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| ACTION: | 11/88 |
| FILE NO: | |

TR-2

COMINCO LTD

EXPLORATION

GEOPHYSICS

NTS:82/F9,16

# MATHEW CREEK 1987

# UTEM SURVEY

- ASSESSMENT REPORT -

Latitude: 49 45'N

Longitude: 116 05'W

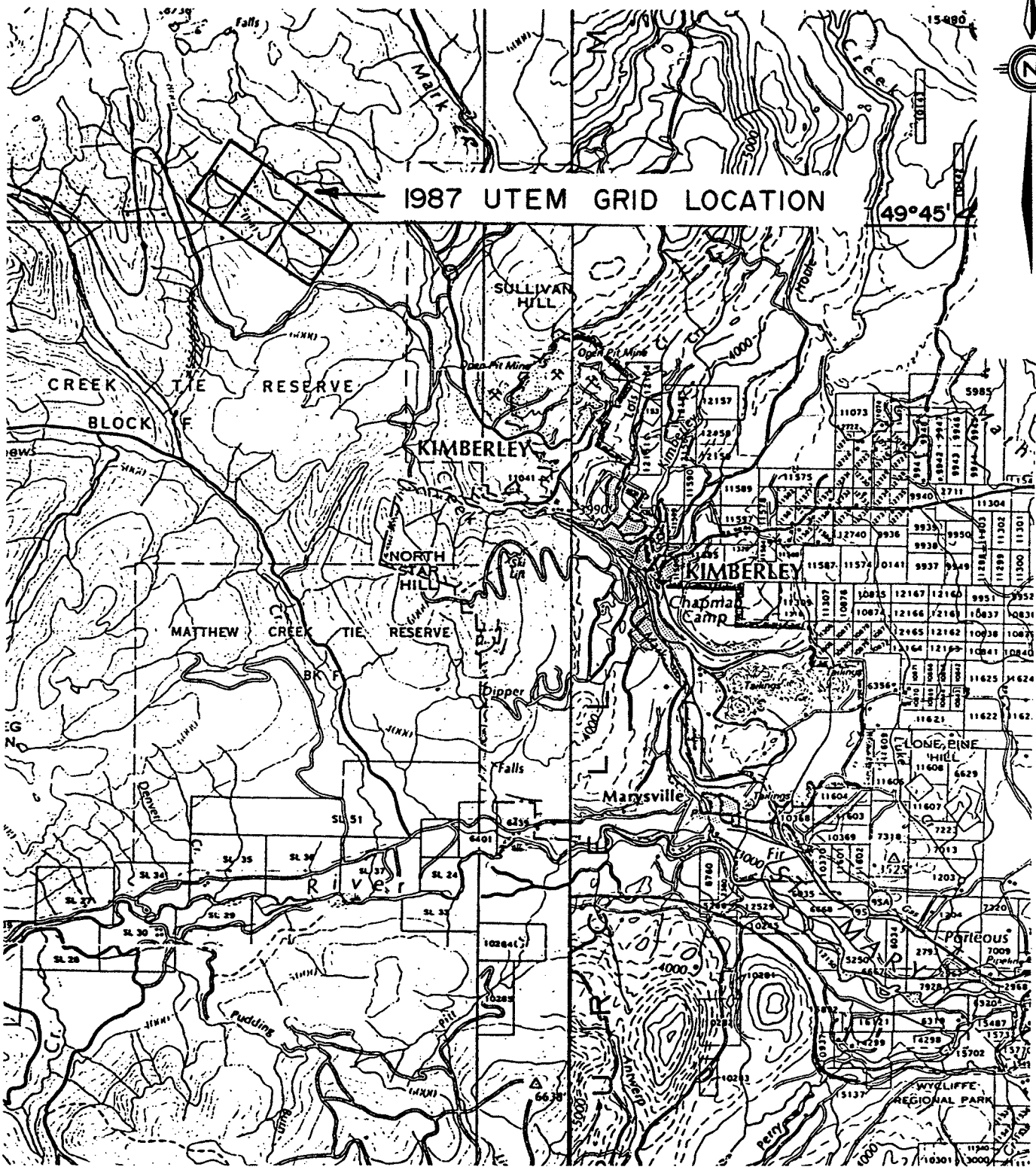
Work Performed by: I. Jackish and J. Vyselaar

Claim Owner and Operator: Cominco Ltd.



FEBRUARY, 1988

JULES J. LAJOIE




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

# MATTHEW Ck.

## Location Map

| Scale: 1:125,000 | Date: JAN. 1988 | Plate: 333-87-1 |
|---|---|---|

NCI - 112A - CL

210-0610

TABLE OF CONTENTS

COMINCO LTD

EXPLORATION GEOPHYSICS

NTS: 82F/9,16

# - MATHEW CREEK 1987 UTEM SURVEY -

# - ASSESSMENT REPORT -

## INTRODUCTION

This report describes a Utem electromagnetic survey performed in the Mathew Creek area, located 10 kilometres northwest of Kimberley, B.C. The area is underlain by rocks of the Aldridge Formation which are known to host the Sullivan orebody at Kimberley, B.C.

Access to the grid is westerly from Marysville along the St. Mary's lake road for about 7 kilometres, then north on the Mathew Creek road.

16 kilometres of Utem surveying were completed.

## FIELD WORK

The field work was carried out between October 1 to 6, 1987, inclusive, by geophysicists I. Jackish, J. Vyselaar, and assistants S. Kempt, E. Ricketts, and D. Murphy. Two transmitter loops were used for the survey.

## DESCRIPTION OF THE UTEM SYSTEM

UTEM is an acronym for "University of Toronto ElectroMagnetometer". The system was developped 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 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 transmitter loop is energized with a precise triangular waveform at a carefully controlled base frequency (30.974Hz 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, and it must be accurate to about one second in fifty years.

The receiver sensor coil measures the vertical component of the electromagnetic field and responds to its time derivative. Since the transmitter current waveform is rectangular, 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 information 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 late time or low frequency. Therefore, poor or weak conductors will respond on channels 9, 8, 7, and 6. 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.

At the end of the day the casette tape is played back into a Pascal microengine computer at the base camp. The computer is used to process the data and control the plotting on an 11" x 15" graphics plotter. Data are portrayed on Data Sections as profiles of each of the nine channels, one section for each survey line.

## DATA PRESENTATION

The results of this survey are presented in one compilation map and 8 Data Sections which all face N.

The maps are listed as follows:

Plate 333-87-1: Location Map (in text)

Plate 333-87-2: Utem Grid and Compilation Map (in text)

A legend for the compilation map and data sections is included. The data sections are arranged in order of loop number, then in order of line number. Loop number defines a loop survey area for purposes of data processing and data management.

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 from the transmitter loop. 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 according to the following schemes:

1. 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) The remaining channels (n=2 to 9) 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 9).

2. Point normalized plots.

These plots display an arrow at the top of the section indicating the station to which all data on the line are normalized. The purpose of point normalized plots is to display only the relative amplitude variation of the

secondary field along the line, that is, only that magnetic field from the currents induced in the ground.

a) For Channel 1:

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

where Ppn is the primary field from the loop at the point norm station and Ch.1 is the observed amplitude for Channel 1.

b) The remaining channels (n=2 to 9) are channel 1 reduced and channel 1 normalized:

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

where Ch.n is the observed amplitude of Channel n and Ch.1pn is the observed channel 1 amplitude at the point norm station.

Point normalized plots are usually produced on data sections containing anomalies to help interpretation by providing a different perspective to the data. They are identified by an arrow at the top of the plot which denotes the station used for point normalization; the latter is usually chosen as a station which is at a constant separation from the loop for the whole grid, or, if there is an anomaly, at a station near the center of the anomalous response.

The above normalizing procedures result in chaining error displayed in Channel 1 only.

## INTERPRETATION

The results are shown in the Data Sections and compiled in Plate 333-87-2. A few regions of lower resistance than background have been identified by a stronger gradient in the early time channels (9-8-7). No anomalies from good conductors are interpreted.

## CONCLUSIONS

16 kilometres of Utem electromagnetic surveying were

completed in a small area about 10 kilometres NW of Kimberley, B.C. Half of this is overlap from two transmitter loops so that the effective line coverage is 12 kilometres. No good conductors were found in this survey.

Report by:

Jules Lajoie

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

Approved for release by:

John Hamilton

J. M. Hamilton, Manager,
Western District Exploration,
Cominco Ltd.

Distribution:
Mining Recorder (2) — 2
Sullivan Mine
Kootenay Exploration
Western District
Geophysics

## REFERENCES

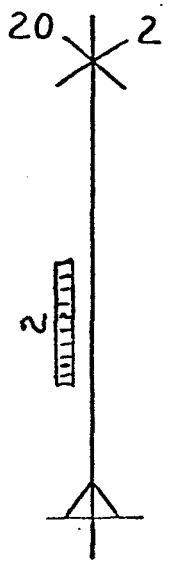
Lamontagne, Y., 1975, Applications of Wideband, time-domain EM measurements in mineral exploration: Ph.D. thesis, U. of Toronto.

## 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 |

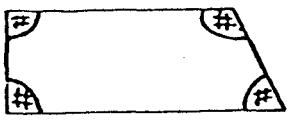
In the data sections, the upper graph contains Channels 9 to 5, the centre graph contains Channels 5 to 2, and the lower graph contains Channel 1. Station numbers are indicated along the abscissa. Elevations along the survey line are shown by the solid profile in the lower graph, the scale for which 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, or S = shallow depth, M = moderate depth and D = deep.

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

## APPENDIX I

IN THE MATTER OF THE B.C. MINERAL ACT

AND THE MATTER OF A GEOPHYSICAL PROGRAMME

CARRIED OUT ON THE MAT 65

AND ADJOINING MINERAL CLAIMS

LOCATED 10 KM NW OF KINBERLEY, B.C.

IN THE FORT STEELE MINING DIVISION OF THE

PROVINCE OF BRITISH COLUMBIA, MORE PARTICULARLY

N.T.S. 82 F/9,16

## A F F I D A V I 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 a geophysical survey on the Mat 65 and adjoining mineral claims;

3. THAT the said expenditures were incurred between October 1 and 6, 1987, for the purpose of mineral exploration of the above-noted claims.

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

## APPENDIX II

## EXHIBIT 'A'

### STATEMENT OF GEOPHYSICAL EXPENDITURES (1986)

### MAT 65 AND ADJOINING CLAIMS CLAIMS

1. SALARIES

| | | |
|---|---|---|
| P. Ransom, geological supervision, 2 days @ $250.00/day | $500.00 | |
| I. Jackish, geophysicist, 6 days @ $285.00/day | $1710.00 | |
| J. Vyselaar, geophysicist, 6 days @ $290.00/day | $1740.00 | |
| S. Kemp, assistant, 6 days @ $125.00/day | $750.00 | |
| D. Murphy, assistant, 6 days @ $110.00/day | $660.00 | |
| E. Ricketts, assistant, 4 days @ $102.50/day | $410.00 | |
| | | $5770.00 |

2. OPERATING DAY CHARGES

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

5 days @ $300.00/day $1500.00

3. EQUIPMENT RENTAL

| | | |
|---|---|---|
| Utem system: 5 days @ $150.00/day: | $750.00 | |
| Additional Receiver: 1 day: | $75.00 | |
| | | $825.00 |

4. EXPENSE ACCOUNTS (incl. accom., meals, fuel)

| | | |
|---|---|---|
| I. Jackish | $766.38 | |
| J. Vyselaar | $238.96 | |
| | | $1005.34 |

5. LINECUTTING (D. Calder, Cranbrook)

| | |
|---|---|
| 22.522 km @ $382.50/km | $8614.67 |

5. MISCELLANEOUS

| | |
|---|---|
| Trucks (two 4X4): 6 days @ $90.00/day: | $540.00 |
| | ========== |
| T O T A L | $18,255.01 |

I certify this to be a true statement of expenditures for the geophysical program on the Mat 65 and adjoining claims in 1987.

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

## APPENDIX III

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

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 an M.Sc. in Geophysics, and from the University of Toronto in 1973 with a Ph.D. in Geophysics.

2. I am a registered member (#12077) 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 fourteen years.

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

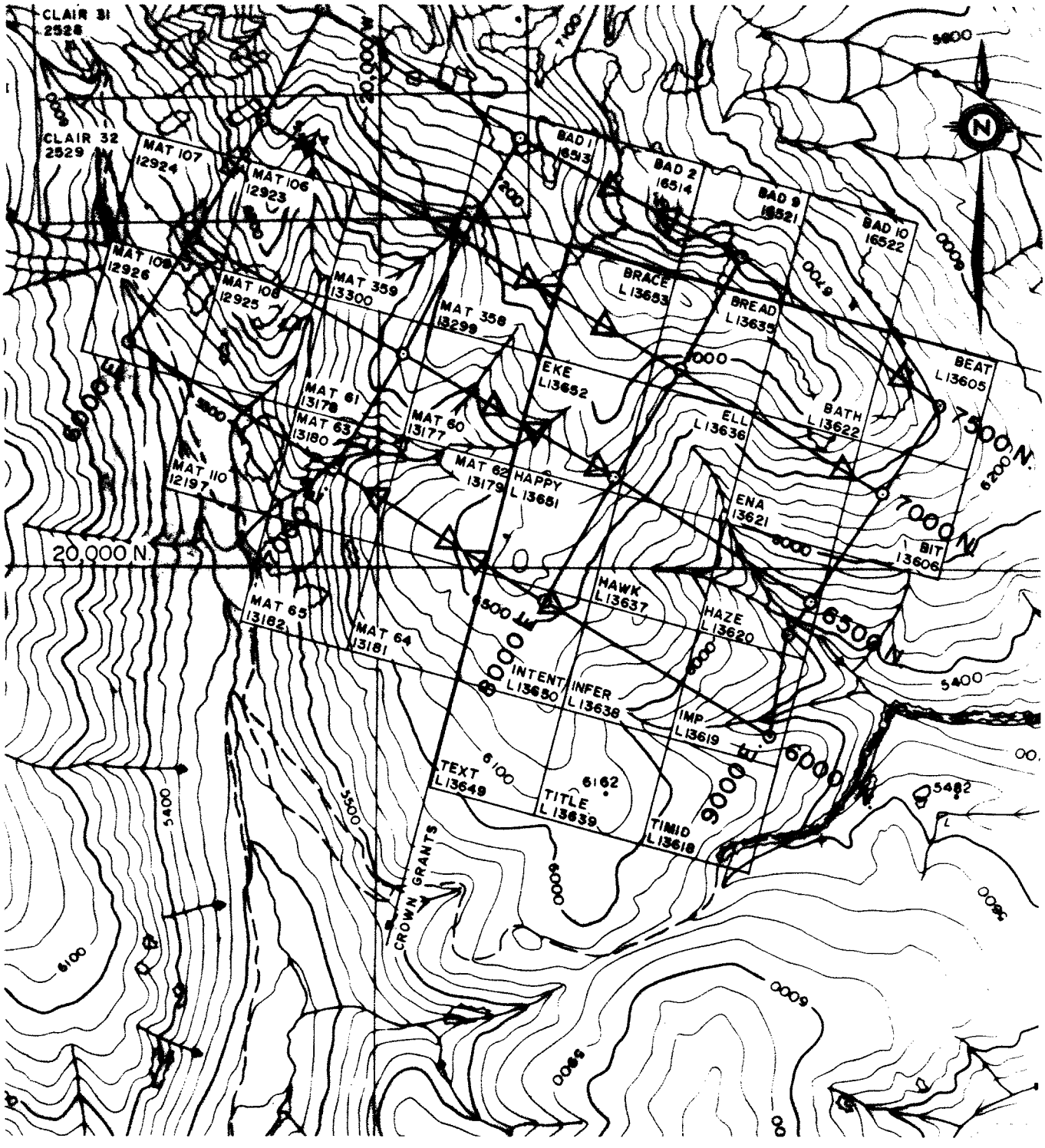
APPENDIX 4

## SULLIVAN MINE GROUP OF MINERAL CLAIMS

NOVEMBER 27, 1986

| | | Number of Units | |
|---|---|---|---|
| 1. | Crown-Granted M.C. | | 680 |
| 2. | Held by Assessment: | | |
| | 2(a) TWO POST CLAIMS | | |
| | Luke Group | 75 | |
| | Rho Group | 20 | |
| | Med Group | 15 | |
| | Donna, Etc. Group | 15 | |
| | Uke Group | 11 | |
| | Mar Group | 17 | |
| | Bad Group | 36 | |
| | Late Group | 91 | |
| | Mat Group | 268 | |
| | Jackpot | 1 | 549 |
| | 2(b) REVERTED CROWN GRANTED MINERAL CLAIMS | | |
| | Tip 4-12 | 9 | |
| | Hope 2-12 | 11 | |
| | Sun 2-12 | 11 | |
| | Cue 2-12 | 11 | |
| | B.C., Silver Bell, Tarrant | 3 | |
| | Black Hills, Yankee Girl, Wasp Fr. | 3 | |
| | Blue Dragon | 1 | 49 |
| | 2(c) MINERAL CLAIMS (54) | | |
| | Dip 1-8 | 56 | |
| | Fal 1-14 | 84 | |
| | Golf 1-3 | 17 | |
| | Quark 1&2 | 12 | |
| | Fin 1-3 | 18 | |
| | Mead 1-3 | 36 | |
| | Gin 1-9 | 110 | |
| | Clair 24-32 | 56 | |
| | Mark 1-3 | 17 | 406 |
| 3. | Greenhorn Mineral Lease | | 1 |
| | GRAND TOTAL (1 + 2 + 3) | | 1,685 |

PWR/lrm




0 250 500 1000m.

(see legend in text)

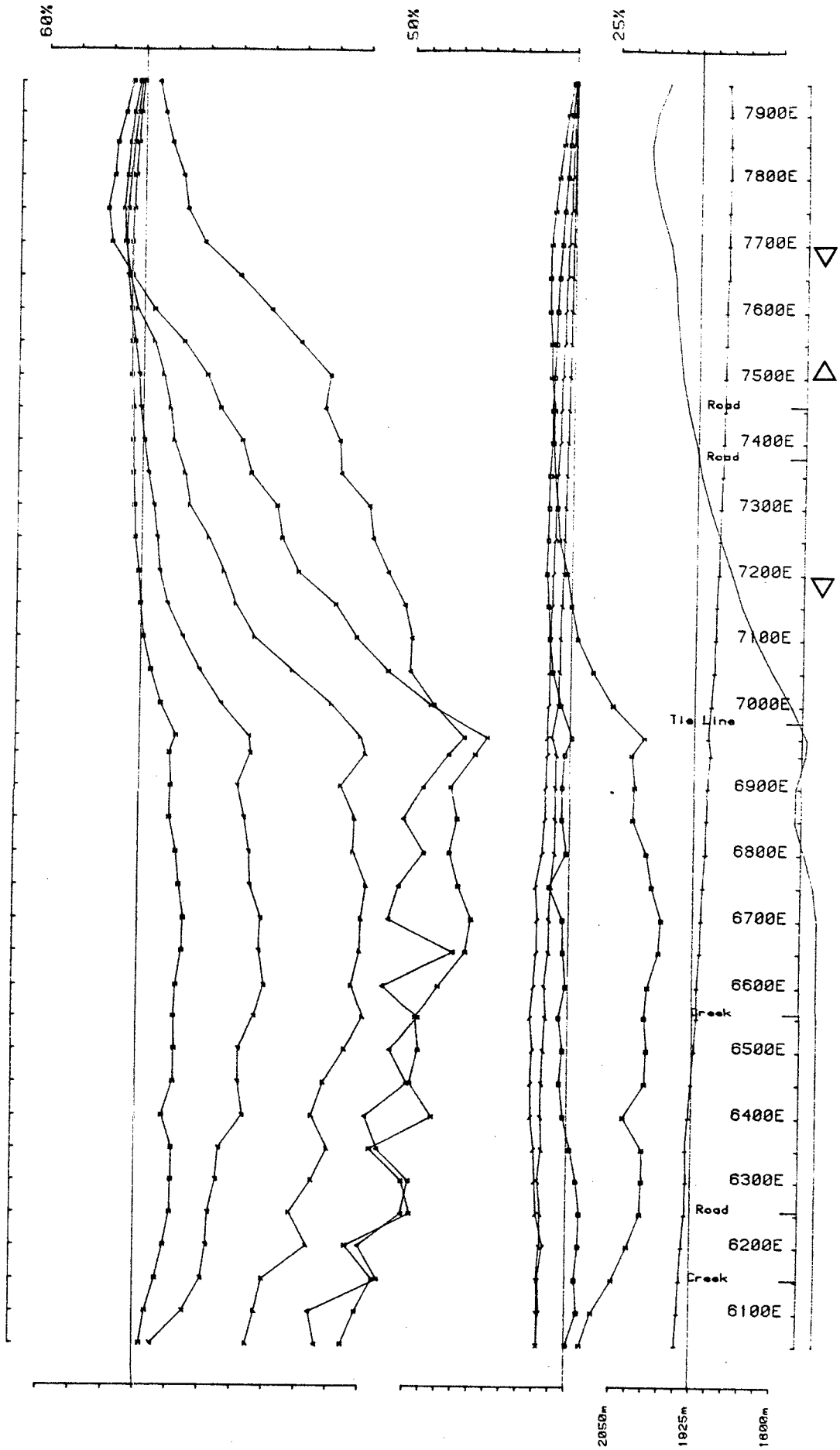
| Drawn by: | | Traced by: | |
|---|---|---|---|
| Revised by | Date | Revised by | Date |
| | | | |

# MATTHEW CREEK

## UTEM GRID & COMPILATION MAP

Scale: 1 : 2500 | Date: JAN. 1988 | Plate: 333-87-2

# DATA SECTIONS




Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974

Loopno 5 Line 6000N component Hz secondary Ch I normalized Ch I reduced

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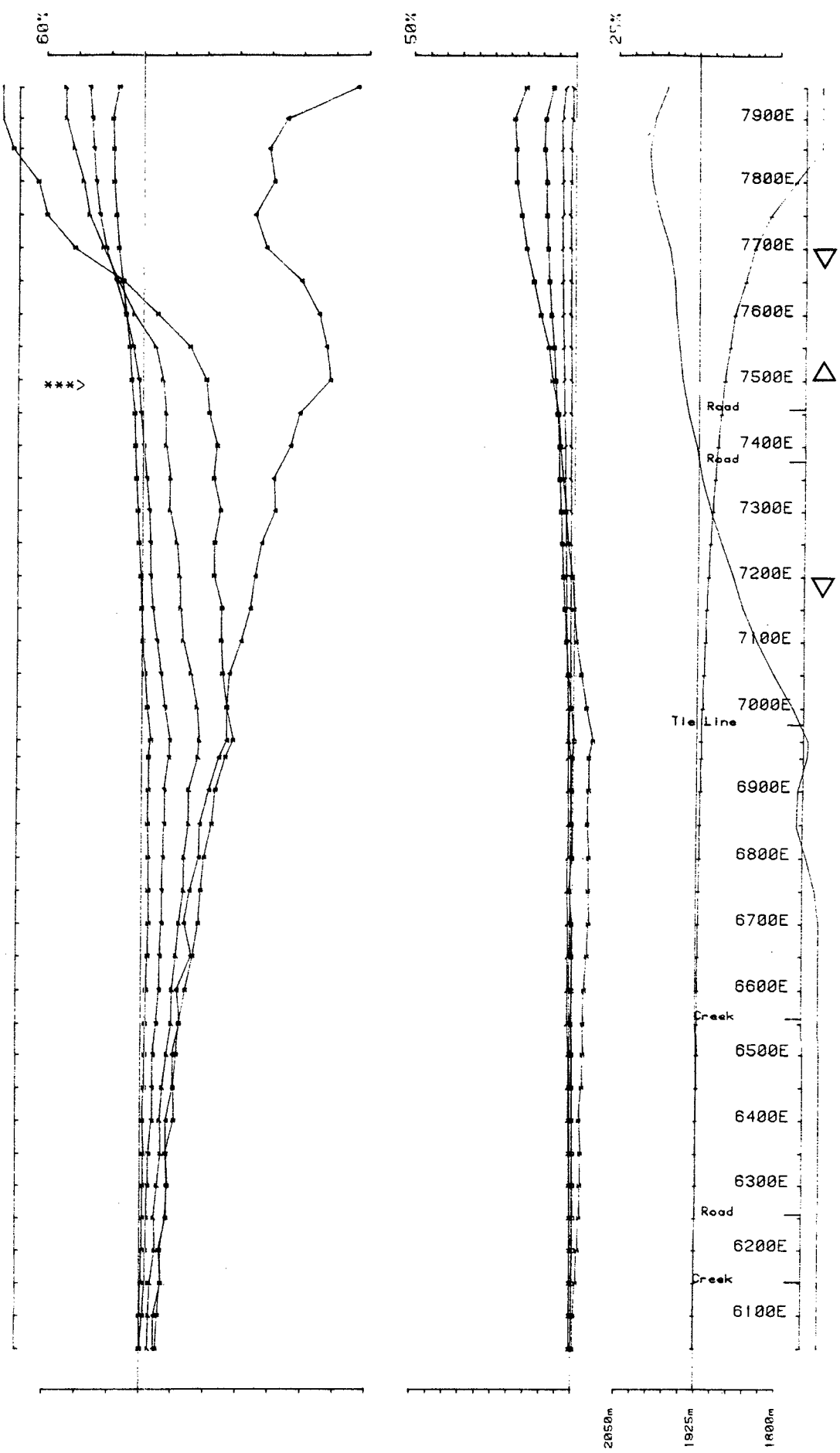


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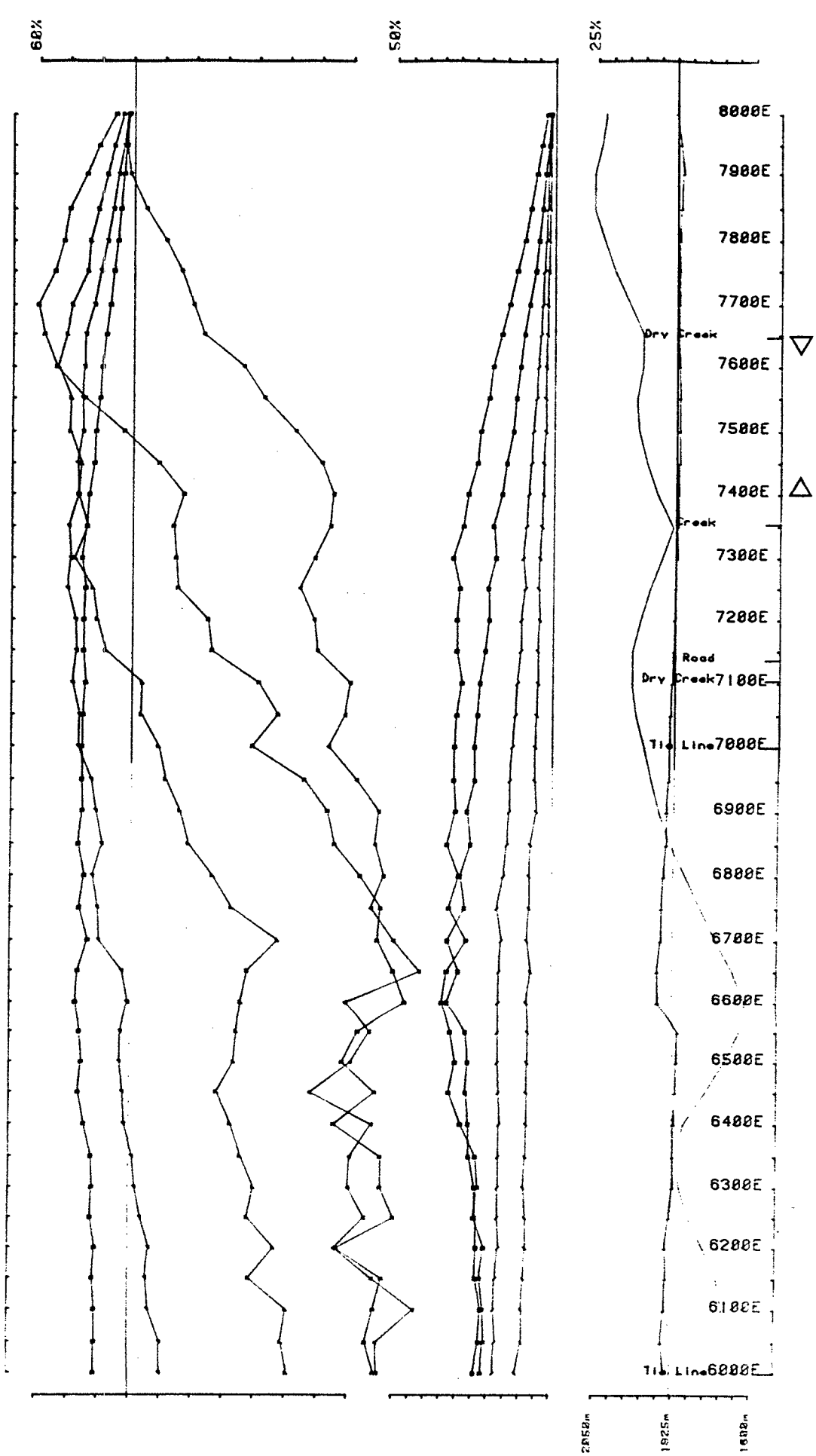
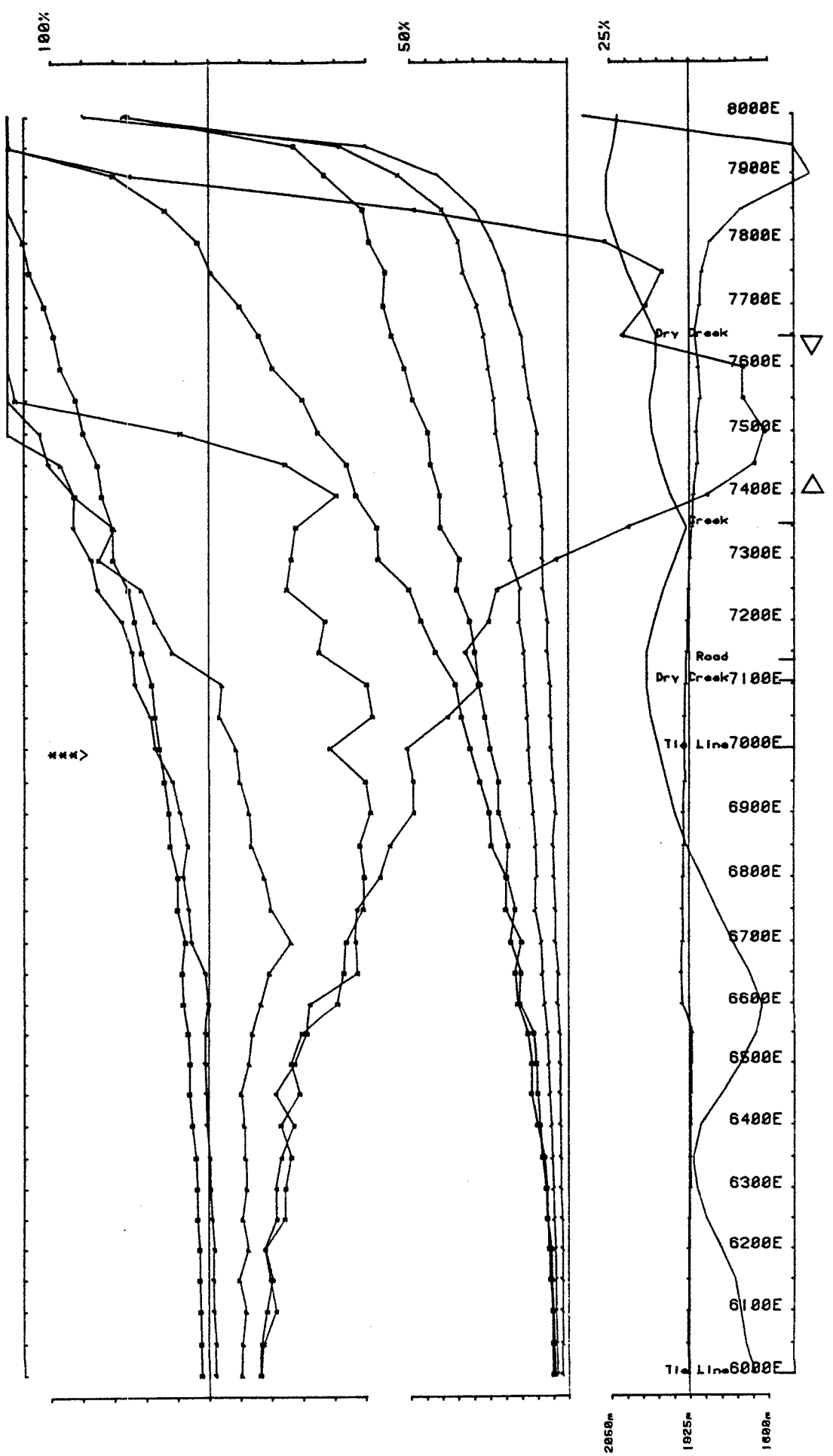
D.S. 1a




Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974

Loopno 5 Line 6500N component Hz secondary Ch I normalized Ch I reduced

D.S. 2

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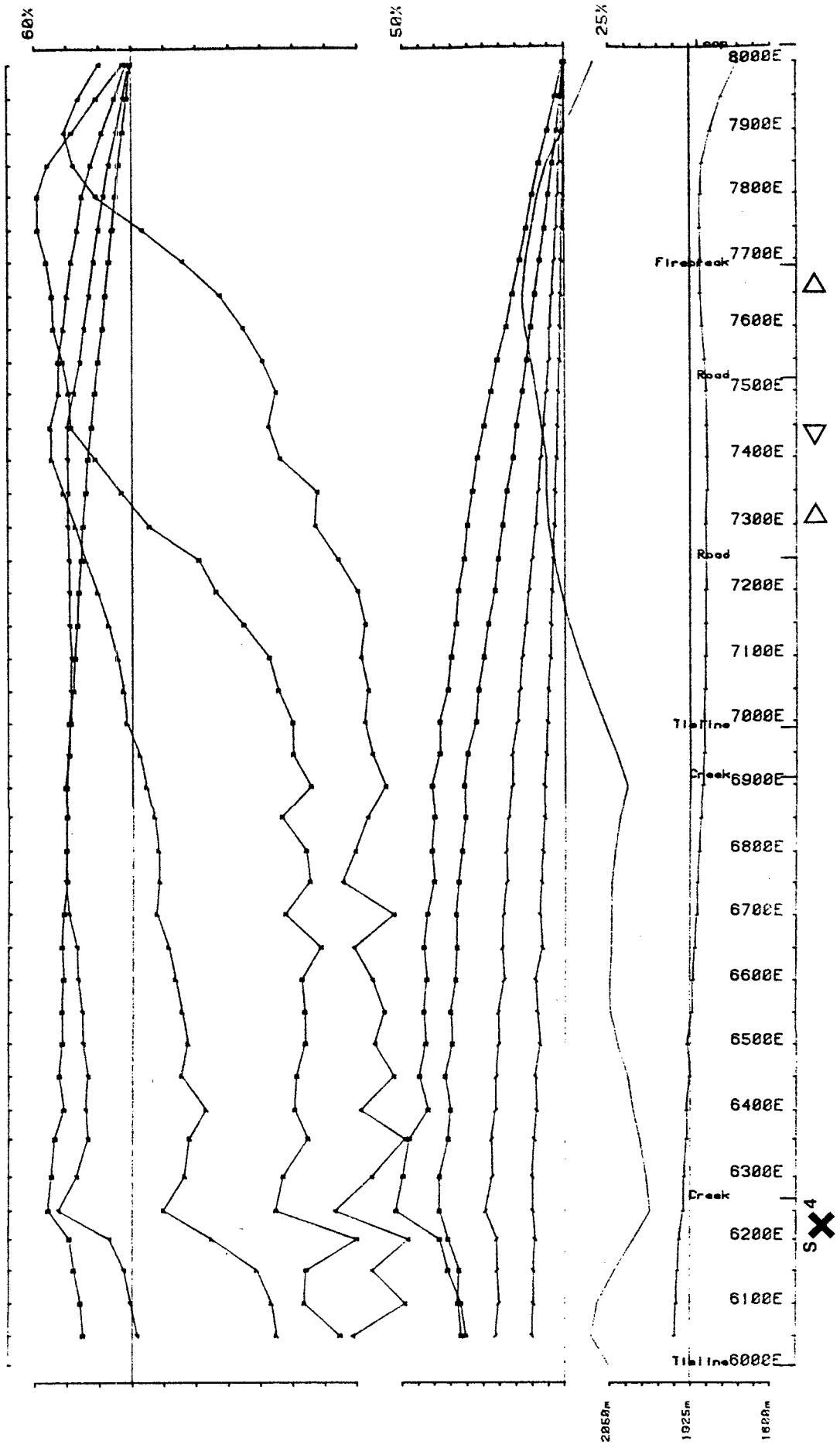
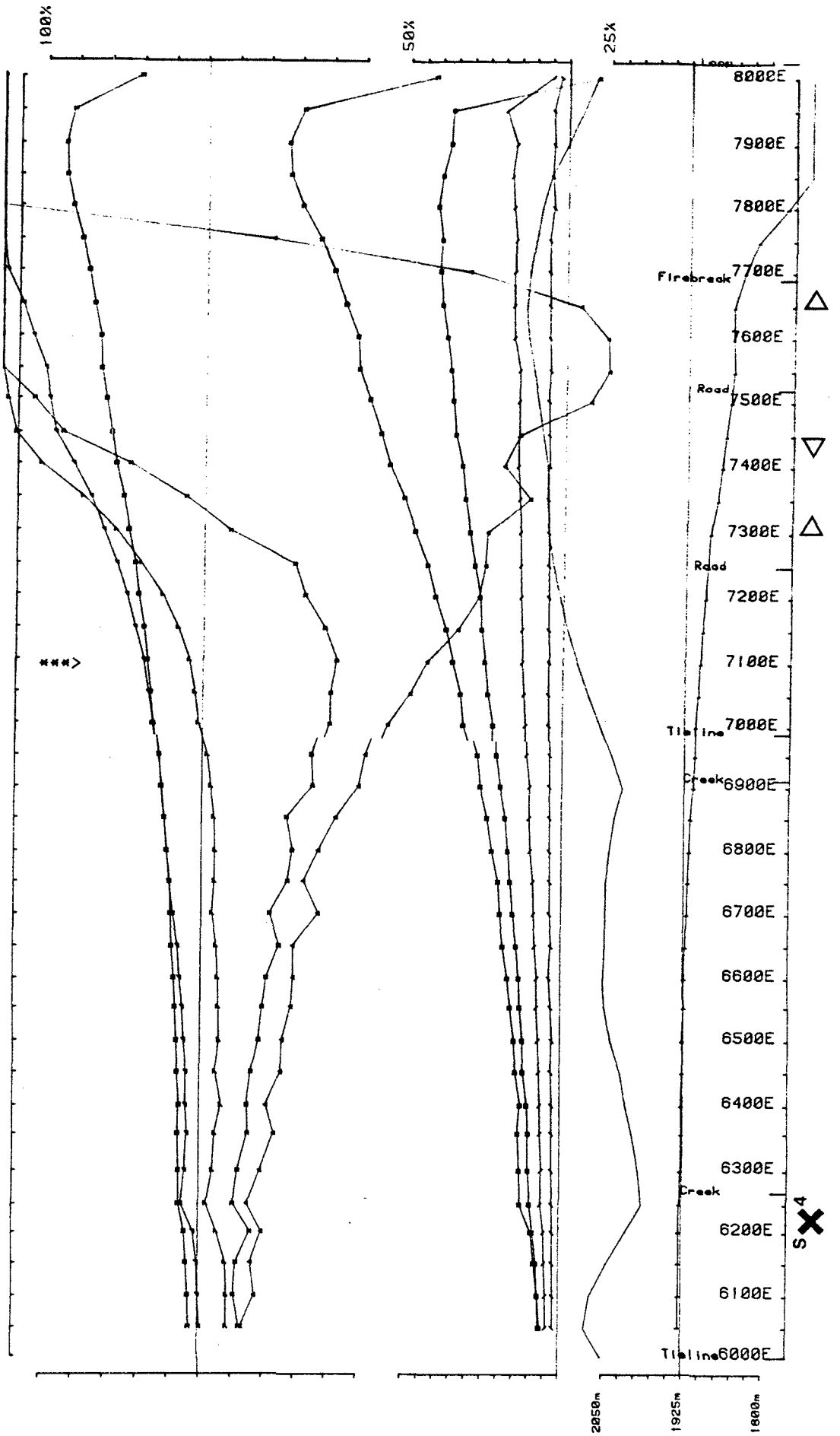



Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974

Loopno 5 Line 7000N component Hz secondary Ch I normalized Ch I reduced

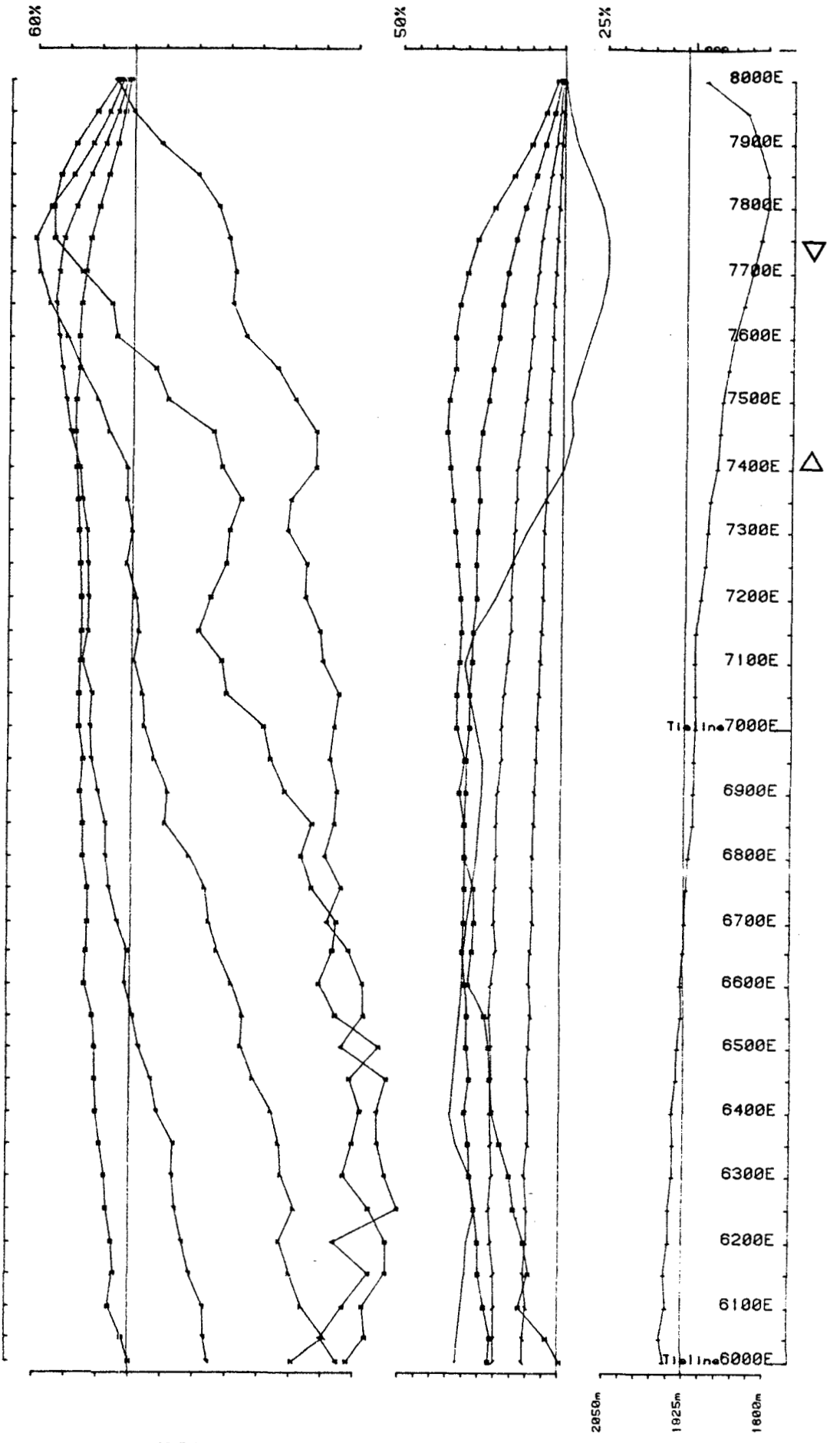
D.S. 3




Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974

Loopno 5 Line 7000N component Hz secondary primary field normalized Ch I reduced

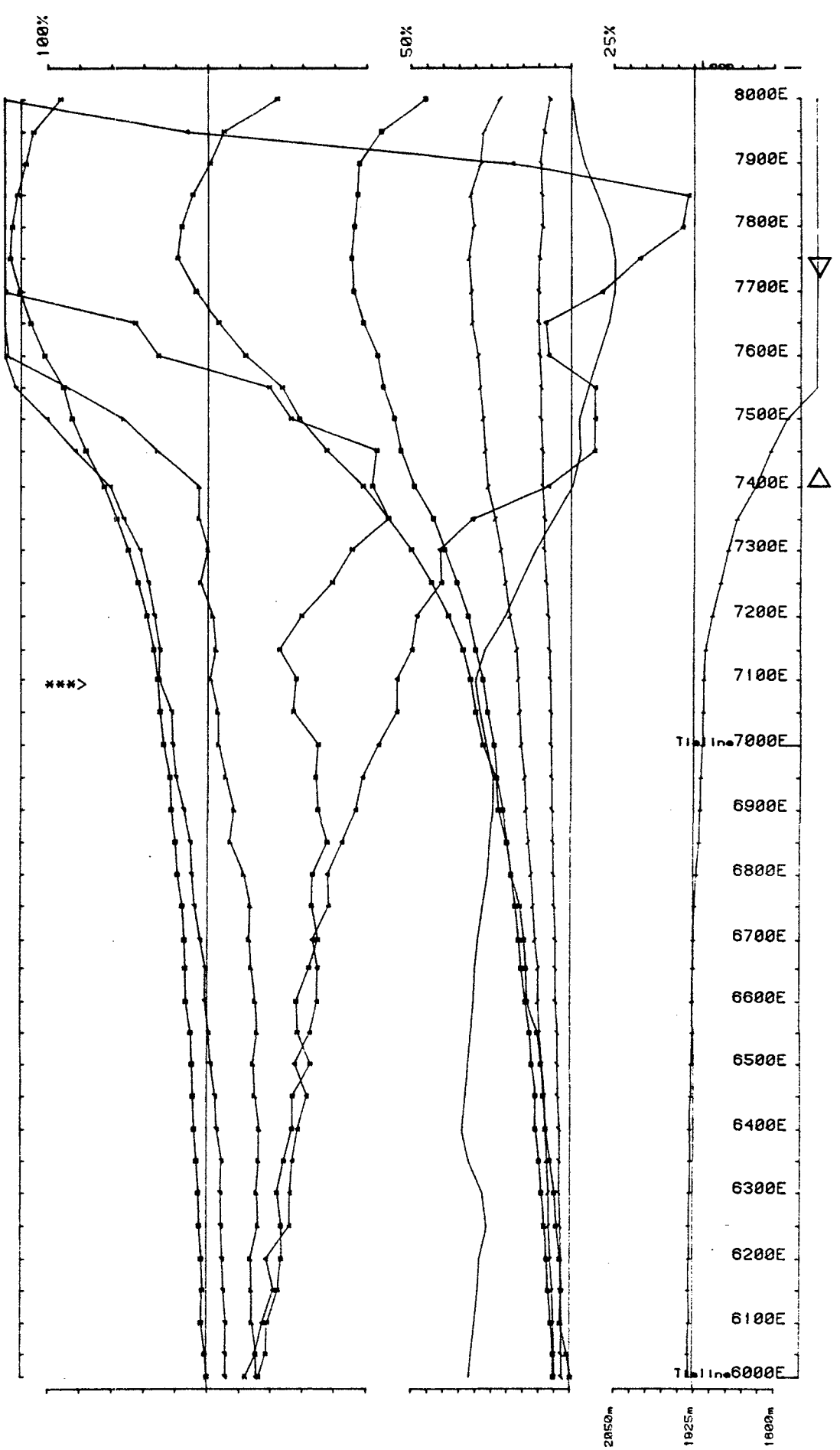
D.S. 3a




Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974

Loopno 5 Line 7500N component Hz secondary Ch I normalized Ch I reduced

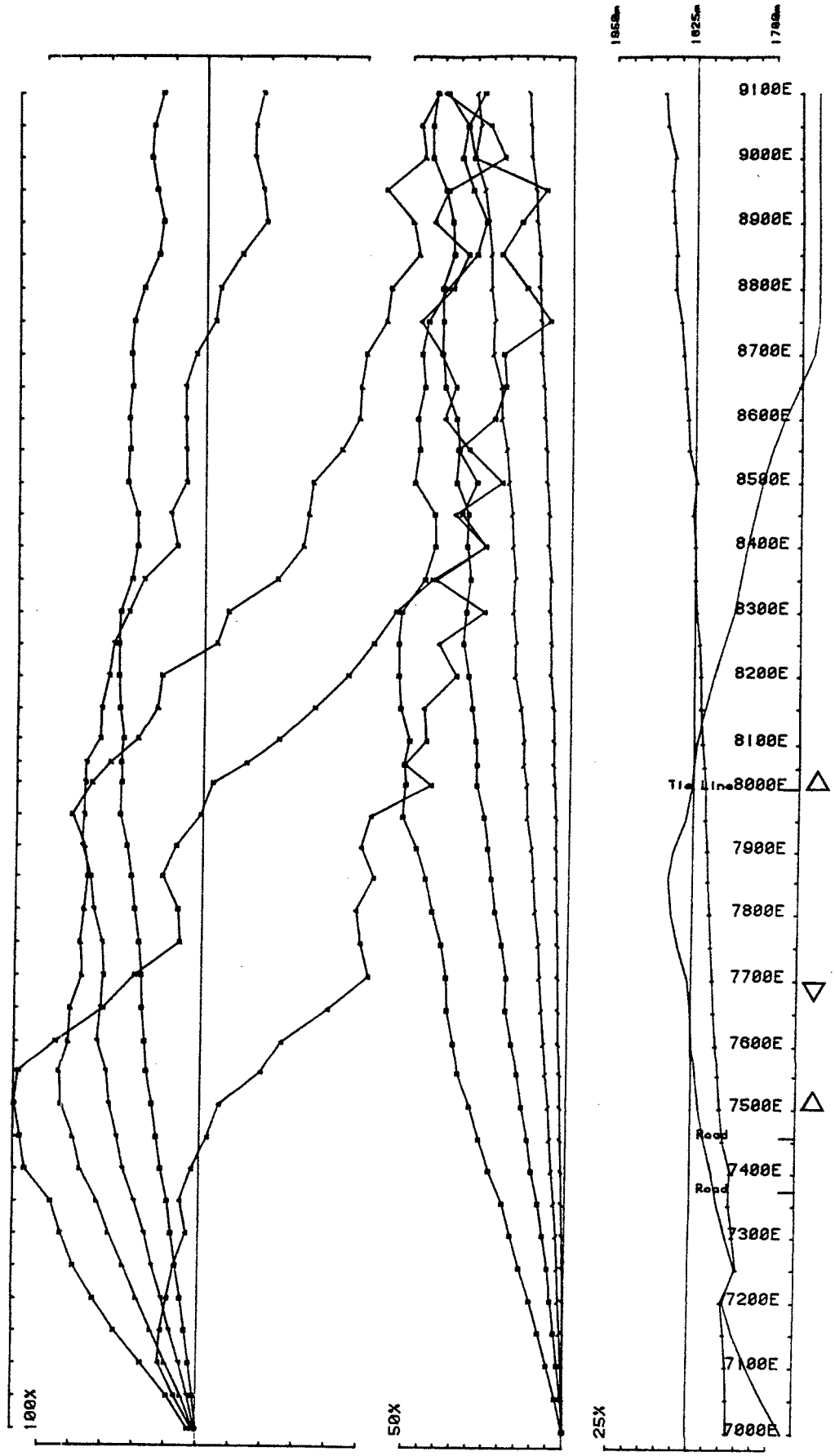
D.S. 4




Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974

Loopno 5 Line 7500N component Hz secondary Ch 1 normalized Ch 1 reduced

D.S. 4a




Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974

Loopno 6 Line 8000N component Hz secondary Ch I normalized Ch I reduced

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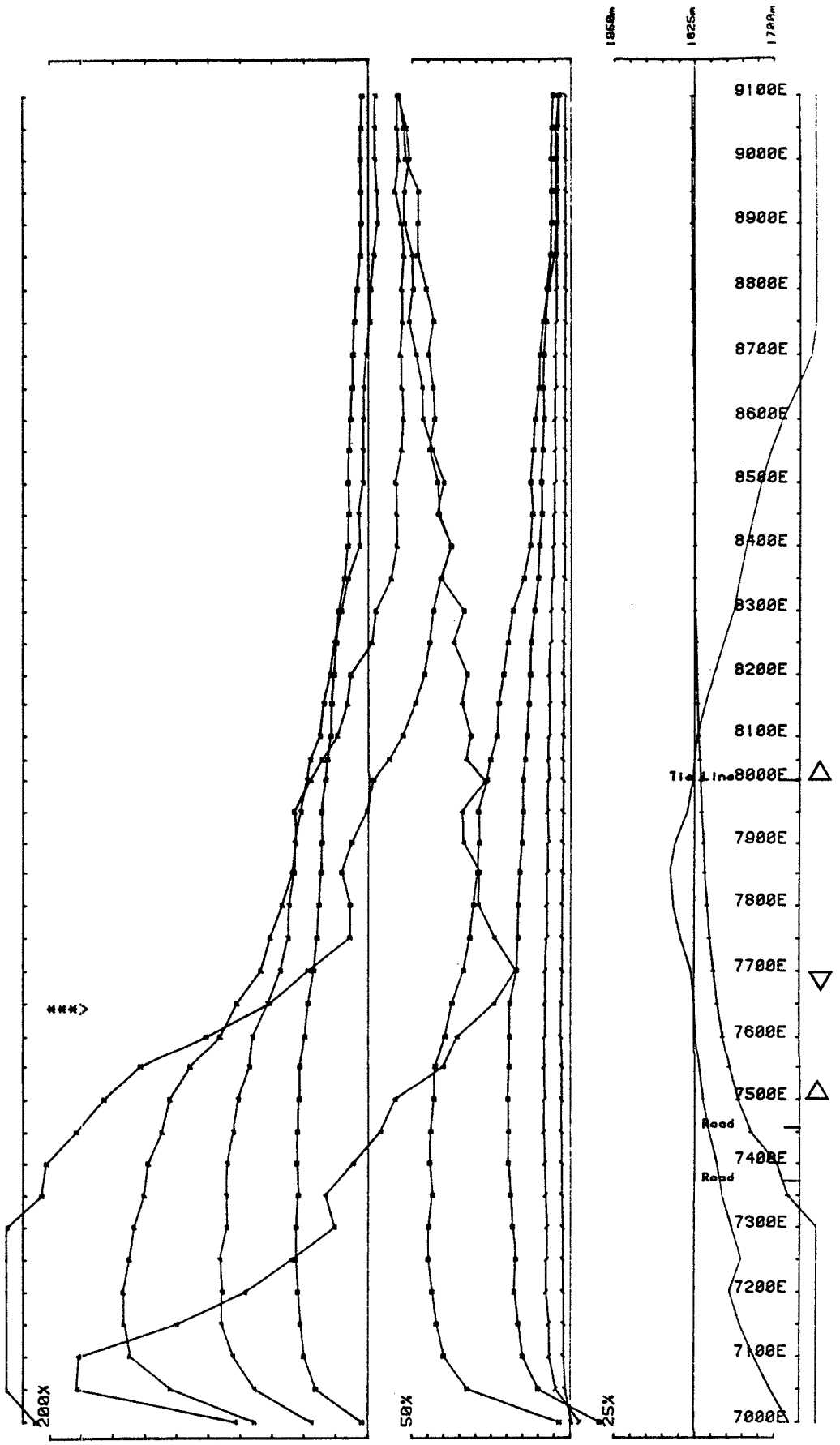


Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974

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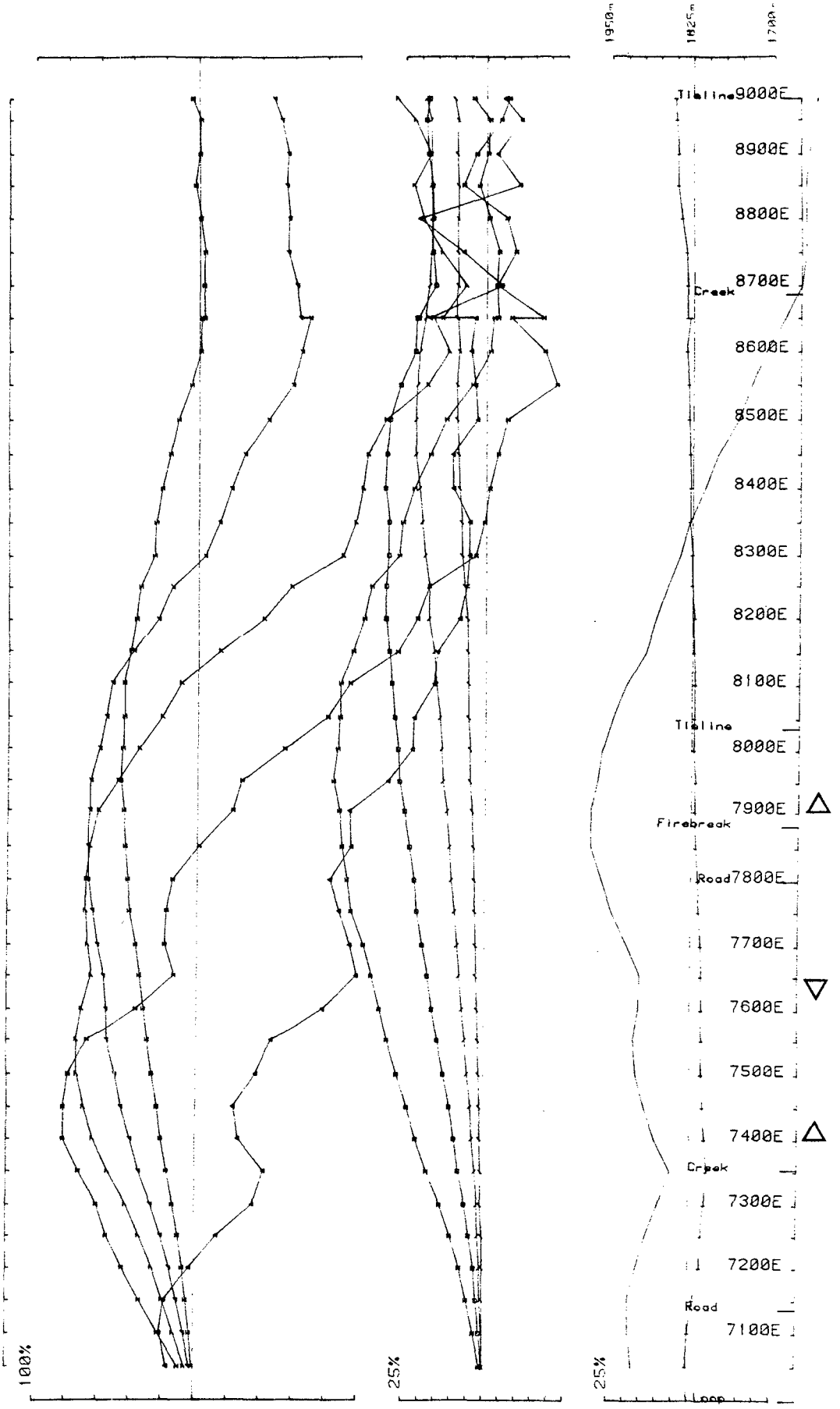
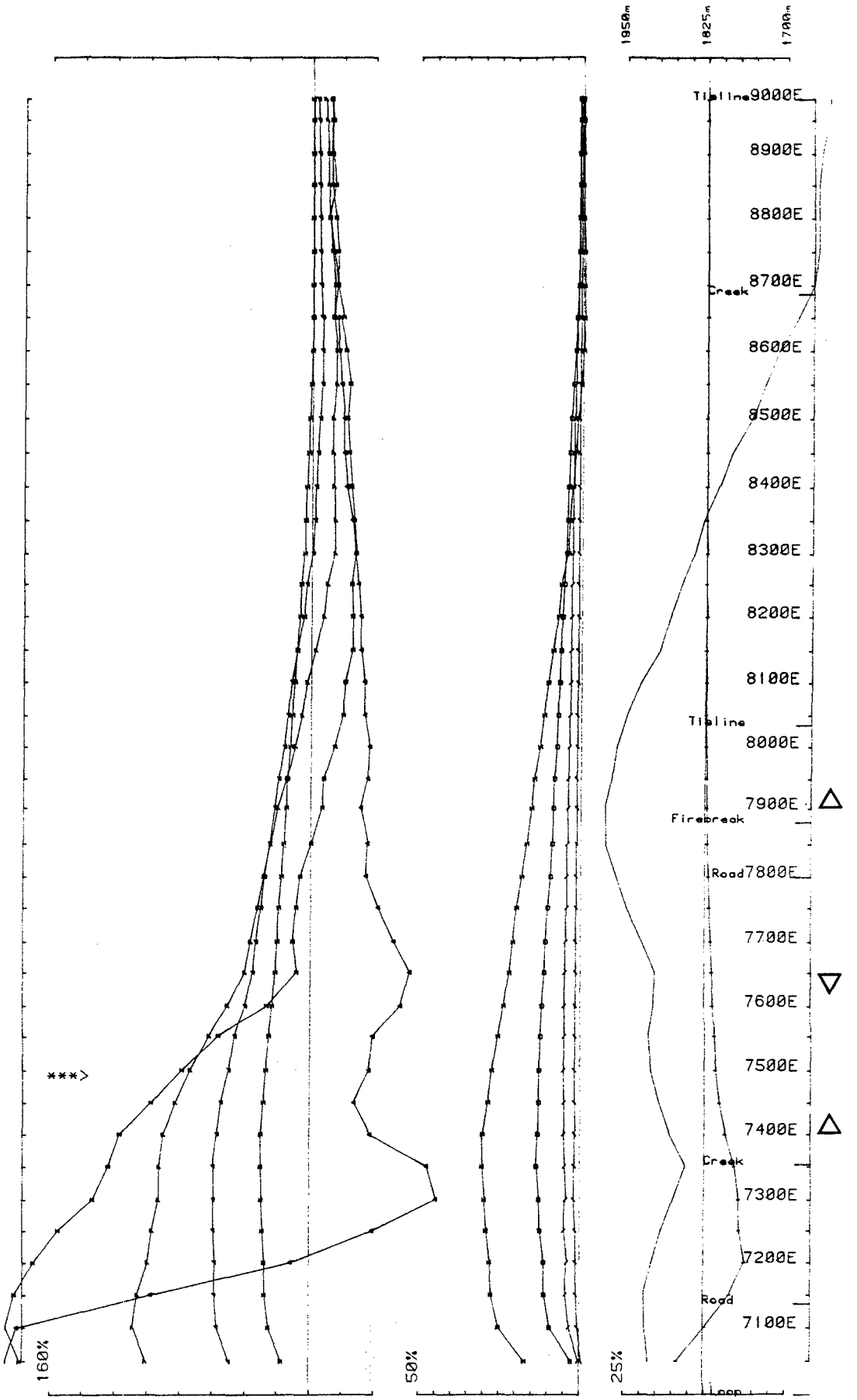
D.S. 5a




Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974

Loopno 6 Line 6500N component Hz secondary Ch 1 normalized Ch 1 reduced

D.S. 6




Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974

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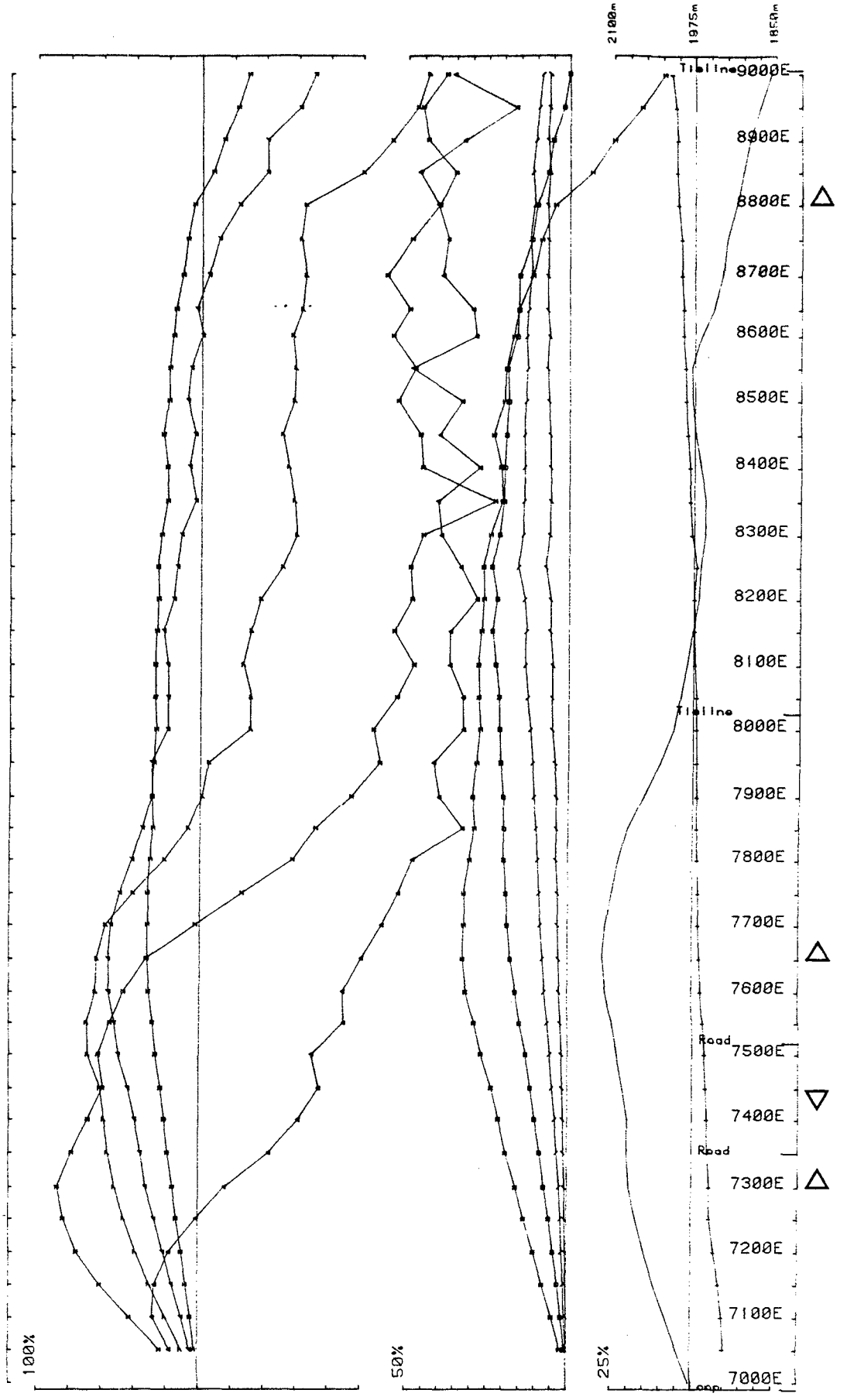
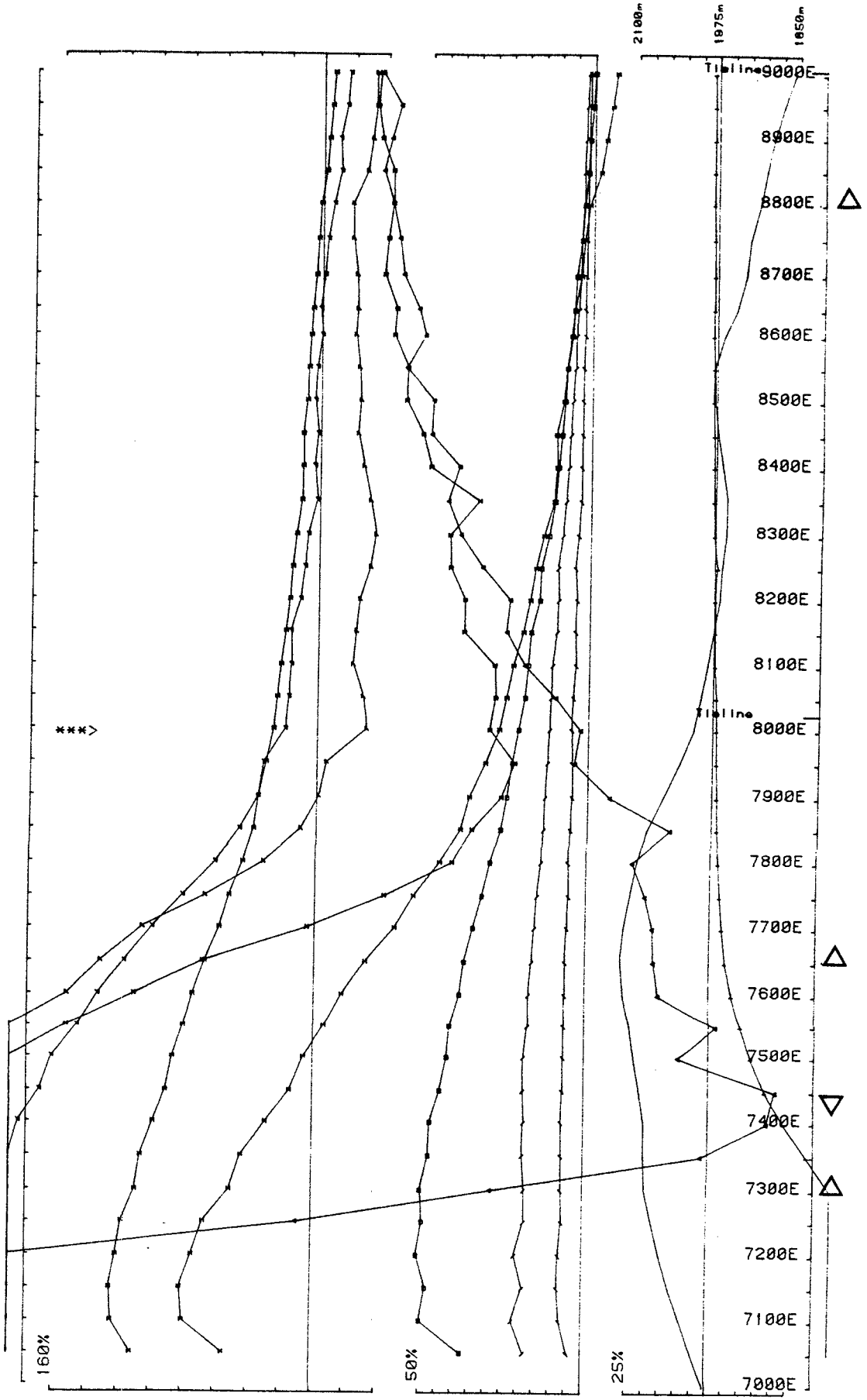
D.S. 6a




Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974

Loopno 6 Line 7000N component Hz secondary Ch I normalized Ch I reduced

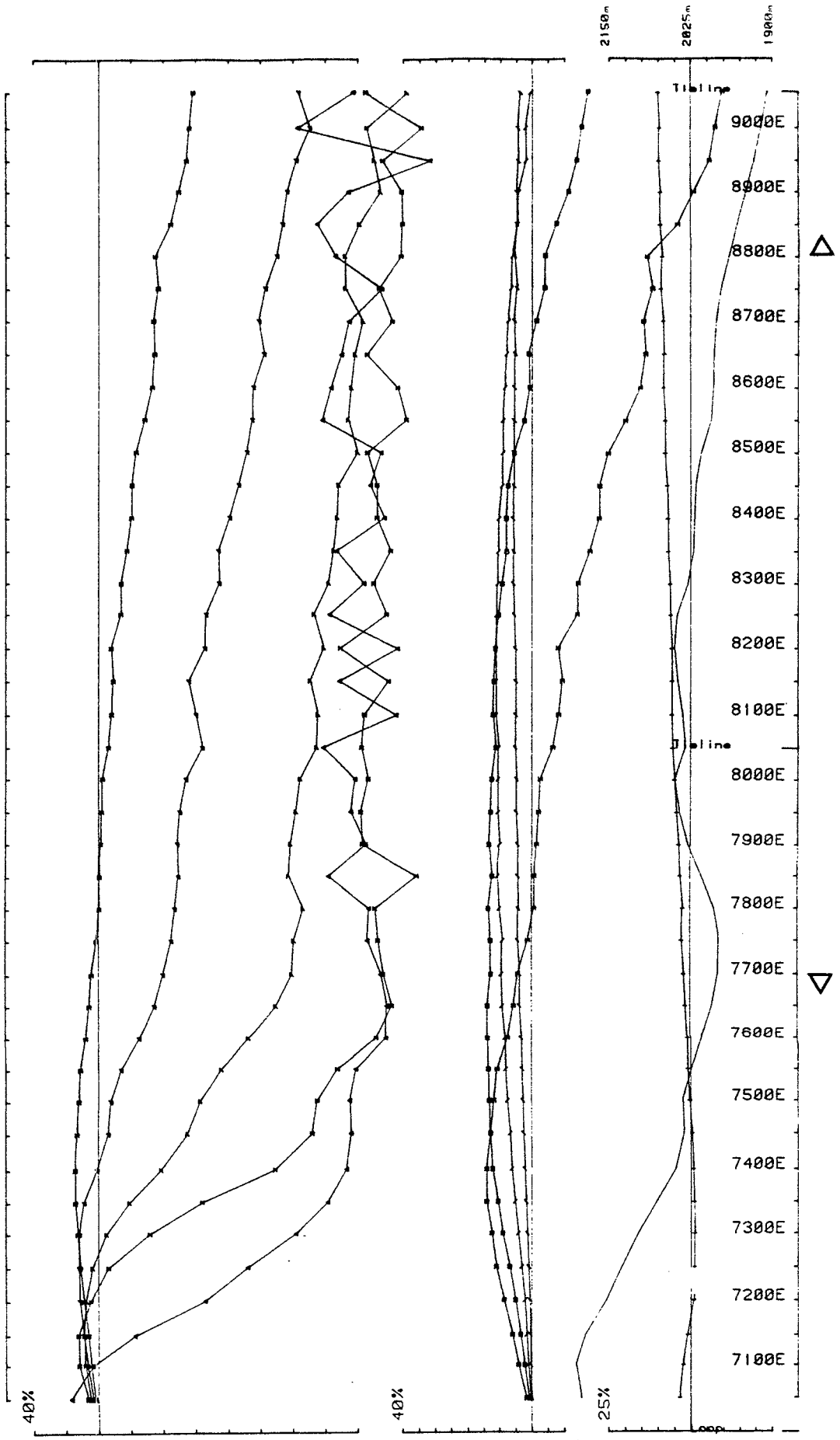
D.S. 7




Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974

Loopno 6 Line 7000N component Hz secondary Ch I normalized Ch I reduced

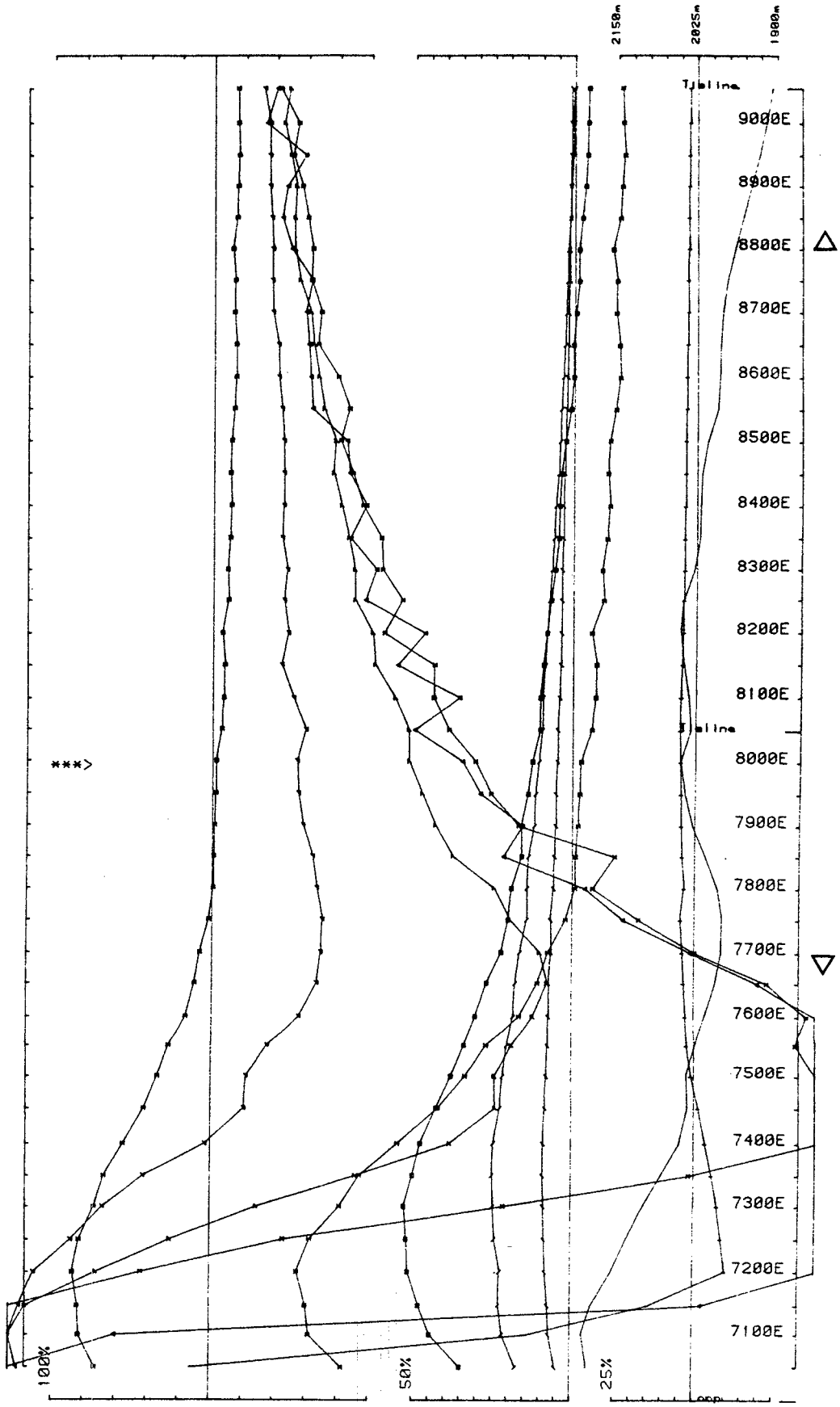
D.S. 7a




Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974

Loopno 6 Line 7500N component Hz secondary Ch I normalized Ch I reduced

D.S. 8




Area MATTHEW CREEK COMINCO operator IJ JV freq(hz) 30.974
Loopno 6 Line 7500N component Hz secondary Ch I normalized Ch I reduced

D.S. 8a