

REPORT OF SEISMOGRAPH SURVEY  
OF THE  
**ISLAND RIVER AREA**

OF  
NORTHWEST TERRITORIES, CANADA

Abstracted for  
Geo-Science Data Index

Date \_\_\_\_\_

FOR

**THE PURE OIL COMPANY**  
ALCAN PRODUCING DIVISION

CALGARY, ALBERTA



APRIL, 1965

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Geo-Science Data Index

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REPORT OF A SEISMOGRAPH SURVEY

ISLAND RIVER AREA

NORTHWEST TERRITORIES, CANADA

LATITUDE  $60^{\circ}00'$  and  $60^{\circ}40'$

LONGITUDE  $120^{\circ}15'$  and  $121^{\circ}15'$

for

THE PURE OIL COMPANY

ALCAN PRODUCING DIVISION

CALGARY, ALBERTA

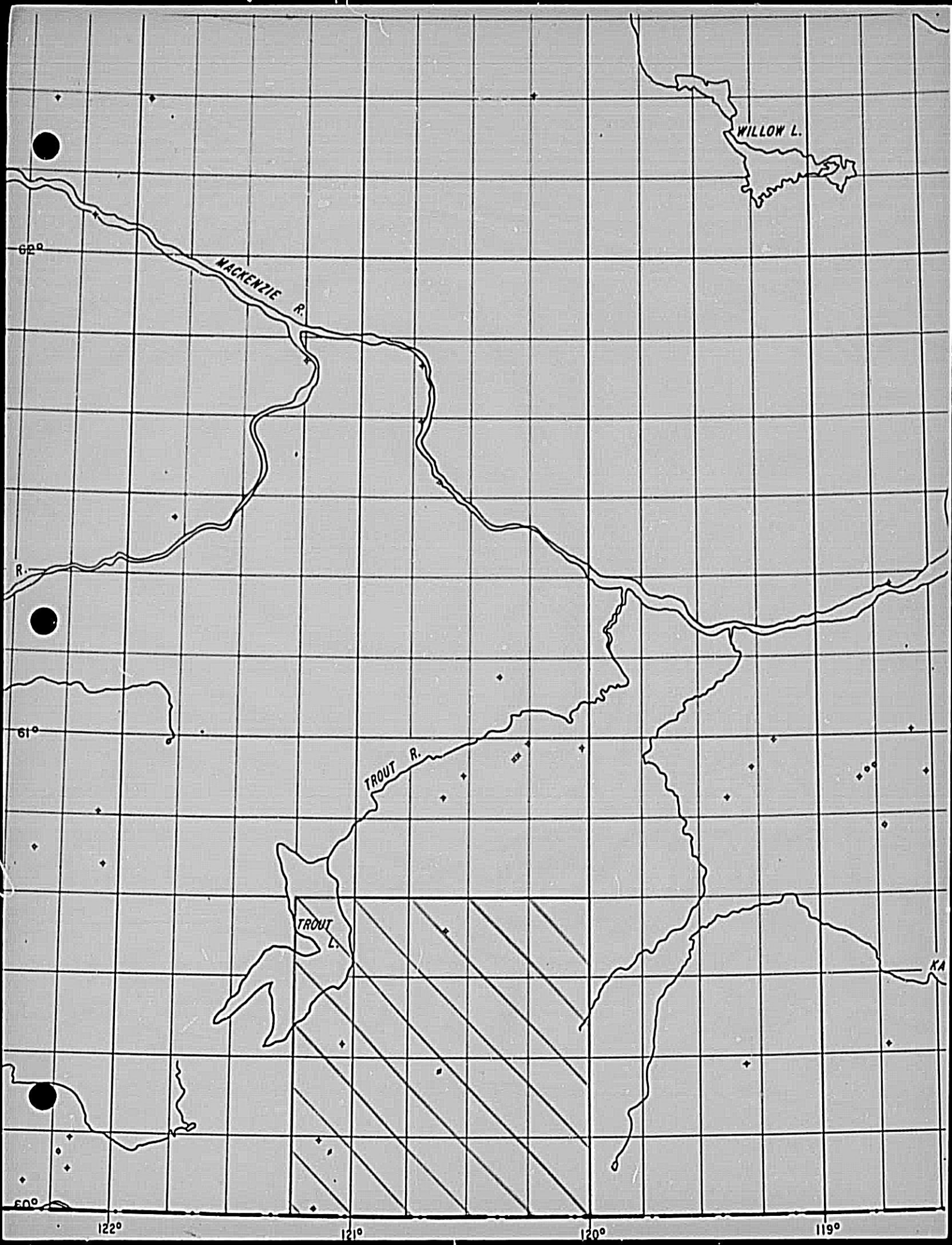
Submitted by:

SEISMOTECH 64 LTD, PARTY 91

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JANUARY 27 to APRIL 6, 1965





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### LIST OF ILLUSTRATIONS

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## I SUMMARY AND CONCLUSIONS

### A. Island River South

Two known Slave Point reef edges were examined in this area. It is the writer's opinion that both edges represent the main Slave Point Carbonate Front<sup>1</sup> separated by a shale tongue extending south-east, likely beyond the map area (see Slave Point Horizon Map).

The first segment of the front courses north-northwest to south-southeast through the east-central portion of the map area with the up-side of the edge to the east. A favorable well (C-39 Trainor Lake) was drilled jointly by The Pure Oil Company and Pan American Petroleum Corporation in section 39, P2698<sup>2</sup> near the north border of the area. Of main interest is a Slave Point high or crest starting at the lower centre of P2706 and extending north to the border of this permit. A maximum reversal of 0.014 seconds to the east of the up-side is noted. This feature is supported by the Mississippian-to-Slave-Point and Utahn-to-Slave-Point isochron maps. An extension of this crest to the C-39 Trainor Lake Well is possible, based mainly on the isochron maps, but is not as clearly evident on the Slave Point structure map.

A change in direction of strike is noted in the southeast portion of the area. This is clearly evident on the Utahn map, but

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<sup>1</sup> Geological History of Western Canada - A. S. P. G.

<sup>2</sup> Permit or parcel number system noted on maps.

is masked by the steep edge on the Slave Point map. It is believed that the regional reference plane used is the main influence in this strike direction change.

The second frontal segment lies in the west portion of the map area coursing north-northeast to south-southwest. The up-side of this edge lies to the west, in direct contrast to the aforementioned feature. A prominent crest extending the complete length of the program has been distinctly mapped. The maximum Slave Point high plus Mississippian-to-Slave-Point and Utahn-to-Slave-Point thinning is reached in sections 29 and 30, P2709. A reversal of up to 0.021 seconds is reached to the west side of the crest. All isochron maps involving the Slave Point horizon definitely support the crest evidence.

A correlation of reflections between both edges is apparently satisfactory.

#### B. Island River North

The program in this area depicts the north-northwest continuation of the east front found in the Island River South area to the north-central portion where it then swings northwest. A progression of the crest at C-39 Trainor Lake Well to the proximity of the centre of P2690 is possible. East reversal of 0.014 seconds in sections 31 and 42 and 0.020 seconds in section 47 is noted. This feature is supported by a thin trend on the Utahn-to-Slave-Point map.

Although the results of this survey are supplementary to a previous seismic reconnaissance, they delineate several prospective drilling locations.



## II INTRODUCTION

Two adjoining areas, Island River North and Island River South constitute this project. The combined Island River area lies between latitudes  $60^{\circ}00'$  and  $60^{\circ}40'$  and longitudes  $120^{\circ}15'$  and  $121^{\circ}15'$  in the Northwest Territories of Canada.

The area is accessible from Fort Nelson, British Columbia, via the Simpson Trail to the Northwest Territories border, and approximately 54 miles east along the border to the southeast corner of the South area.

All locations for the purpose of this report will be referred to a permit or parcel number noted on the maps. It is believed that there is no relationship between these numbers and any geodetic numbering system.

Seismotech 64 Ltd. Field Party No. 91 was engaged by The Pure Oil Company to carry out the reflection survey. A total of 430 split-continuous profiles and 468 long refraction profiles, representing 200 miles of sub-surface coverage, were recorded between January 27 and April 6, 1965.

Extremely rough muskeg trails necessitating long drive time somewhat curtailed production. An extra shooter was engaged on March 15th to pre-load holes which were caving due to gravel conditions. The end hole of each spread was shot for further weathering control.

Four campsites were established during the survey to reduce driving time to a minimum.

Interpretation was conducted at Seismotech 64 Ltd. offices in Calgary, Alberta.

### III - GEOLOGY

Pure - Pan Am Trainor Lake C-39 Well

Elevation Datum: plus 2051 Feet

Correction Velocity: 5800 feet per second

<u>Formation</u>	<u>Depth below log datum</u>	<u>Two way travel time below log datum</u>
Mississippian	1876	0.425
Kotcho (Top Devonian)	2718	0.602
Utahn	4238	0.831
Slave Point	6076	1.140
Pre-Cambrian	7110	1.254



#### IV ATTACHMENTS

##### Island River South Area

###### A. Structure Maps

1. Utahn (T)
2. Slave Point (X)

###### B. Isochron Maps

1. Mississippian to Slave Point (K-X)
2. Devonian to Utahn (D-T)
3. Utahn to Slave Point (T-X)

###### C. Other Maps

1. Surface Topography
2.  $\Delta T$  Corrections
3. Access Roads, etc.
4. Shot point locations.

##### Island River North Area

Same complement of maps as above.

## V PROCEDURES

### A. Survey Objective

The program was laid out in such a fashion that the majority of lines traversed a Slave Point edge established in the area by previous surveys. The prime purpose of the survey was to further define this edge and exploit any possibilities of a barrier crest along the edge.

### B. Reflections Carried

1. Mississippian (K)
2. Top of Devonian (D)
3. Utahn (T)
4. Slave Point (X)

Reflection identifications were supplied by The Pure Oil Company from previous surveys in the area.

### C. Computing Procedure

It was established that the best data for the enclosed maps could be achieved by the use of the two layer computation method. A careful examination was given to both the two layer and three layer weathering corrections which were calculated over the entire area. Both methods were laid out in a letter of instructions from The Pure Oil Company.

The two layer computations were based on plots of the half-mile spreads utilizing average velocities of 6000 and 7200 feet per second. A 7200 foot per second breakover was estimated where none existed, approximately over one-third of the area.



Some irregularities occurred in the two layer system, due primarily to the necessity of estimating the  $D_1$  time between control points.

Plots from the long refraction spreads (one-mile spreads) were used for the three layer computations. Upon examination of the long refraction plots the 7200 foot per second layer in some cases was found to be erroneous, therefore, the three layer problem became a two layer problem using average velocities of 6000 and 9000 feet per second. Where an actual three layer problem did exist average velocities of 6000, 7200 and 9000 feet per second were used, but in all cases the two layer depths and computations were used for the three layer calculations.

In some cases it was difficult to make the  $\Delta T$  corrections the same at tie points, since two and three layer cases occurred at the same locations from different directions. It is believed that this is partly due to the length of spread, since the travel path did not have to follow under the line of geophones presumed in the computation. The tie point  $\Delta T$ 's were adjusted to the most logical fit.

#### D. Record Sectioning Procedure

Variable density Galvanometer record sections are being prepared from magnetic tapes by Magnettrace Services Ltd. in Calgary.

Static corrections were executed by Seismotech 64 Ltd. by flattening the Utahn event to a record section time of 0.900 seconds. A normal move out curve was prepared by Magnettrace Services Ltd. from a sonic log of the Pure - Pan Am Trainor Lake C-39 Well. The interpretation of these sections is not included in this report.

A considerable amount of experimentation was carried out by Seismotech, but it was established that our moveout control was inadequate for this area.



## VI DISCUSSION OF RESULTS

### A: Island River South

#### 1. Utahn Horizon

A maximum of 0.070 second of dip is noted on the east program. A portion of this dip is probably regional but a large percentage can be directly attributed to drape over the Slave Point edge. As mentioned earlier in this report, strike direction has been greatly influenced by the use of a regional reference plane.

Regional dip has cancelled a majority of drape on the west edge, but an indication of dip is still evident. Of great importance is a high feature built up directly above the Slave Point crest.

The Utahn reflection is to be considered the most reliable in the area, maintaining good character throughout. Lines M and H are the only exceptions where record quality is poor.

#### 2. Slave Point Horizon

A clear definition of the Slave Point Carbonate Front has been achieved. It is possible that a crest exists on the east program running along the length of the edge starting at the C-39 Trainor Lake Well and extending south beyond the map boundary. A total of 0.014 seconds of reversal at the south-central portion of the area, and 0.030 seconds at the well is noted. Reversal along the north-central section of the edge may be obscured by a computation

method which may not be totally suited for the weathering conditions in the immediate area.

The Slave Point crest is indicated as a distinct continuous feature on the western reef front with a maximum of 0.021 seconds of reversal.

Quality of the Slave Point reflection ranged from good to poor. A strong character was maintained on the high-side of the edge, but was distorted at the transitional and off-side.

It is suspected that multiples exist in the near vicinity of the Slave Point reflection. Although all the record sections were not prepared to the time of this report it is believed that the multiples were not strong enough to disturb the Slave Point reflection.

3. Utahn to Slave Point Isochron

Both crests are clearly defined by this map.

4. Top of Devonian to Utahn Isochron

Thick data influenced by Utahn drape, is noted on the off-side of the east edge with a slight thinning noted along the crest. A slight amount of thinning can also be seen along the west crest.

Character of the Devonian reflector is good and quality is equal to that of the other events.

5. Mississippian to Slave Point Isochron

The Mississippian to Slave Point map is similar to the Utahn-to-Slave Point. Unlike the Utahn, the Mississippian horizon, likely due to peneplaining, does not show drape over the Slave



point edge and as a result, this map more clearly defines the edge and crest.

Reflection character ranges from fair to good.

B. Island River North

1. Utahn Horizon

Low data is observed on the down-side of the edge. An indication of a high trend can be seen along the crest.

Character is reliable where record quality is good. Record quality of lines Y, X and AA deteriorated, but records improved progressively to the north.

2. Slave Point Horizon

A crest formation, supported by a fair amount of reversal is indicated along the lower half of the program.

Reflection character was good on the high-side of the edge, but was distorted at the transitional and off-side.

3. Utahn to Slave Point Isochron

This map supports the Slave Point crest indication.

4. Top of Devonian to Utahn Isochron

Thick data, influenced by Utahn drape, is noted on the off-side of the edge.

Character strength ranged from fair to good.

5. Mississippian to Slave Point Isochron

This map is similar to the Utahn to Slave Point map with the exception being at the extreme south end of the program where no anomolous feature can be seen.

Reflection character was generally fair.

## VII RECOMMENDATIONS

Among other prospective drilling locations along the crests of both reef fronts, we respectfully recommend that the observed maximum build-ups of reef in Section 30, P2709 and Sections 59 and 70, P2706 be considered firstly. It is advisable that the data of this survey be incorporated with that of previously available results.



## VIII APPENDIX

### A. Statistical Report

1. Commencement date of work: January 27, 1965
2. Date of completion: April 6, 1965
3. (a) Field recording time: 655 $\frac{1}{4}$  hrs.  
(b) Travel time: 160 $\frac{3}{4}$  hrs.  
(c) Total crew hours: 816 hrs.  
(d) Pre-load time: 143 $\frac{1}{2}$  hrs.
4. (a) Number of locations recorded as split profiles: 430  
(b) Number of locations recorded as weathering profiles: 468
5. (a) Number of shots taken: 1317  
(b) Average number of shots per location: 1.97  
(c) Total dynamite used: 4845 11/16 lbs.  
(d) Average dynamite per shot: 3.68 lbs.
6. Number of locations recorded per 10 hr. day: 6.56 split profile locations  
: 7.14 weathering profile locations
7. Total miles of subsurface coverage obtained: 200 miles
8. Miles at subsurface coverage per 10 hour day: 3.06 miles
9. Drill #1 (Pattern) (a) Field time: 550 $\frac{3}{4}$  hrs.  
(b) Travel time: 279 $\frac{1}{4}$  hrs.  
(c) Total time: 830 hrs.  
(d) Total footage: 31,528 ft.  
(e) Footage per 10 hour day: 379.86 ft.
- Drill #2 (Sando-Murray) (a) Field Time: 240 $\frac{1}{4}$  hrs.  
(b) Travel time: 148 $\frac{1}{4}$  hrs.  
(c) Total time: 388 $\frac{1}{2}$  hrs.  
(d) Total footage: 12,507 ft.  
(e) Footage per 10 hour day: 321.93 ft.
- Drill #3 (Becker) (a) Field time: 433 $\frac{1}{4}$  hrs.  
(b) Travel time: 234 $\frac{1}{4}$  hrs.  
(c) Total time: 668 hrs.  
(d) Total footage: 17,462 ft.  
(e) Footage per 10 hour day: 261.41 ft.

10. Dozing: Dozer #2 Total hours: 1653 hrs.  
Dozer #3 Total hours: 1657 hrs.  
Dozer #4 Total hours: 1037½ hrs.  
Drag Total hours: 1052½ hrs.
11. (a) Maximum surface elevation: 2409 ft.  
(b) Minimum surface elevation: 1803 ft.



B. Field Equipment and Technique

1. 24 trace SIE modified GA-11 amplifiers.  
27 channel ETL DS7 tape recorder and playback.
2. EVS-2, 28 cps geophones, 9 per trace spaced at 14 foot intervals.
3. 2640 foot spreads, 220 foot intervals.
4. Three hole patterns spaced at 75 feet.
5. Average hole depth: 35 to 40 feet x 3.  
Average charge: 1/8 to 1 1/4 pound x 3.
6. Recording Procedure:
  - (a) Lines A to AF: Monitor - 0-92, straight, fast AGC, 100% gain.  
Playback - 1-20-64, straight, fast AGC, 100% gain.  
Lines AG to AT: Monitor - 0-64, straight, fast AGC, 80% gain.  
Playback - 0-42, straight, fast AGC, 100% gain.
  - (b) Roll-along procedure was attempted at Shot Point AGI, but was abandoned due to gravel drilling conditions.
7. Survey Procedure
  - (a) Gurly transit and chain
  - (b) Take-off control:
    1. B.C. - N.W.T. Boundary monument #111
    2. N.E.C. Sec. 36, Twp. 132, Rge. 16, W6M
    3. Western Geophysical, United Geophysical and E.C.I.  
shot points.
    4. Polaris star shot
  - (c) A majority of the lines were adjusted on the base map in order to tie the previous surveys. A Shot Point Location Map based on geodetic bench marks and a shot on Polaris is being submitted with this report. The survey closes satisfactorily within the limits of this current project.

C. Subcontracted Equipment and Services

<u>Services</u>	<u>Name</u>	<u>Address</u>	<u>Evaluation</u>
Drill	Pattern Drilling	Calgary, Alberta	Excellent
Drill	Sando-Murray Drilling	Calgary, Alberta	Excellent
Drill	Becker Drilling	Calgary, Alberta	Satisfactory
Bulldozers	L. I. Adams Contractors	Grande Prairie, Alta.	Excellent
Camp and Supply	ATCO	Calgary, Alberta	Satisfactory
Supply	Northern Air Services Ltd.	Ft. Nelson, B.C.	Excellent



D. SHOT HOLE DRILL LOGS:

S.P. A-1 0'-2' muskeg, 2'-50' clay & rocks  
A-2 0'-25' brown clay, 25'-50' blue clay & rocks  
A-3 0'-10' muskeg, 10'-50' clay & boulders  
A-4 0'-2' muskeg, 2'-50' clay & rocks  
A-5 0'-15' brown clay & rocks, 15'-50' blue clay & rocks  
A-6 0'-5' muskeg, 5'-50' clay & boulders  
A-7 0'-2' muskeg, 2'-50' clay & boulders  
A-8 0'-20' brown clay & rocks, 20'-50' blue clay & rocks  
A-9 0'-3' muskeg, 3'-50' clay & rocks  
A-10 0'-1' muskeg, 1'-50' clay & rocks  
A-11 0'-3' muskeg, 3'-50' gravel, clay & boulders  
A-12 1'-3' muskeg, 3'-40' gravel, clay & boulders  
S.P. A-13 0'-25' brown clay & rocks, 25'-50' blue clay & rocks  
  
S.P. B-1 0'-1' muskeg, 1'-50' clay & boulders  
B-2 0'-3' muskeg, 3'-50' clay & boulders  
B-3 0'-10' brown clay & rocks, 10'-50' blue clay & rocks  
B-4 0'-2' muskeg, 2'-50' clay & boulders  
B-5 0'-3' muskeg, 3'-50' clay & rocks  
B-6 0'-15' brown clay & rocks, 15'-50' blue clay & rocks  
B-7 0'-2' muskeg, 2'-50' clay & rocks  
B-8 0'-2' muskeg, 2'-50' clay & boulders  
B-9 0'-2' muskeg, 2'-27' clay, boulders, & sandstone  
B-10 0'-2' muskeg, 2'-50' clay & rocks  
B-11 0'-10' brown clay & rocks, 10'-40' blue clay & rocks,  
40'-50' gravel  
S.P. B-12 0'-10' brown clay & rocks, 10'-30' blue clay & rocks,  
30'-50' gravel  
  
S.P. C-1 0'-3' muskeg, 3'-50' clay & rocks  
C-2 0'-3' muskeg, 3'-50' clay & rocks  
C-3 0'-50' clay & rocks  
C-4 0'-10' muskeg, 10'-50' clay & boulders

C-5 0'-5' muskeg, 5'-50' clay & boulders  
 C-6 0'-3' muskeg, 3'-50' clay & boulders  
 C-7 0'-50' sand, clay & boulders  
 C-8 0'-40' clay & rocks  
 C-9 0'-10' muskeg, 10'-50' clay & boulders  
 C-10 0'-15' muskeg, 15'-50' clay & boulders  
 C-11 0'-6' muskeg, 6'-50' rocks & clay  
 C-12 0'-3' muskeg, 3'-50' sand, clay & boulders  
 C-13 0'-12' muskeg, 12'-50' clay & rocks  
 S.P. C-14 0'-18' muskeg, 18'-50' clay & rocks

S.P. D-1 0'-5' muskeg, 3'-50' clay & rocks  
 D-2 0'-4' muskeg, 4'-39' clay & rocks  
 D-3 0'-4' muskeg, 4'-50' clay & rocks  
 D-4 0'-50' clay & rocks  
 D-5 0'-50' clay & rocks  
 D-6 0'-4' muskeg, 4'-12' sand & gravel, 12'-50' clay & rocks  
 D-7 0'-41' sand & gravel  
 S.P. D-8 0'-3' muskeg, 3'-28' sand & rocks, 28'-50' clay & rocks

S.P. E-1 0'-50' clay & rocks  
 E-2 0'-50' clay & rocks  
 E-3 0'-5' clay & rocks  
 E-4 0'-10' brown clay & rocks, 10'-50' blue clay & rocks  
 E-5 0'-10' brown clay & rocks, 10'-35' blue clay & rocks  
 35'-50' blue clay & gravel  
 S.P. E-6 0'-5' brown clay, 5'-15' pea gravel, 13'-35' blue clay &  
 boulder, 35'-50' blue clay & gravel

S.P. F-1 0'-3' muskeg, 3'-50' clay & rocks  
 F-2 0'-3' muskeg, 3'-50' clay & rocks  
 F-3 0'-4' muskeg, 4'-50' clay & rocks  
 F-4 0'-6' muskeg, 6'-50' clay & rocks  
 F-5 0'-4' muskeg, 4'-50' clay & rocks  
 F-6 0'-15' brown clay & rocks, 15'-50' blue clay & rocks  
 F-7 0'-10' brown clay & boulders, 10'-50' blue clay & rocks



S.P.	F-8	0'-15' brown clay & boulders, 15'-30' blue clay & seams of sand.
S.P.	G-1	0'-3' muskeg, 3'-38' clay & rocks
	G-2	0'-5' muskeg, 5'-40' clay & rocks
	G-3	0'-50' clay & rocks
	G-4	0'-10' brown clay & rocks, 10'-40' blue clay & rocks, gravel at 45'
	G-5	0'-15' brown clay & granite boulders, 15'-50' blue clay & boulders
	G-6	0'-10' brown clay & boulders, 10'-30' sand & gravel, 30'-50' blue clay & rocks
S.P.	G-7	0'-10' muskeg, 10'-20' brown clay & boulders, 20'-50' blue clay & boulders
S.P.	H-1	0'-5' muskeg, 5'-40' clay & rocks
	H-2	0'-6' muskeg, 6'-38' clay & rocks
	H-3	0'-8' muskeg, 8'-50' clay & boulders
	H-4	0'-15' muskeg, 15'-50' clay & boulders & gravel
	H-5	0'-10' permafrost, 10'-50' blue clay & boulders
	H-6	0'-8' muskeg, 8'-50' clay & boulders
	H-7	0'-6' muskeg, 6'-50' clay & rocks
	H-8	0'-8' muskeg, 8'-50' clay & rocks
	H-9	0'-8' muskeg, 8'-15' brown clay & rocks, 15'-50' blue clay & rocks
	H-10	0'-15' muskeg, 15'-40' clay, boulders & sandstone
	H-11	0'-18' muskeg, 18'-50' clay & boulders
	H-12	0'-10' muskeg, 10'-50' sand, blue clay & rocks
S.P.	H-13	0'-22' muskeg, 22'-40' clay & rocks
S.P.	I-1	0'-50' clay & rocks
	I-2	0'-15' permafrost, 15'-50' blue clay & gravel seams
	I-3	0'-41' clay & rocks
	I-4	0'-2' muskeg, 2'-36' clay & rocks
	I-5	0'-15' brown clay & rocks, 15'-50' blue clay & gravel seams
	I-6	0'-25' permafrost, 25'-50' blue clay & rocks
	I-7	0'-4' muskeg, 4'-50' clay & rocks
	I-8	0'-6' muskeg, 6'-50' clay & rocks

I-9	0'-8' permafrost, 8'-20' brown clay & rocks, 20'-50' blue clay & rocks
I-10	0'-20' brown clay & boulders, 20'-50' blue clay & boulders
S.P. I-11	0'-15' muskeg, 15'-50' clay & rocks
S.P. J-1	0'-10' permafrost, 10'-20' blue clay & boulders, 20'-50' blue clay & gravel
J-2	0'-13' sand & rocks, 13'-50' clay & rocks
J-3	0'-50' clay & boulders
J-4	0'-20' muskeg, 20'-50' blue clay & boulders
J-5	0'-8' muskeg, 8'-50' clay & rocks
J-6	0'-12' muskeg, 12'-47' clay, boulders & gravel
J-7	0'-14' muskeg, 14'-50' clay & rocks
S.P. J-8	0'-10' muskeg, 10'-50' clay & boulders
S.P. K-1	0'-10' brown clay & boulders, 10'-50' blue clay & rocks
K-2	0'-50' clay & boulders
K-3	0'-3' muskeg, 3'-50' clay & rocks
K-4	0'-50' clay & rocks
K-5	0'-9' muskeg, 9'-50' clay & boulders
K-6	0'-15' brown clay & rocks, 15'-50' blue clay & rocks
S.P. K-7	0'-15' muskeg, 15'-27' clay & boulders
S.P. L-1	0'-10' permafrost, 10'-50' blue clay & boulders
L-2	0'-10' brown clay & rocks, 10'-50' blue clay & rocks
L-3	0'-10' brown clay & rocks, 10'-50' blue clay & rocks
L-4	0'-40' clay & rocks
L-5	0'-50' clay & boulders
L-6	0'-2' muskeg, 2'-40' clay, boulders & sand
L-7	0'-35' clay & rocks
L-8	0'-33' clay & boulders
L-9	0'-15' brown clay & boulders, 15'-50' blue clay & gravel seams
S.P. L-10	0'-50' clay & rocks
S.P. M-1	0'-15' brown clay & large boulders, 15'-50' blue clay & rocks
M-2	0'-40' clay & rocks
M-3	0'-5' muskeg, 5'-10' brown clay, 10'-40' blue clay & rocks
M-4	0'-5' muskeg, 5'-15' pea gravel, 15'-40' blue clay & rocks



	M-5	0'-2' muskeg, 2'-22' clay, boulders & sand
	M-6	0'-5' muskeg, 5'-15' pea gravel, 15'-40' blue clay & rocks
	M-7	0'-50' clay & rocks
S.P.	M-8	0'-50' clay & rocks
S.P.	N-1	0'-5' muskeg, 5'-40' clay & boulders, & sandstone
	N-2	0'-50' clay & rocks
	N-3	0'-3' muskeg, 3'-50' clay & boulders
	N-4	0'-50' clay & rocks
	N-5	0'-2' muskeg, 2'-50' clay & boulders
	N-6	0'-50' clay & rocks
	N-7	0'-35' gravel, clay & boulders
	N-8	0'-15' brown clay & rocks, 15'-40' blue clay & boulders
S.P.	N-9	0'-50' clay & rocks
S.P.	O-1	0'-50' clay & rocks
	O-2	0'-2' muskeg, 2'-50' clay, boulders & sand
	O-3	0'-50' clay & boulders
	O-4	0'-50' clay & rocks
	O-5	0'-32 clay & boulders
	O-6	0'-2' muskeg, 2'-50' clay & boulders
	O-7	0'-3' muskeg, 3'-50' gravel, clay & boulders
	O-8	0'-8' muskeg, 8'-35' sand, clay & boulders
	O-9	0'-45' clay & rocks
	O-10	0'-38' clay & rocks
	O-11	0'-3' muskeg, 3'-50' clay & boulders
S.P.	O-12	0'-10' sand & gravel, 10'-50' clay & rocks
S.P.	P-1	0'-25' clay & rocks, 25'-50' sand
	P-2	0'-24' clay & boulders
	P-3	0'-47' clay, boulders, sand & sandstone
	P-4	0'-50' sand & sandstone ledges
	P-5	0'-50' clay, boulders, sand & sandstone
	P-6	0'-40' clay & rocks
	P-7	0'-32' clay & boulders
	P-8	0'-38' clay & rocks
	P-9	0'-3' muskeg, 3'-50' clay & boulders



	P-10	0'-50' clay & rocks
	P-11	0'-30' clay & boulders
	P-12	0'-2' muskeg, 2'-40' clay & boulders
S.P.	P-13	0'-40' clay & rocks
S.P.	Q-1	0'-50' clay & rocks
	Q-2	0'-50' clay & rocks
	Q-3	0'-50' clay & rocks
	Q-4	0'-50' clay & rocks
	Q-5	0'-50' clay & rocks
	Q-6	0'-50' clay & rocks
	Q-7	0'-50' clay & rocks
	Q-8	0'-14' sand & gravel, 14'-50' clay & rocks
	Q-9	0'-14' sand & gravel, 14'-50' clay & rocks
	Q-10	0'-12' sand & gravel, 12'-50' clay & rocks
	Q-11	0'-12' sand & gravel, 12'-50' clay & rocks
	Q-12	0'-50' clay & rocks
	Q-13	0'-50' clay & rocks
S.P.	Q-14	0'-50' clay & rocks
S.P.	R-1	0'-4' muskeg, 4'-50' gravel, clay & boulders
	R-2	0'-45' sand, clay & boulders
	R-3	0'-10' muskeg, 10'-50' gravel, clay & boulders
	R-4	0'-6' muskeg, 6'-50' clay & rocks
	R-5	0'-18' sand & gravel, 18'-50' clay & rocks
	R-6	0'-10' muskeg, 10'-40' sand
	R-7	0'-15' sand & rocks, 15'-50' clay & rocks
S.P.	R-8	0'-20' sand, 20'-50' clay & rocks
S.P.	S-1	0'-5' muskeg, 5'-50' clay & boulders
	S-2	0'-3' muskeg, 3'-50' clay & boulders
	S-3	0'-18' muskeg, 18'-50' clay & boulders
	S-4	0'-50' clay & rocks
	S-5	0'-12' brown clay & rocks, 12'-50' blue clay & rocks
S.P.	S-6	0'-50' clay & rocks

S.P.	T-1	0'-15' muskeg, 15'-32' sand, clay & boulders
	T-2	0'-15' muskeg, 15'-25' clay & boulders
	T-3	0'-6' gravel, 6'-28' clay & rocks
	T-4	0'-33' clay & rocks
	T-5	0'-12' muskeg, 12'-35' clay & boulders
	T-6	0'-40' clay & rocks
	T-7	0'-8' muskeg, 8'-35' clay & boulders
	T-8	0'-50' clay & rocks
	T-9	0'-6' muskeg, 6'-50' clay & rocks
	T-10	0'-10' brown clay & rocks, 10'-50' blue clay & rocks
	T-11	0'-5' muskeg, 5'-50' clay & rocks
S.P.	T-12	0'-50' clay & rocks
S.P.	T-4A	0'-50' clay & boulders
	U-1	0'-3' muskeg, 3'-37' clay & boulders
	U-2	0'-50' clay & rocks
	U-3	0'-50' clay & rocks
	U-4	0'-2' muskeg, 2'-50' clay & boulders
	U-5	0'-50' clay & rocks
	U-6	0'-5' muskeg, 5'-50' sand, clay & boulders
	U-7	0'-50' clay & boulders
	U-8	0'-50' clay & rocks
	U-9	0'-2' muskeg, 2'-22' clay, boulders & sandstone
S.P.	U-10	0'-50' clay & rocks
S.P.	V-1	0'-50' clay & rocks
	V-2	0'-2' muskeg, 2'-35' clay & rocks
	V-3	0'-50' clay & rocks
	V-4	0'-4' muskeg, 4'-50' sand
	V-5	0'-12' muskeg, 12'-50' clay & rocks
	V-6	0'-50' clay & boulders
	V-7	0'-15' muskeg, 15'-40' clay & boulders
	V-8	0'-18' muskeg, 18'-50' clay & boulders
	V-9	0'-6' muskeg, 6'-50' clay & rocks
	V-10	0'-5' muskeg, 5'-45' clay & boulders



	V-11	0'-50' muskeg, 15'-50' clay & rocks
	V-12	0'-8' muskeg, 8'-50' clay & rocks
	V-13	0'-12' muskeg, 12'-50' clay & boulders
	V-14	0'-20' muskeg, 20'-50' clay & rocks
	V-15	0'-15' muskeg, 15'-50' clay & boulders
S.P.	V-16	0'-16' muskeg, 16'-50' clay & rocks
S.P.	W-1	0'-50' clay & boulders
	W-2	0'-50' clay & rocks
	W-3	0'-2' muskeg, 2'-50' clay & boulders
	W-4	0'-50' clay & boulders
	W-5	0'-50' clay & boulders
	W-5A	0'-40' clay & boulders, 40'-50' sand
S.P.	W-6	0'-50' clay & boulders
S.P.	W-1A	0'-50' clay & rocks
	X-1	0'-2' muskeg, 2'-40' clay & boulders
	X-2	0'-5' muskeg, 5'-25' clay, boulders & sand
	X-3	0'-50' clay & boulders
	X-4	0'-36' clay & rocks
	X-5	0'-50' clay & rocks
	X-6	0'-10' muskeg, 10'-50' clay & boulders
	X-7	0'-50' clay & rocks
	X-8	0'-8' muskeg, 8'-50' clay & boulders
	X-9	0'-34' clay & rocks
	X-10	0'-5' muskeg, 5'-45' clay & boulders
S.P.	X-11	0'-50' clay & rocks
S.P.	Y-1	0'-50' clay & boulders
	Y-2	0'-5' muskeg, 5'-50' clay & boulders
	Y-3	0'-12' muskeg, 12'-50' clay & rocks
	Y-4	0'-50' clay & boulders
	Y-5	0'-8' muskeg, 8'-50' clay & rocks
	Y-6	0'-7' muskeg, 7'-45' clay & boulders
	Y-7	0'-50' clay & rocks
S.P.	Y-8	0'-3' muskeg, 3'-50' gravel, clay & boulders



S.P. AA-6A 0'-15' muskeg, 15'-50' clay & boulders  
 Z-1 0'-16' muskeg, 16'-40' clay & rocks  
 Z-2 0'-20' muskeg, 20'-50' clay & boulders  
 Z-3 0'-45' clay & rocks  
 Z-4 0'-50' clay & boulders  
 Z-5 0'-5' muskeg, 5'-33' sand & rocks  
 Z-6 0'-50' clay & rocks  
 S.P. Z-7 0'-50' clay & boulders  
 S.P. AA-1 0'-10' muskeg, 10'-50' clay & boulders  
 AA-2 0'-8' muskeg, 8'-50' clay & rocks  
 AA-3 0'-50' clay & boulders  
 AA-4 0'-13' muskeg, 13'-50' clay & rocks  
 AA-5 0'-50' clay & rocks  
 AA-6 0'-10' muskeg, 10'-50' clay & boulders  
 AA-7 0'-20' muskeg, 20'-50' clay & boulders  
 X-8A 0'-3' muskeg, 3'-40' sand & rocks  
 AA-8 0'-15' muskeg, 15'-50' clay & boulders  
 AA-9 0'-8' muskeg, 8'-50' clay & rocks  
 AA-10 0'-15' muskeg, 15'-50' clay & boulders  
 AA-11 0'-50' clay & rocks  
 AA-12 0'-11' muskeg, 11'-50' clay & rocks  
 S.P. AA-13 0'-20' muskeg, 20'-50' clay & boulders  
 S.P. AB-1 0'-50' clay & rocks  
 AB-2 0'-50' clay & boulders  
 AB-3 0'-50' clay & rocks  
 AB-4 0'-10' muskeg, 10'-50' clay & rocks  
 S.P. AA-1A 0'-10' muskeg, 10'-50' clay & rocks  
 S.P. AB-1A 0'-50' clay & rocks  
 AC-1 0'-50' clay & boulders  
 AC-2 0'-50' clay & rocks  
 AC-3 0'-30' clay & boulders  
 AC-4 0'-7' muskeg, 7'-40' clay & rocks  
 AC-5 0'-6' muskeg, 6'-50' clay & rocks

AC-6 0'-3' muskeg, 3'-50' clay & rocks  
 AC-7 0'-4' muskeg, 4'-50' clay & rocks  
 S.P. AC-8 0'-6' muskeg, 6'-50' clay & rocks  
 S.P. AD-1 0'-22 sand & rocks, 22'-50' clay & rocks  
 AD-2 0'-50' clay & boulders  
 AD-3 0'-18' sand & rocks, 18'-42' clay & rocks  
 AD-4 0'-30' clay & boulders  
 AD-5 0'-18' sand & gravel  
 S.P. AD-6 0'-30' clay & boulders, 30'-40' sand, 40'-45' gravel  
 S.P. AB-2A 0'-26' clay & rocks  
 AE-1 0'-50' clay & boulders  
 AE-2 0'-16' sand & gravel, 16'-40' clay & rocks  
 AE-3 0'-50' clay & boulders  
 AE-4 0'-40' clay & rocks  
 AE-5 0'-50' clay & boulders  
 AE-6 0'-40' clay & rocks  
 AE-7 0'-35' clay & rocks  
 AE-8 0'-45' clay & rocks  
 S.P. AE-9 0'-50' clay & boulders  
 S.P. AF-1 0'-16' muskeg, 16'-45' clay & rocks  
 AF-2 0'-50' clay & boulders  
 AF-3 0'-20' muskeg, 20'-50' clay & boulders  
 AF-4 0'-8' muskeg, 8'-45' clay & rocks  
 AF-5 0'-10' muskeg, 10'-35' sand & rocks  
 AF-6 0'-40' clay & boulders, 40'-50' gravel  
 AF-7 0'-12 muskeg, 12'-36' sand & rocks  
 AF-8 0'-10' muskeg, 10'-50' clay & boulders  
 AF-9 0'-10' muskeg, 10'-25' gravel, 25'-40' clay & boulders  
 AF-10 0'-35' sand & gravel  
 AF-11 0'-25' clay & boulders, 25'-40' sand & gravel  
 AF-12 0'-30' sand & gravel, 30'-35' clay & rocks  
 AF-13 0'-50' clay & boulders  
 S.P. AF-14 0'-16' muskeg, 16'-45' clay & rocks

ISLAND RIVER SOUTH

S.P. AG-1 0'-40' clay & rocks  
AG-2 0'-35' clay & rocks  
AG-3 0'-30' sand & rocks  
AG-4 0'-25' sand & rocks  
AG-5 0'-16' sand & rocks  
AG-6 0'-45' clay & rocks  
S.P. AG-7 0'-35' clay & rocks  
S.P. AI-1 0'-40' clay & rocks  
AI-2 0'-40' clay & rocks  
AI-3 0'-20' sand & rocks, 20'-40' clay & rocks  
AI-4 0'-40' sand & gravel  
AI-5 0'-35' clay & rocks  
AI-6 0'-35' sand & rocks  
AI-7 0'-40' clay & boulders  
S.P. AI-8 0'-35' sand & gravel  
S.P. AI-1 0'-45' clay & rocks  
AI-2 0'-40' clay & boulders  
AI-3 0'-30' gravel, 30'-40' clay & boulders  
AI-4 0'-10' clay & boulders, 10'-30' gravel, 30'-40'  
clay & boulders  
AI-5 0'-35' clay & rocks  
AI-6 0'-26' clay & rocks  
S.P. AI-7 0'-40' clay & rocks  
S.P. AJ-1 0'-18' sand & gravel  
AJ-2 0'-10' sand & gravel  
AJ-3 0'-23' sand & gravel  
S.P. AI-6A 0'-35' clay & rocks  
S.P. AK-1 0'-40' clay & rocks  
AK-2 0'-30' clay & boulders  
AK-3 0'-35' clay & rocks  
S.P. L-10A 0'-35' clay & rocks



S.P.	AL-1	0'-40' clay & rocks
	AL-2	0'-32' clay & rocks
	AL-3	0'-17' clay & rocks
	AL-4	0'-35' clay & rocks
	AL-5	0'-35' clay & rocks
S.P.	AL-6	0'-45' clay & rocks
S.P.	AM-1	0'-8' muskeg, 8'-40' clay & rocks
	AM-2	0'-10' muskeg, 10'-50' clay & rocks
	AM-3	0'-50' clay & rocks
	AM-4	0'-24' clay & rocks
	AM-5	0'-36' clay & rocks
	AM-6	0'-45' clay & rocks
	AM-7	0'-50' clay & rocks
	AM-8	0'-20' sand, 20'-50' clay & rocks
S.P.	AM-9	0'-45' clay & rocks
S.P.	AN-1	0'-45' clay & rocks
	AN-2	0'-40' clay & boulders
	AN-3	0'-35' sand & gravel
	AN-4	0'-45' clay & rocks
	AN-5	0'-50' sand, clay & rocks, layers at sand
	AN-6	0'-45' clay & rocks
S.P.	AN-7	0'-45' clay & rocks
S.P.	AO-1	0'-20' clay & rocks, 20'-45' sand & rocks
	AO-2	0'-45' clay & rocks
	AO-3	0'-20' clay & rocks, 20'-45' sand & rocks
	AO-4	0'-5' sand & gravel, 5'-35' clay & rocks
	AO-5	0'-25' clay & rocks, 25'-45' sand
S.P.	AO-6	0'-32' sand & rocks
S.P.	AP-1	0'-35' Clay & rocks
	AP-2	0'-40' sand & gravel
	AP-3	0'-30' sand & rocks
S.P.	AP-4	0'-40' sand & rocks

S.P. AQ-1 0'-45' clay & rocks  
 AQ-2 0'-14' sand & rocks  
 AQ-3 0'-45' clay & rocks  
 AQ-4 0'-6' sand & gravel, 6'-40' clay & rocks  
 AQ-5 0'-40' clay & rocks  
 AQ-6 0'-45' clay & rocks  
 S.P. AQ-7 0'-30' clay & rocks  
 S.P. AR-1 0'-10' muskeg, 10'-35' sand layers & gravel  
 AR-2 0'-18' sand & rocks, 18'-45' clay & rocks  
 AR-3 0'-40' sand, clay & rocks  
 AR-4 0'-45' clay & rocks  
 AR-5 0'-40' sand, clay & rocks  
 AR-6 0'-45' clay & rocks  
 S.P. AR-7 0'-4' muskeg, 4'-40' sand, clay & rocks,  
 S.P. AS-1 0'-40' sand, clay & rocks  
 AS-2 0'-45' clay & rocks  
 AS-3 0'-40' sand, clay & rocks  
 AS-4 0'-40' clay & rocks  
 AS-5 0'-8' muskeg, 8'-40' sand  
 AS-6 0'-45' clay & rocks  
 AS-7 0'-5' muskeg, 5'-40' sand, clay & rocks  
 S.P. AS-8 0'-40' clay & rocks  
 S.P. AT-1 0'-23' clay & rocks, 23'-40' sand & rocks  
 AT-2 0'-40' clay & rocks  
 AT-3 0'-3' muskeg, 3'-40' sand, clay & rocks  
 AT-4 0'-1' muskeg, 1'-40' sand, clay & gravel,  
 AT-5 0'-40' clay & rocks  
 AT-6 0'-40' sand, clay & rocks, sand ledges  
 AT-7 0'-40' clay & rocks  
 AT-8 0'-40' sand, clay & rocks  
 AO-4A 0'-30' sand & boulders  
 AT-9 0'-40' sand & rocks  
 AT-10 0'-40' sand, clay & large gravel  
 AT-11 0'-21' sand & gravel

AT-12 0'-30' sand, clay & large gravel  
AT-13 0'-27' clay & boulder  
AT-14 0'-5' muskeg, 5'-20' silt, 20'-40' sand, clay & rocks  
AT-15 0'-40' clay & rocks  
AT-16 0'-40' sand, clay & rocks  
AT-17 0'-30' clay & rocks  
AT-18 0'-40' sand, clay & rocks  
AT-19 0'-40' sand, clay & rocks  
AT-20 0'-40' clay & rocks  
AT-21 0'-40' sand, clay & rocks  
AT-22 0'-40' sand, clay & rocks  
AT-23 0'-30' clay & rocks  
AT-24 0'-40' clay & rocks  
AT-25 0'-6' muskeg, 6'-40' sand, clay & rocks  
S.P. AT-26 0'-30' clay & rocks



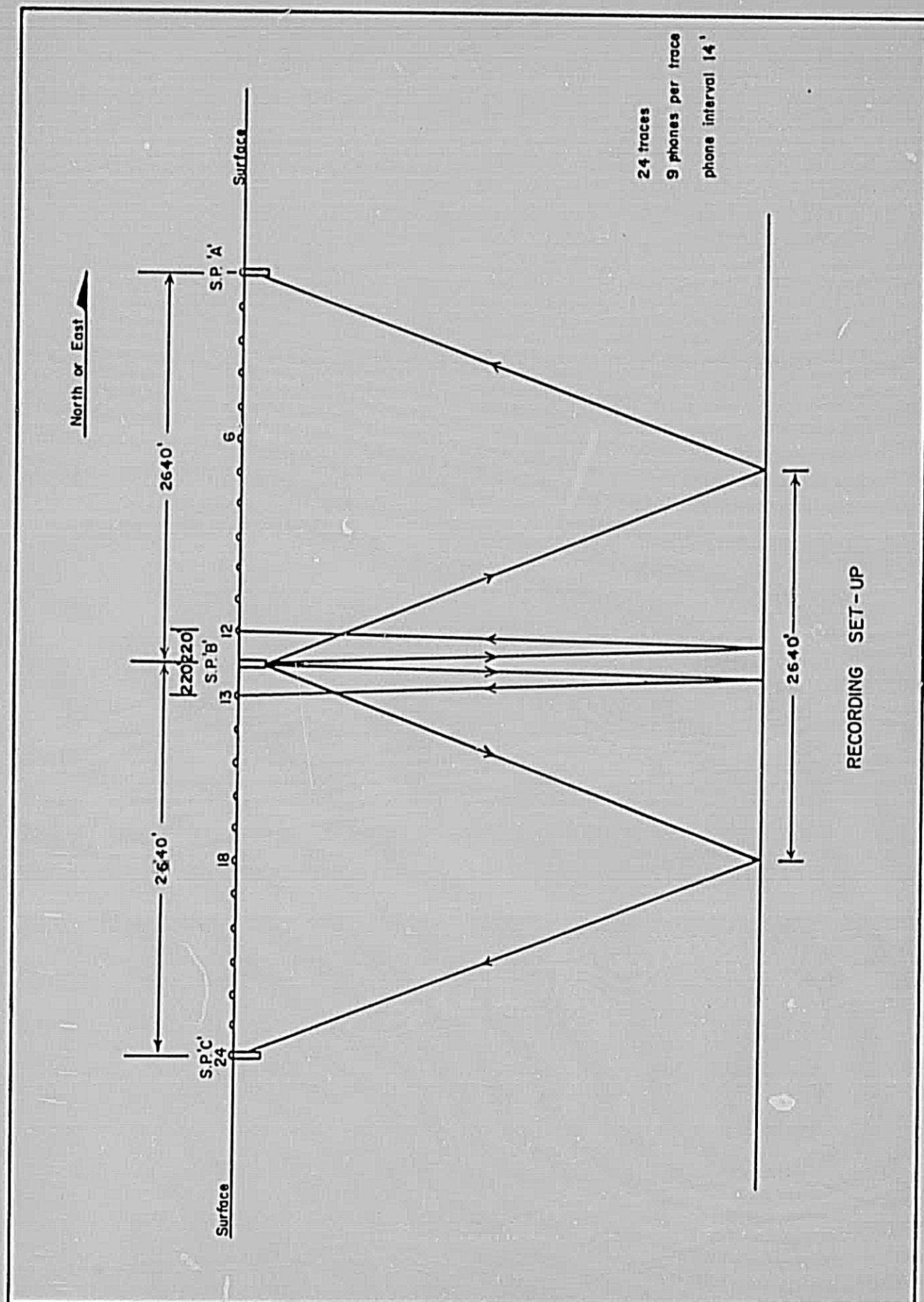
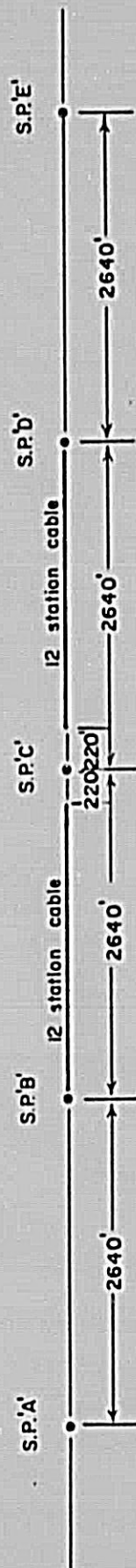


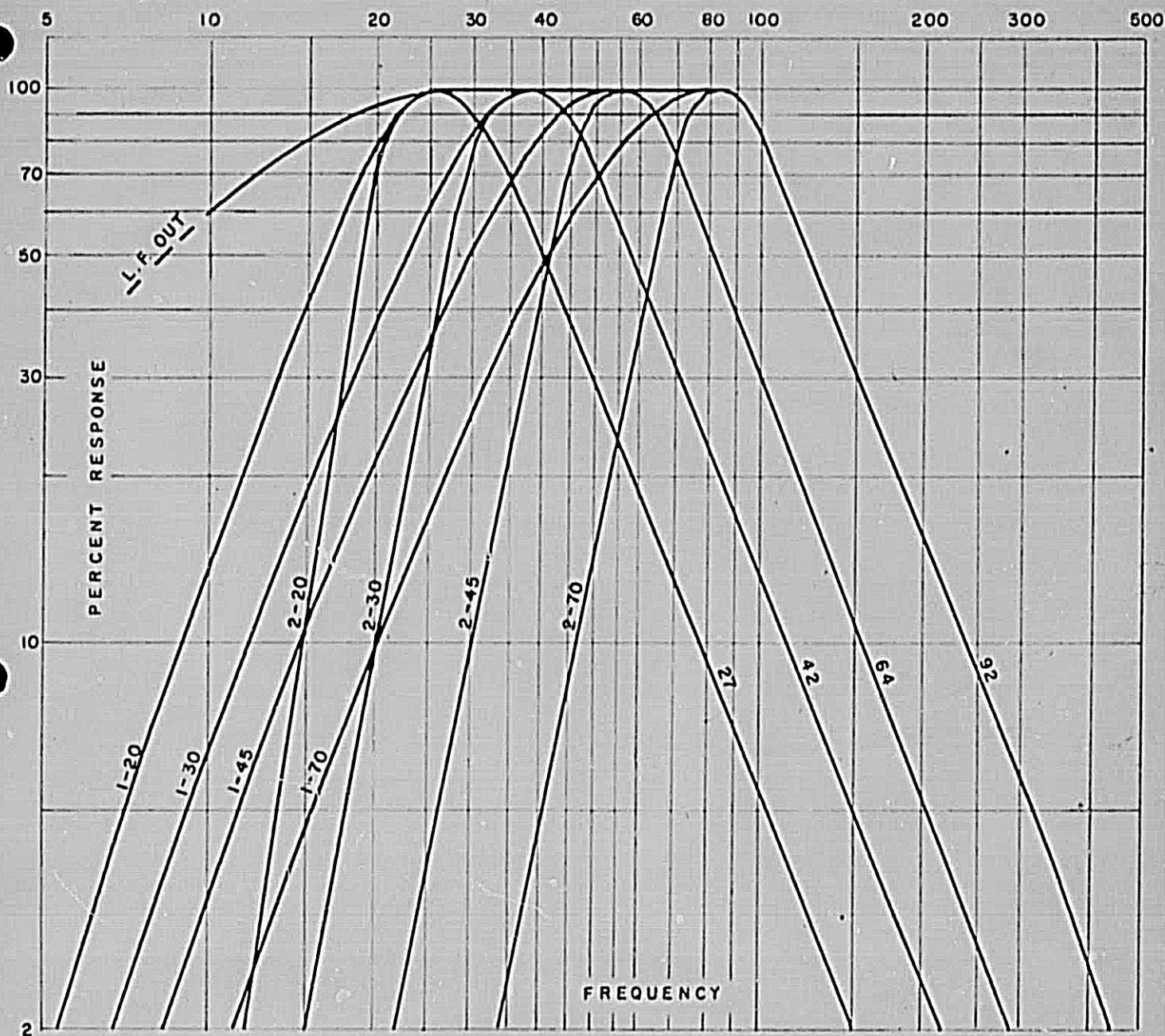
Figure 1

North or East



Cable set-up for long refraction when either S.P. B or S.P. D is shot.

Figure 2

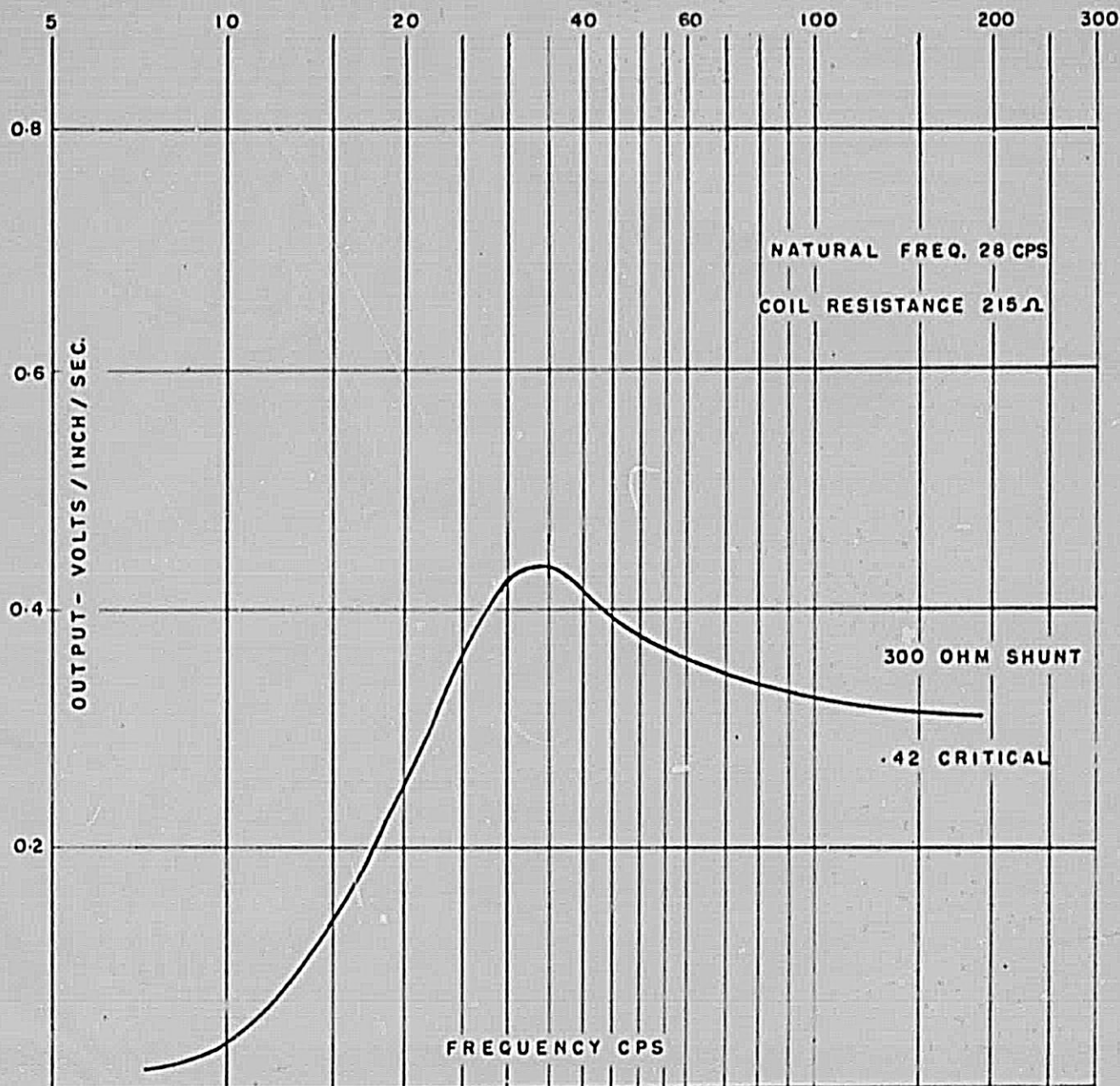


# AMPLIFIER RESPONSE S.I.E. GA-II

AS EMPLOYED BY

SEISMOTECH 64 LTD.  
CALGARY ALBERTA





OUTPUT vs FREQUENCY  
OF  
EVS 28 CPS GEOPHONES

AS EMPLOYED BY

SEISMOTECH 64 LTD.  
CALGARY, ALTA

Figure 4