 3000S component Hz secondary Ch 1 normalized

D.S. 8



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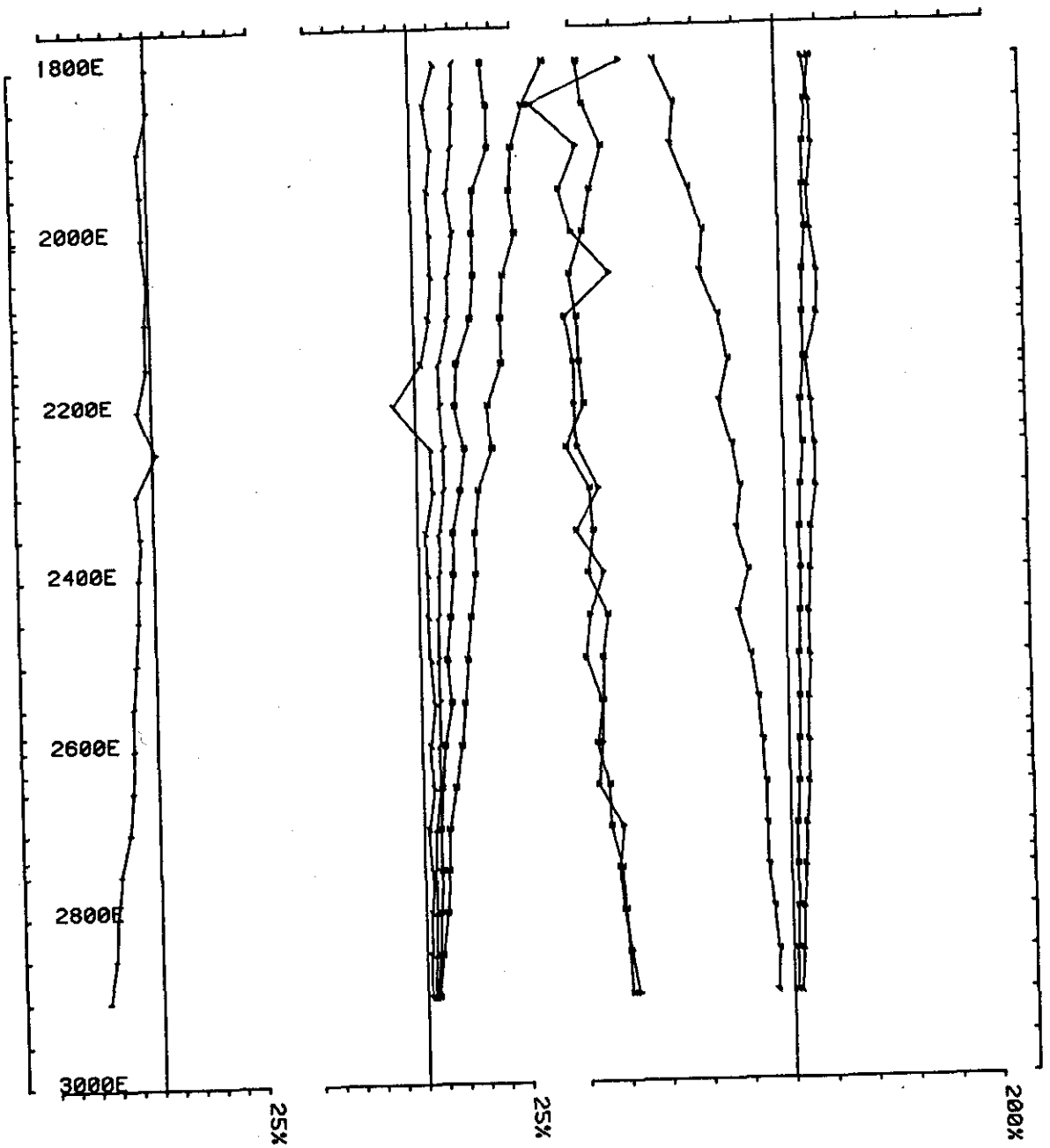
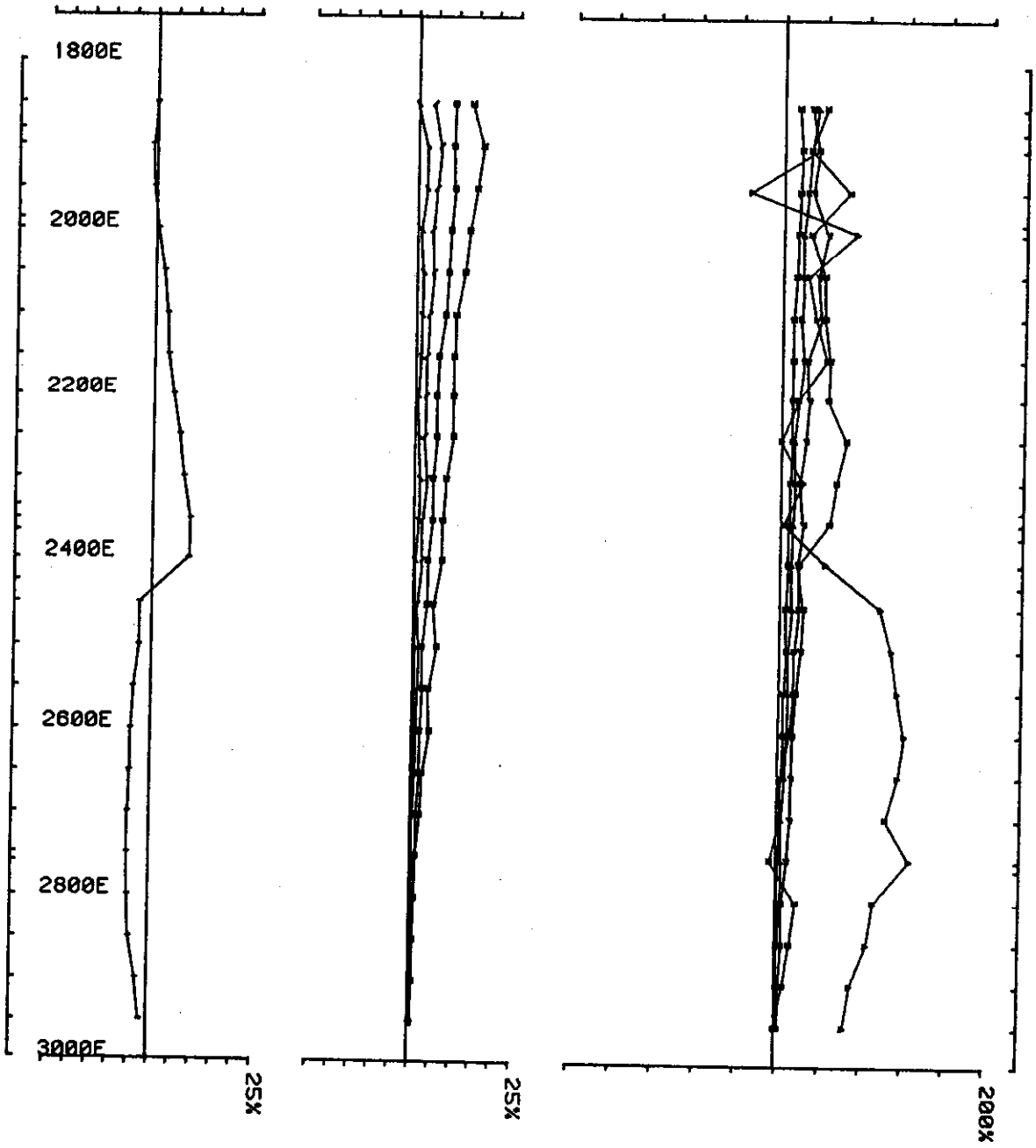
Loopno 0808 Line 500S component Hz

D.S. 9



Area Lew 81 Cominco Job 808 freq(hz) 30.496
Loopno 0808 Line 1000S component Hz

D.S. 10



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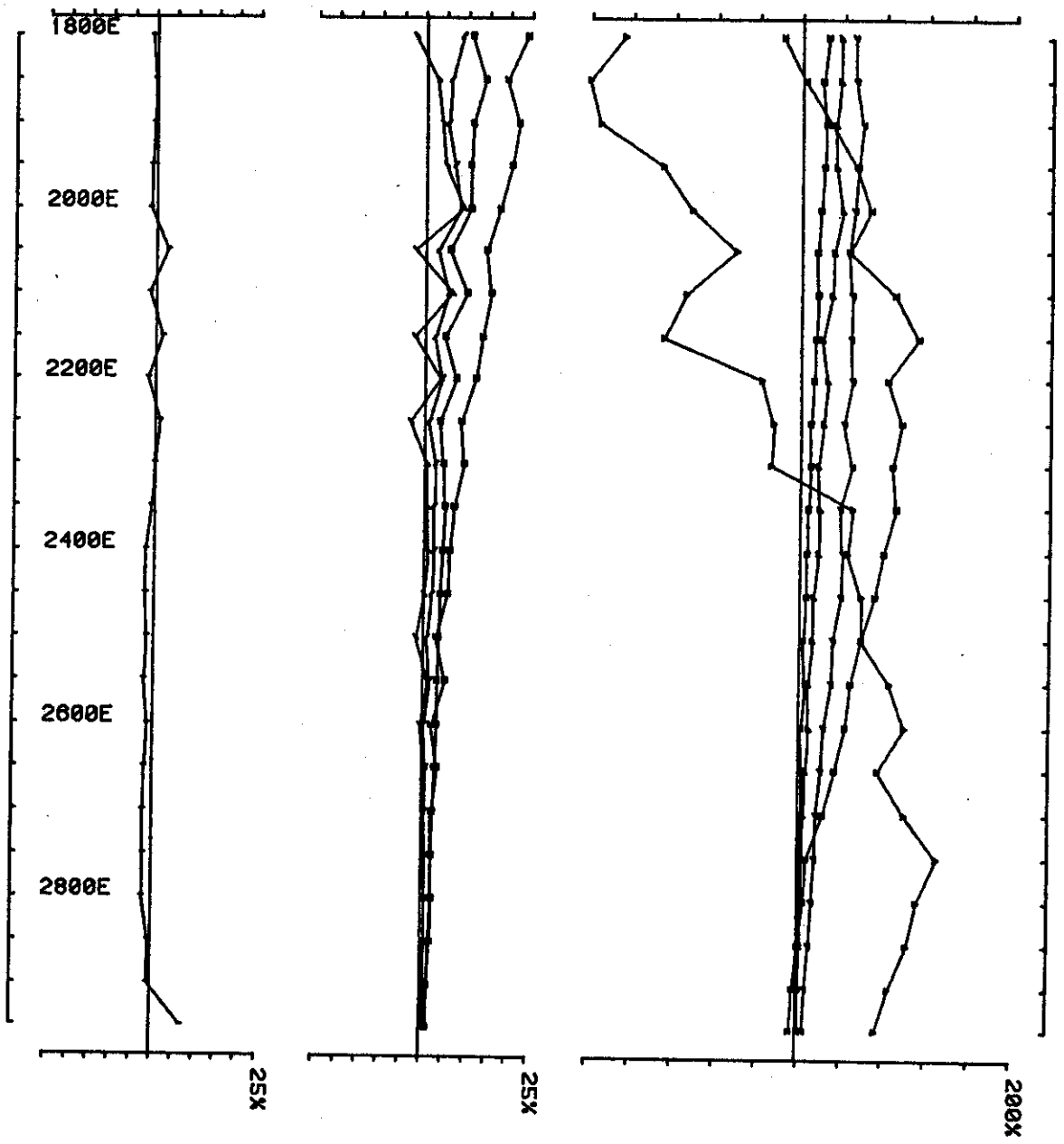
Loopno 0808 Line 1500S component Hz

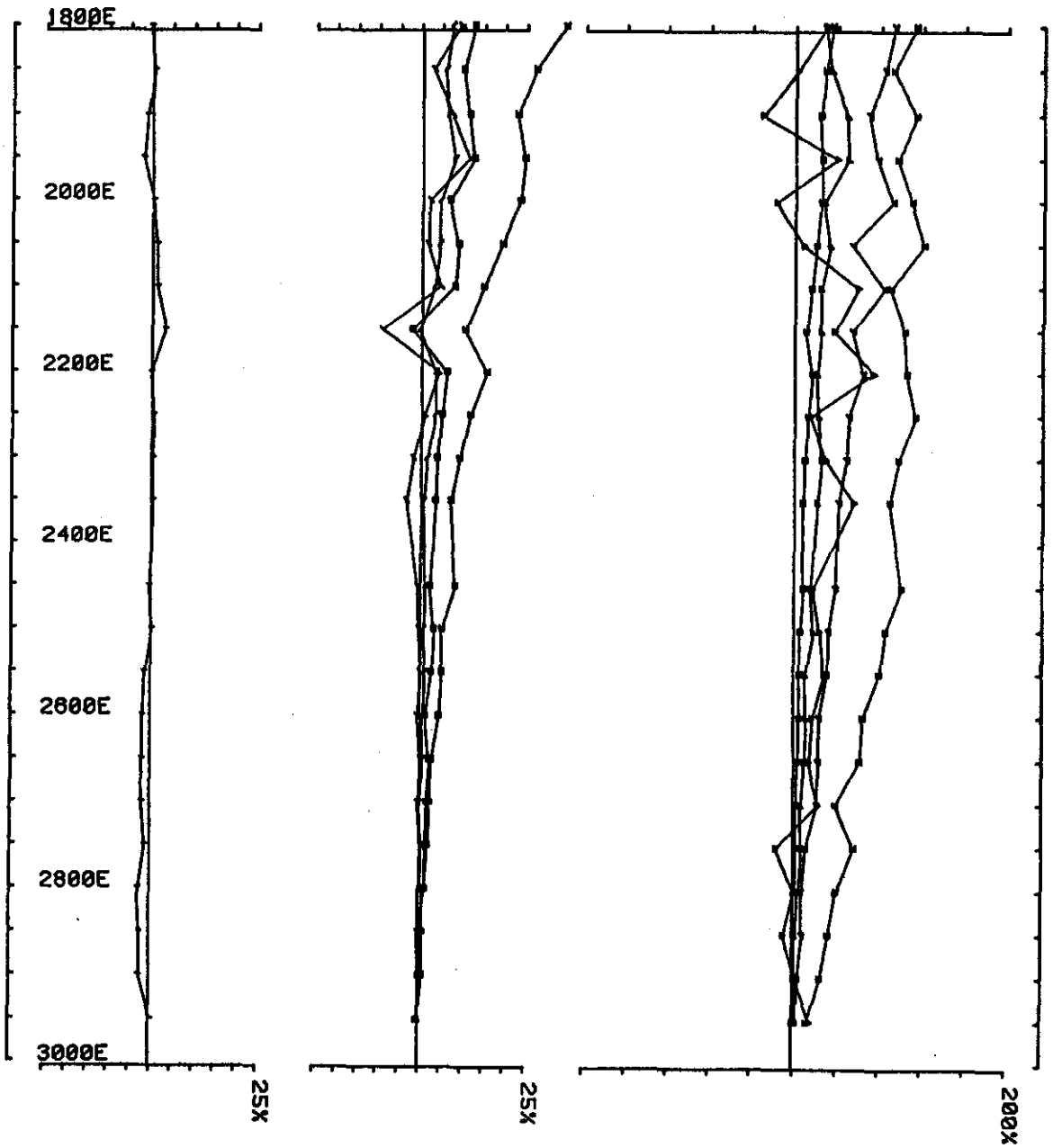
D.S. 11



Area Law 81 Cominco Job 808 freq(hz) 30.496

Loopno 0808 Line 2000S component Hz secondary Ch 1 normalized

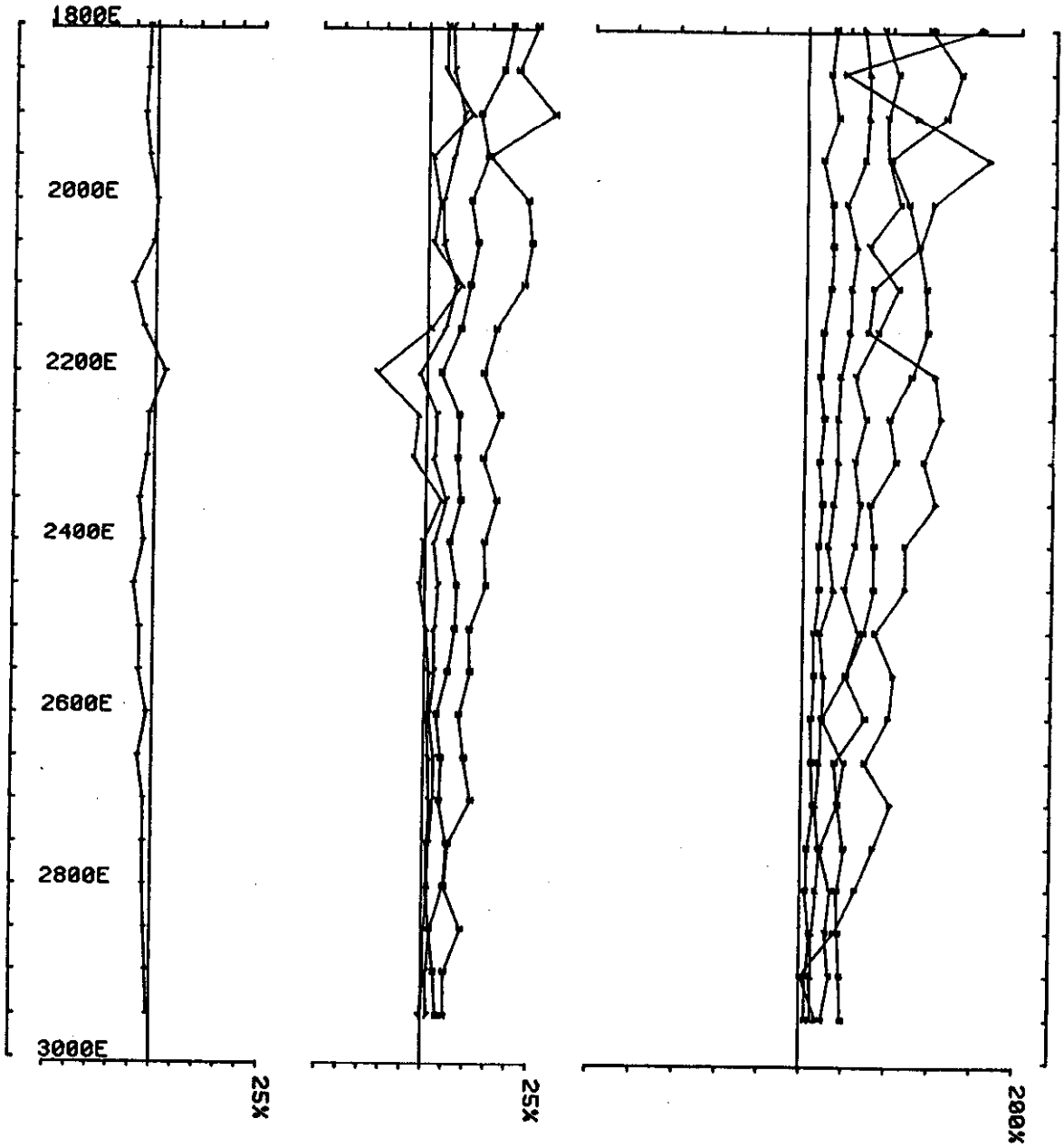
D.S. 12



Area Law 81 Cominco Job 808 freq(hz) 30.496

Loopno 0808 Line 2500S component Hz secondary Ch 1 normalized

D.S. 13



Area Lew 81 Cominco Job 808 freq(hz) 30.496
Loopno 0808 Line 3000S component Hz secondary Ch 1

D.S. 14

APPENDIX IV

A P P E N D I X IV

IN THE MATTER OF THE B.C. MINERAL ACT

AND IN THE MATTER OF A GEOPHYSICAL PROGRAMME

CARRIED OUT ON THE LEW CLAIMS

LOCATED 32 KM S.W. OF CRANBROOK, B.C.

IN THE FORT STEELE MINING DIVISION OF THE

PROVINCE OF BRITISH COLUMBIA, MORE PARTICULARLY

N.T.S. 82 F/8

S T A T E M E N T

I, SYD J. VISSER, of the City of Surrey 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 LEW mineral claims;

3. That the said expenditures were incurred between June 29 and August 13, 1981, for the purpose of mineral exploration of the above-named claims.

Syd J. Visser, B.Sc.
Geophysicist, Cominco Ltd.

"EXHIBIT A"

LEWIS CREEK CLAIMS

STATEMENT OF GEOPHYSICAL EXPENDITURES (1981)

1)	SALARIES			
	(a) Research Geophysicist (JJL)			
	1 day @ $190/day		$ 190.00	
	(b) Geophysicist (ETE)			
	14 days @ $135/day		1,890.00	
	(c) Geophysicist (SJV)			
	10 days @ $135/day		1,350.00	
	(d) Field Assistant (RSY)			
	11 days @ $ 93/day		1,023.00	
	(e) Field Assistant (RF)			
	11 days @ $ 93/day		1,023.00	$ 5,476.00
2)	INTERPRETATION REPORT, DRAFTING, COMPUTER WORK (ODC)			
	14 days @ $225/day			3,150.00
3)	EQUIPMENT RENTAL			
	UTEM Equipment			
	14 days @ $150/day		2,100.00	
	TILDEN (Bronco)			
	14 days		369.54	2,469.54
4)	EXPENSE ACCOUNTS			
	Includes, travel, domicile, fuel & oil, field supplies, equipment parts & repairs			
	(a) JJL	$ 40.00		
	(b) ETE	2,399.17		
	(c) SJV	1,065.69		
	(d) RSY	1,200.79		
	(e) RF	1,100.00		5,805.65
5)	MISCELLANEOUS			
	Wire Usage	$ 300.00		
	Freight (UTEM Equipment)	442.49		742.49
			T O T A L	$ 17,643.68

A P P E N D I X V

C E R T I F I C A T I O N

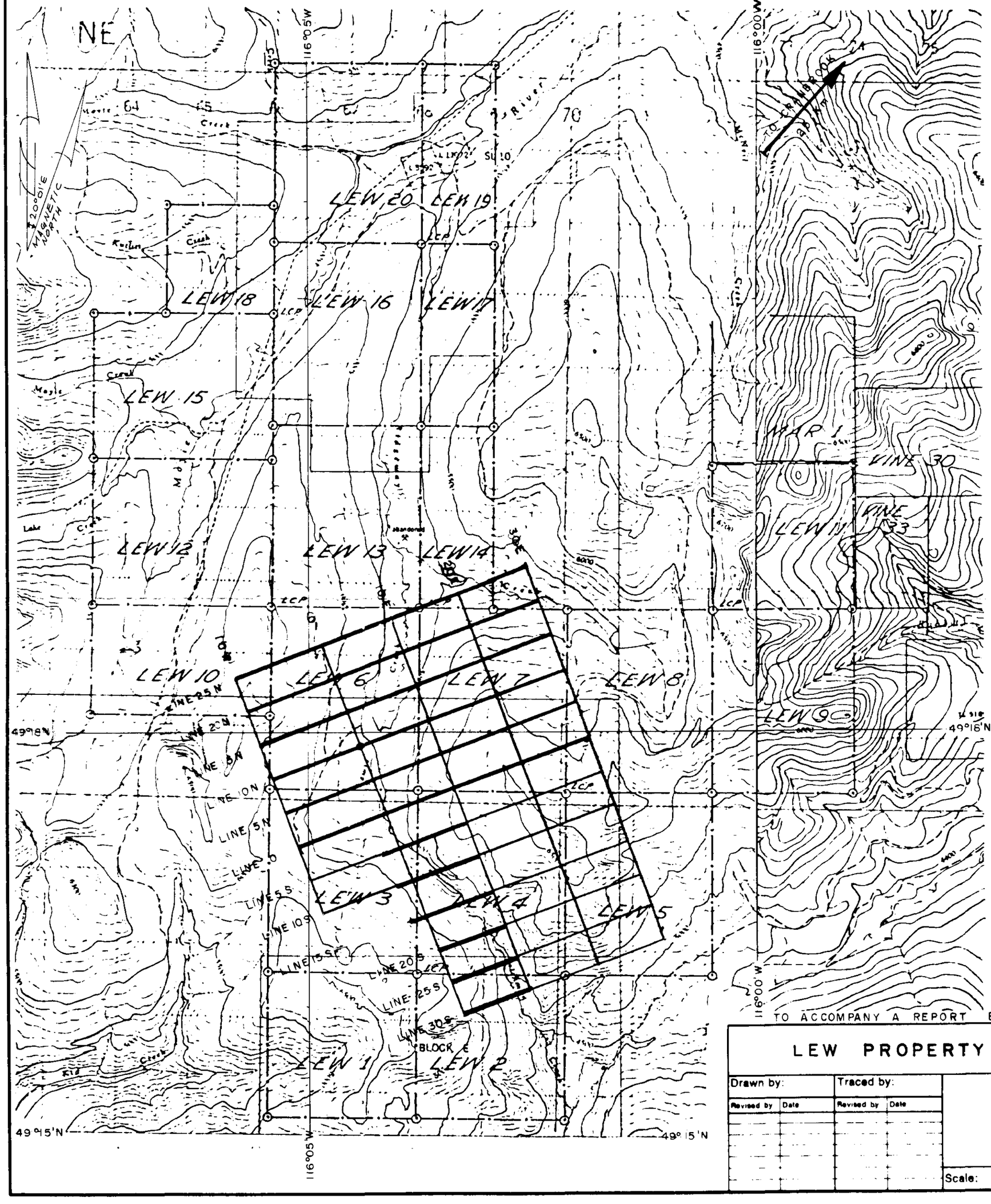
I, Syd J. Visser, of 12627 - 98th Avenue in the City of Surrey, in the Province of British Columbia, do hereby certify that:-

1) I graduated from Haileybury School of Mines in 1971 as a Mining Technician and from the University of British Columbia in 1981 with Honours B.Sc. in Geophysics and Geology.

2) I have worked in mineral exploration since 1968.

SYD J. VISSER
Geophysicist

SJV/jel
November 23, 1981



LEW 1 to 20 Incl.
RECORD No's 906 to 925
RECORDED MAY 5, 1980

No UNITS	342
NAME	UNITS
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2	16
3	20
4	20
5	20
6	20
7	20
8	20
9	20
10	15
11	16
12	20
13	20
14	10
15	20
16	20
17	10
18	9
19	10
20	20

LINES SURVEYED BY UTEM (1980)

LINES SURVEYED BY UTEM (1981)

10,305

METRES
0 1000 2000 3000 4000 5000

TO ACCOMPANY A REPORT BY S.J. VISSER

LEW PROPERTY

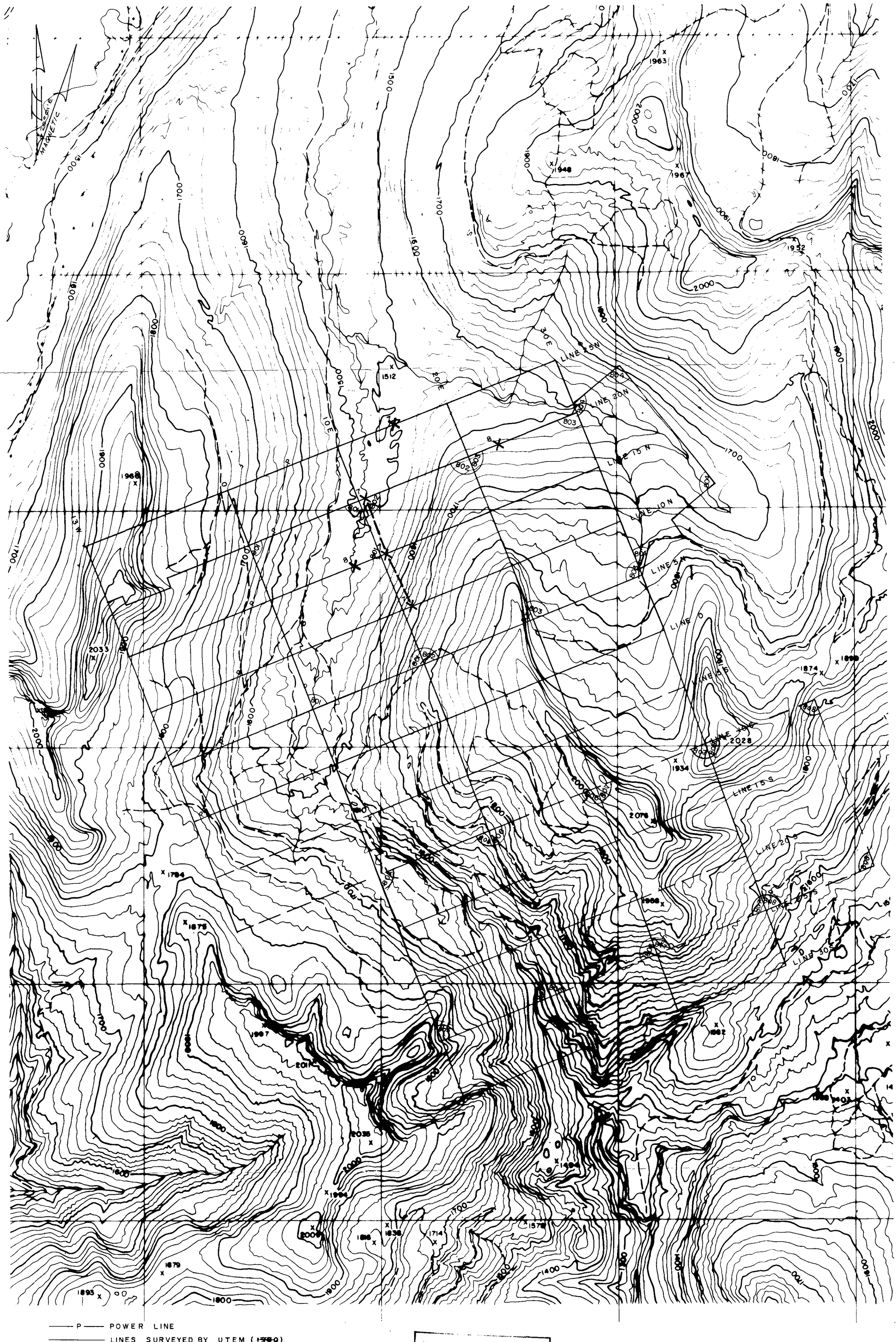
NTS 82 F 8

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

LOCATION AND CLAIM MAP

FORT STEELE M.D., B.C.

Scale: 1:50,000 Date: NOV 1981 Plate: 219-81-1



— P — POWER LINE

LINES SURVEYED BY UTEM (1980)

LINES SURVEYED BY UTEM (1981)

4 — AXIS OF A CROSS-OVER ANOMALY
THE NUMBER INDICATES THE LATEST ANOMALOUS CHANNEL

4 — AXIS OF A REVERSE CROSS-OVER ANOMALY
THE NUMBER INDICATES THE LATEST ANOMALOUS CHANNEL

7 — 7 — CONDUCTOR AXIS LOCATED BY CROSS-OVER ANOMALIES

801 / 801 / 801 / 801 — OUTLINE OF A TRANSMITTER LOOP WITH LOOP NUMBER

10,305

0 ·5 1 KM

TO ACCOMPANY A REPORT BY S.J. VISSER

LEW PROPERTY

NTS 82 F 8

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

1981 UTEM SURVEY

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NCI-229-C.L.