

MAR 19780012: OLD FORT BAY

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OLD FORT BAY
EXPLORATION - 1978

N.T.S.: 74-L-9

Morley G. Brown
September 1978

Esso Resources Canada
500 - 6th Avenue S.W.
Calgary, Alberta
T2P 0S1

QUARTZ MINERAL EXPLORATION PERMIT No. 235

19780012

C & E EXPLORATIONS LTD.,
52 CALANDAR RD. N.W.,
CALGARY, ALBERTA. T2L 0P6

DATE OF ISSUE - MAY 18, 1976
AREA - 29,920 ACRES

TP. 112

TP. 111

TP. 110

CORRECTION LINE

R. 2

R. 1 W. 4 M.

SUMMARY

Exploration for uranium in the surrounding Athabasca sandstone region is progressing further into the basin interior. Conventional ground prospecting with a scintillometer is not adequate and more sophisticated "grass-roots" surveys must be developed in order to detect suitable targets below the sandstone cover.

Esso Minerals conducted a widespread gravity survey on Permits 225, 235, 236, 246, 687701001 and 77-979 within the Old Fort Bay area. Over 2,000 observations were made, at 50 meter spacings, along 7 handcut lines approximately 6 km apart. The purpose of the survey was to determine the basement topography, hoped to be related to lithostructure, and possibly related to post Helikian supracrustal adjustment within the sandstone. Definite gravity anomalies were established and believed to be associated with lithostructure on the Archean/Aphebian basement complex. No features (structural or otherwise) were recognized as part of the sandstone cover.

A second gravity survey, having more closely spaced lines to delineate more specific trends and develop possible drill targets is recommended. Subsequent drilling is inevitable along steep gravity gradients and in both the gravity highs and lows in order that better geophysical control can be established for future geophysical surveys and to determine a better understanding of the lithostructure of the basement complex.

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OLD FORT BAY

EXPLORATION - 1978

Morley G. Brown
September 1978

INTRODUCTION

LOCATION & ACCESS

The property consists of six adjoining permits comprising 179,520 acres. It covers parts of Twps. 108 to 113, Ranges 1 and 2 adjacent to the Saskatchewan border, southwest of Lake Athabasca in N.T.S. units 74-L-8, 9 and 16. Figure 1 shows the general outline of the property while a detailed description of the permits is contained in Appendix 1.

Mobilization into the property is by charter, float equipped, fixed wing aircraft either from Fort Chipewyan, 35 miles west, Uranium City, 83 miles northeast or Fort McMurray, 135 miles southwest. Uranium City provides the only based twin Otter service. Access within the property is best attained by the use of a helicopter on a contract basis as much of the area is marsh and most lakes are too small or too shallow for landing float equipped fixed wing aircraft.

PREVIOUS WORK

The primary phase of exploration carried out on the permits was done by Esso Minerals Canada during the summer of 1977. The program consisted of an airborne radiometric survey to detect glacial dispersion of radioactive material in conjunction with a reconnaissance lake water

and lake bottom geochemical survey. The airborne radiometric survey was flown at 1/4 mile spacings and covered 1,190 line miles. Results of the survey delineated two areas displaying higher than background readings, one within the southwest corner of Permit 225 and the other within the southeast corner of Permit 246. Neither area was ground checked, however, it was felt that the anomalous readings were probably due to granitic overburden material. Of the 55 lake water and lake bottom samples, six samples were anomalous and all were located on the east side of Twp. 108, Rge. 1, W5. Again, ground exploration was not carried out, consequently no explanation was given.

During the fall of 1977, a reconnaissance Tractech radon gas survey, conducted by Northland Exploration Co. Ltd., attempted to detect possible radon gas leakage from basement mineralization carried up by groundwaters in fracture systems. Cups were placed at 1,000 foot spacings along east-west lines ranging in length from 4 to 13 miles and encompassed Twps. 110, 111, and 112. No conclusive results, however, were drawn from the survey as the broadness of the survey would not allow for the detection of small local anomalous areas.

In continuation of the exploration program, Kenting Exploration Services Ltd. was contracted by Esso Minerals to do a shallow reflection seismic test survey during the winter of 1978. The main purpose of the survey was to outline the contact between the Athabasca Formation and the underlying basement rocks along a 24 km line, however, it was hoped that it would help develop an economical reflection seismic technique that could be used elsewhere in the basin as an exploration tool.

The survey was terminated prior to its completion due to spring breakup, however, 11 of the estimated 16 spreads were shot and the data analyzed and interpreted from both reflection and refraction records. The determined refraction profile is plotted along the side of the Bouger gravity profile on FIGURE 6.

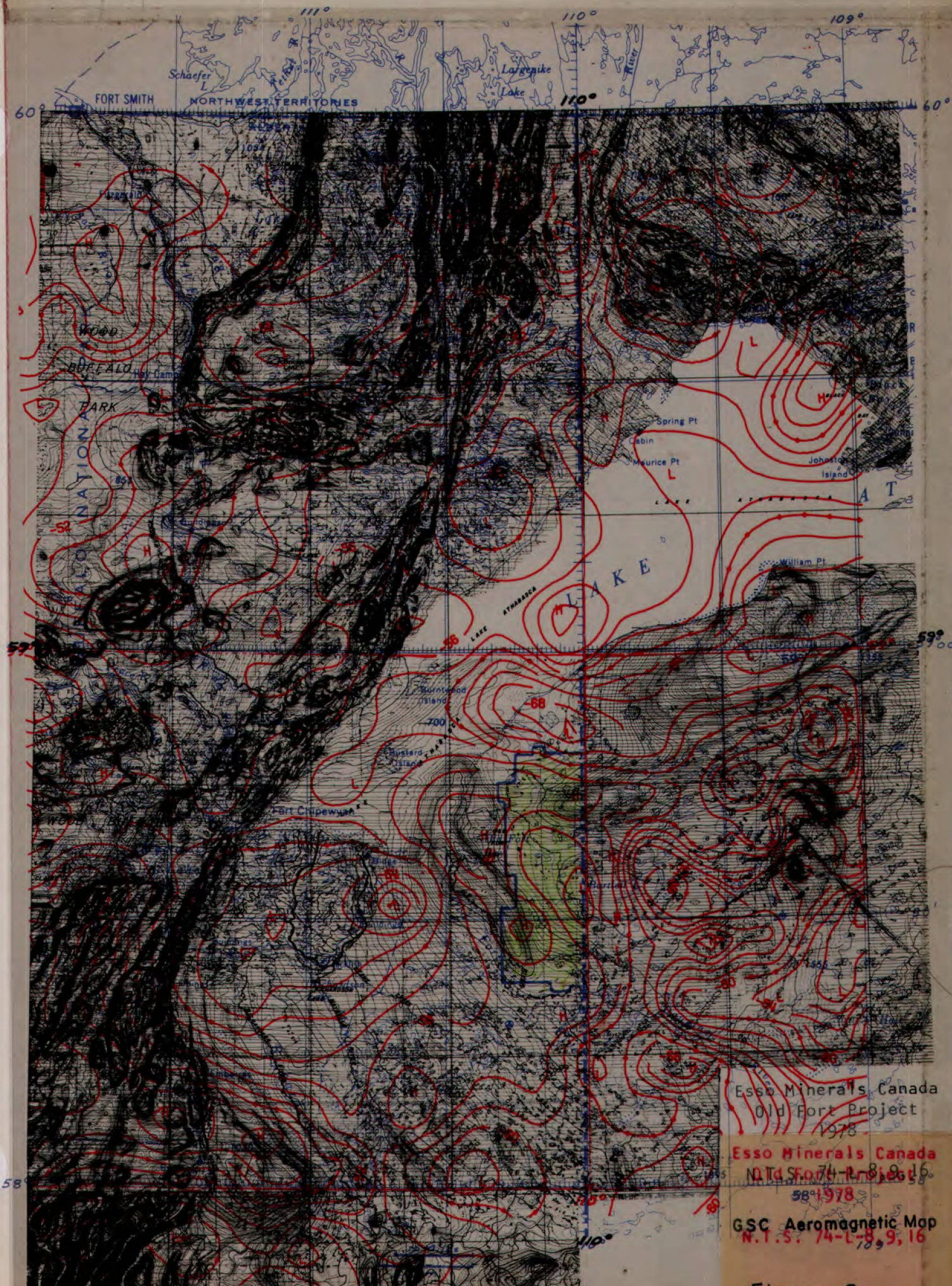
RECENT EXPLORATION FOCUS

In the light of recent uranium discoveries in Saskatchewan, exploration for the metal is shifting further into the Athabasca basin interior. Conventional prospecting methods alone have become insufficient, or in the case of exploratory drilling, too costly to detect economic mineralization spatially associated with the unconformity. Since pitchblende occurs only in selective environments along this unconformity, determined by basement lithostructure, more sophisticated as well as refined geophysical techniques are being applied in the hope that suitable drill targets can be chosen with a reasonable amount of confidence.

The methods chosen depend, for the most part, on location within the basin in relation to thickness of the overlying Athabasca Formation. Most active geophysical techniques, barring conventional seismic methods, will not yield interpretive results much deeper than 200 meters. Furthermore, physiochemical environments which may contain uranium mineralization are very difficult to detect by indirect means. The most that can be hoped for would be the detection of larger, more prominent, structural events or pronounced lithological variations within the basement and possible related supracrustal features.

Regional gravity maps produced by the Geological Survey of Canada provide some clue as to where Archean and/or Aphebian crystalline basement complex highs and lows exist within the Athabasca basin (FIGURE 2). Where gradients are steep, as is evident within the region encompassing the Carswell Dome structure, possible structural linears may exist within basement rocks. Perhaps it is here, or where separate anomalous high or lows abut against each other to form distinct "troughs", that exploration efforts should be focused.

Within the area of Esso Minerals Permits 225, 235, 236, 246, 687701001 & 77-479 the pervasive magnetic and gravity signatures may suggest an anomalous geological feature (FIGURES 2 and 3). The distinct



Esso Minerals Canada
Old Fort Project
1978

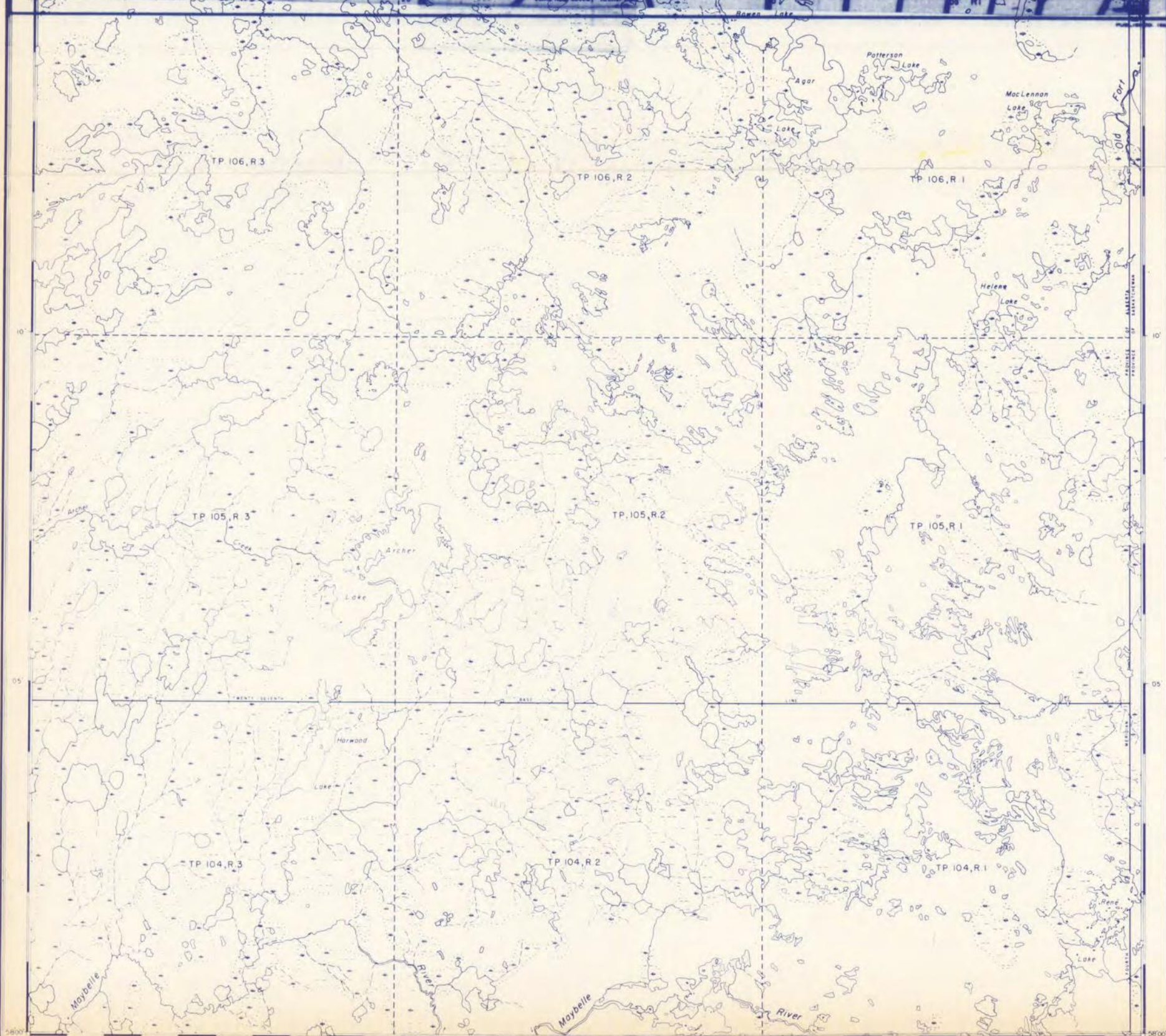
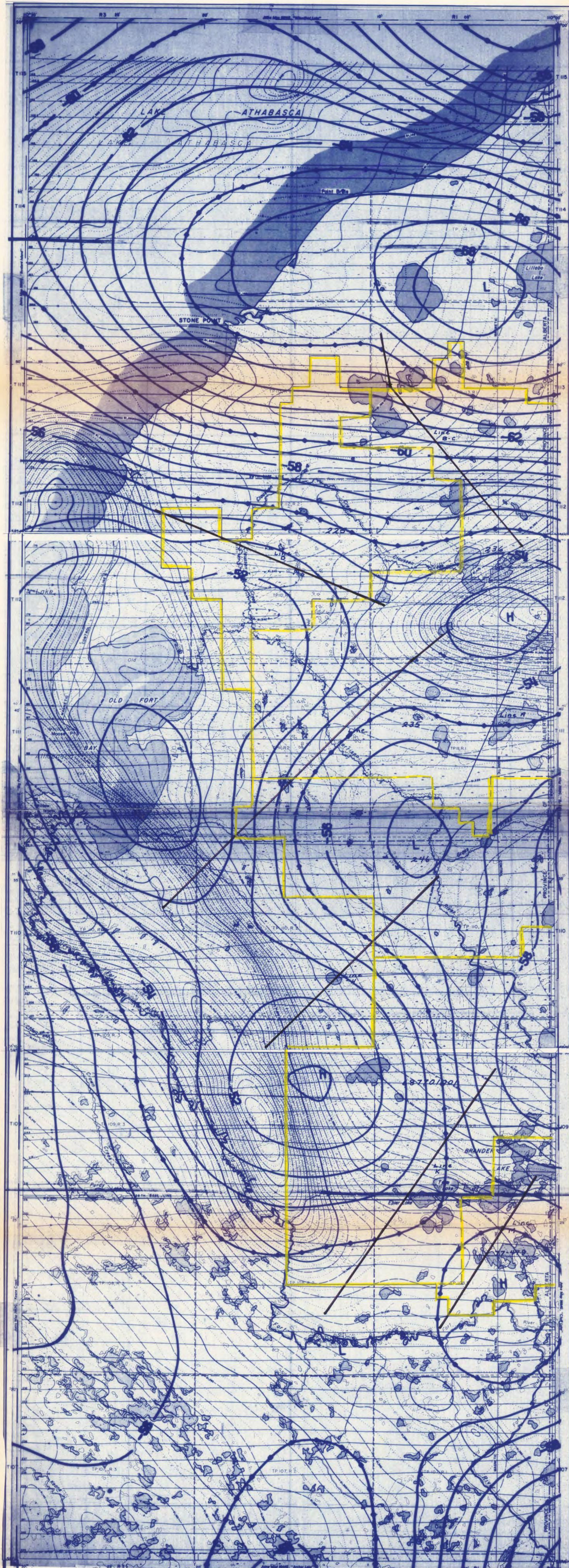
Esso Minerals Canada
N.T.S. 74-L-8, 9, 16
58° 1978

GSC Aeromagnetic Map
N.T.S. 74-L-8, 9, 16

Figure 2
Bouguer Gravity Map

10780012-

19780012



REFERENCE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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ESSO MINERALS CANADA (IMPERIAL OIL LIMITED)	
OLD FORT PROJECT (1978)	
SCALE	NTS
FILE NO.	PROJECT NO.
DRAWING NO.	DATE
DRAWN BY	REVISED

The distinct northwesterly and intersecting easterly trending gravity high parallels the anomalous magnetic fabric. In the apex of this gravity high exists a gravity low in the central area of the permits. It is considered to be a good possibility that a combination of such probable geological features may give rise to favourable loci for "Athabasca type" uranium deposits within the basement or along the Athabasca-basement unconformity (KIRWAN, 1977).

GEOPHYSICS SURVEYS

METHODS & OUTLINE

In order to determine the topography of the basement and to detect any related geological or structural features that may exist within the permit area, suggested by the regional geophysical anomalies, Esso Minerals Canada conducted a widespread gravity survey. The survey entailed 7 hand cut lines totalling 105 km, spaced approximately 6 km apart, located across the magnetic and gravity gradients (FIGURE 3). Stations were positioned at 50 metre intervals along the line so that if any possible post Helikian structural features existed locally within the supercrustal rocks of the Athabasca Formation, and expressed density differences significant enough, they might more readily be detected.

A LaCoste mode G-247 gravity meter was employed so that absolute gravity observations could be determined and the survey compared more directly to the government regional survey. The ruggedness of the LaCoste gravity meter and its adjustable dampening feature enabled observations to be made with accuracy in even the most difficult and spongy terrain which enveloped much of the permits. The instrument was equipped with a low power, adjustable thermostatically controlled temperature stabilizing system which maintains constant temperature in spite of outside thermal shocks. This added to the accuracy to the observed readings and the calculated Bouguer values.

Since the LaCoste gravity meter measures relative gravity, a base station was established at the Epler Lake base camp. From here, all lines were tied with each line containing subsequent base stations at random intervals to which daily traverses could be tied. With the extreme accuracy of the LaCoste gravity meter, drift between base stations along the lines was no more than 0.02 gu. and the average drift for the day, less than 0.04 gu.

Elevations were determined along the lines by an easily operated hydrostatic elevation meter. These, in turn, were tied into the known elevations at the Epler Lake gravity base station by using a barometric altimeter. This enabled relative Bouguer gravity values to be determined. An elevation correction factor of 0.7109 gu/ft. or 2.33 gu/metre was computed using a density of 1.8 gm/cc for the overlying glacial drift. This density was chosen after listing different values of 1.7, 1.8, 1.9, 2.1, 2.2 and 2.3 gm/cc and observing the least correspondence between the respective Bouguer anomalies and topography. The correction of 0.9406 gu/ft or 3.0859 gu/m for instrument height was also computed and used in computing the Bouguer gravity values.

An additional terrain correction, needed to allow for the actual terrain irregularities, was not applied as it was felt that it would not be large enough to significantly alter the shape of the anomalies.

RESULTS & INTERPRETATION

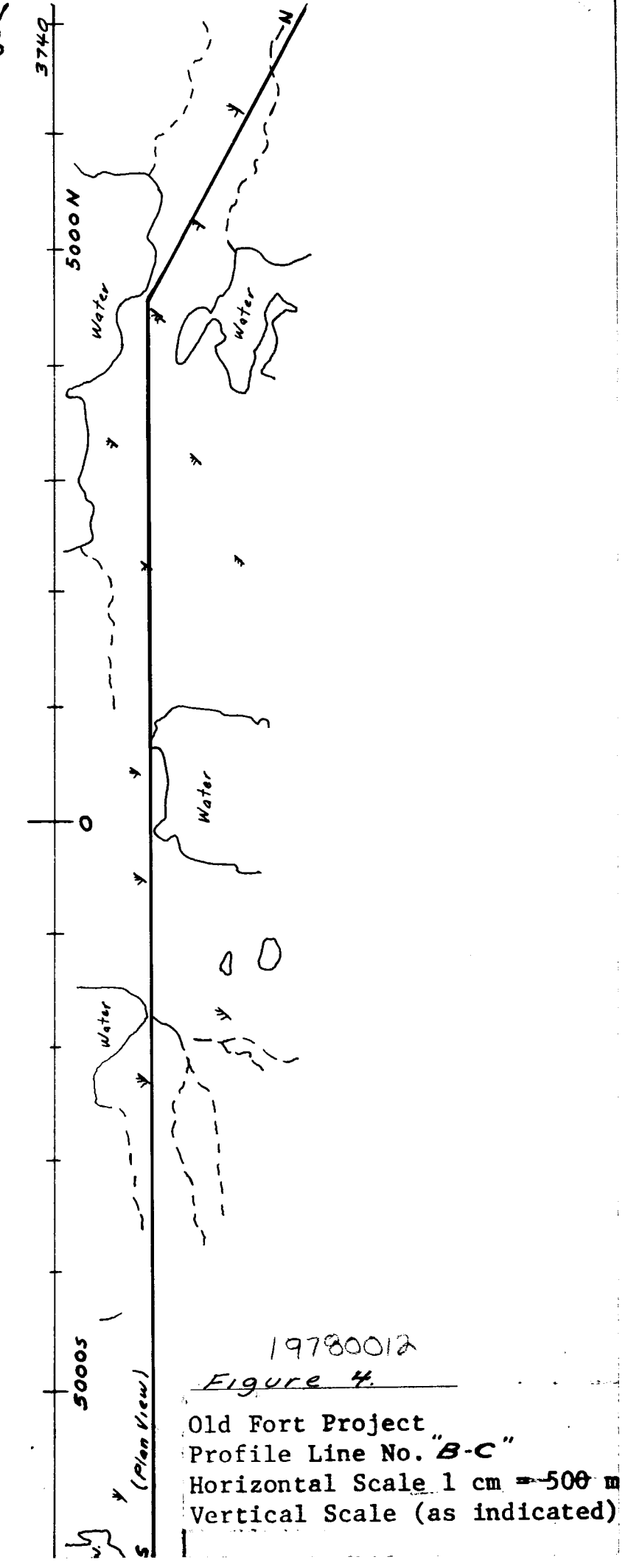
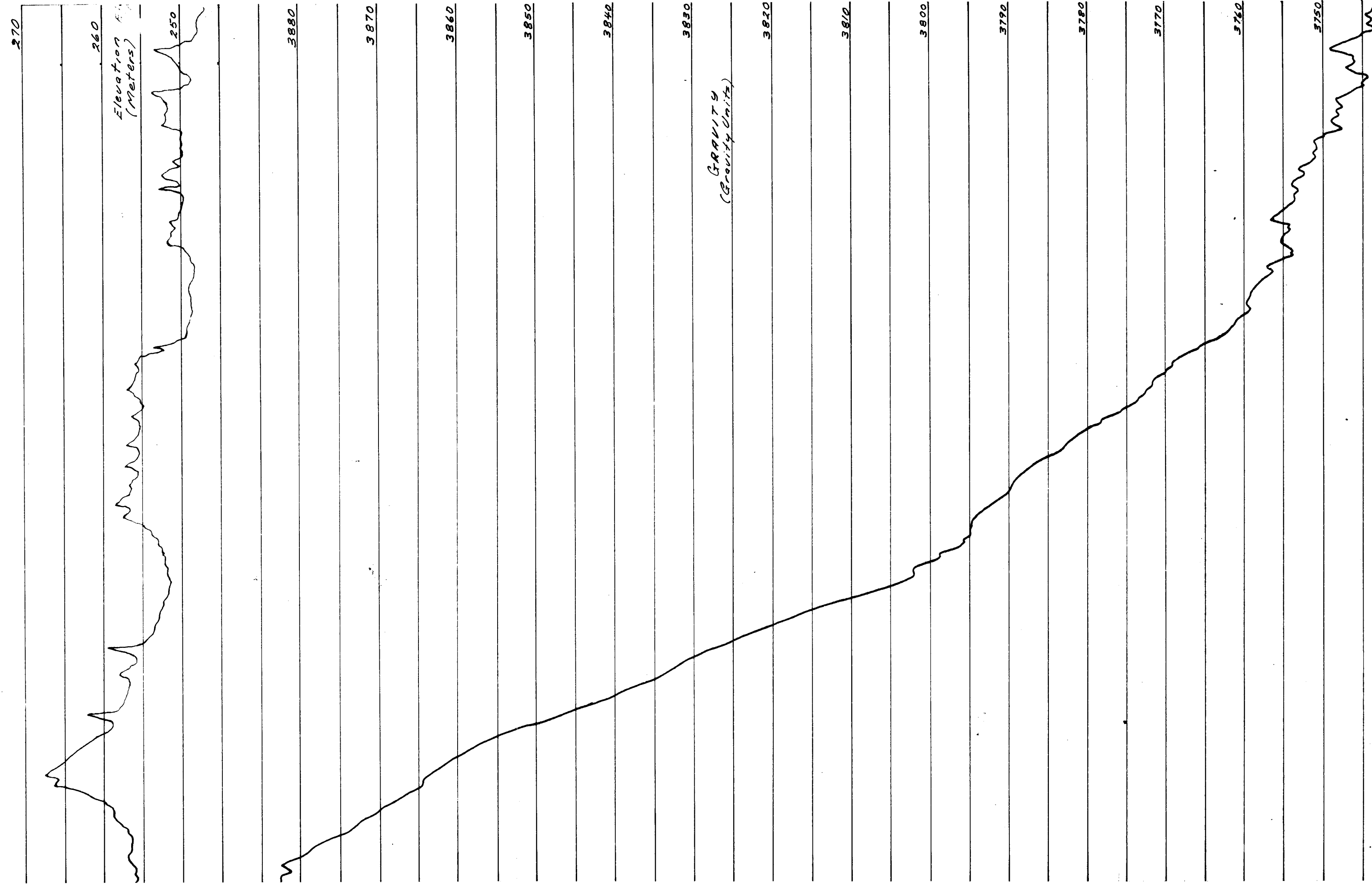
The profiles for each line along with the calculated Bouguer gravity values are included in the back of this report. Figures 4-11, on accompanying pages, display profiles condensed to page size for an easier overall view.

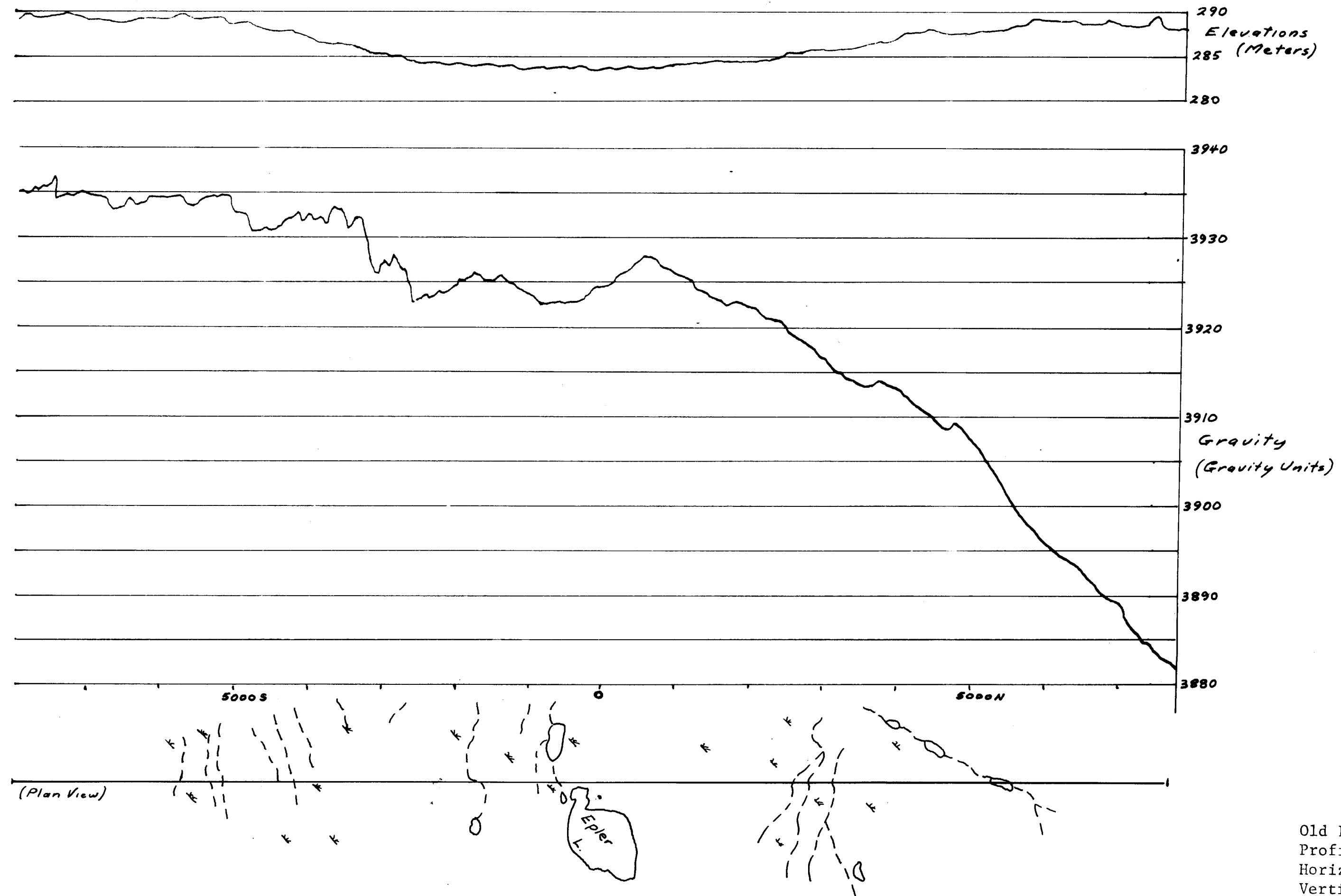
Most of the lines conform quite substantially with the regional gravity outline. This is best exemplified by FIGURE 4 which shows an extreme change in gravity along line B-C. A change of about 135 gu. from south to north over 10 km correlates with the steep gradient

displayed by the regional Bouguer contour map (FIGURE 3). Such an extreme change in gravity over such a short distance is believed, by the author, to indicate a structure feature rather than a lithological change. In order for the latter to be true, the density differences between the two rock types would have to be too extreme such that the gravity meter could record the mass differences on such a catastrophic scale.

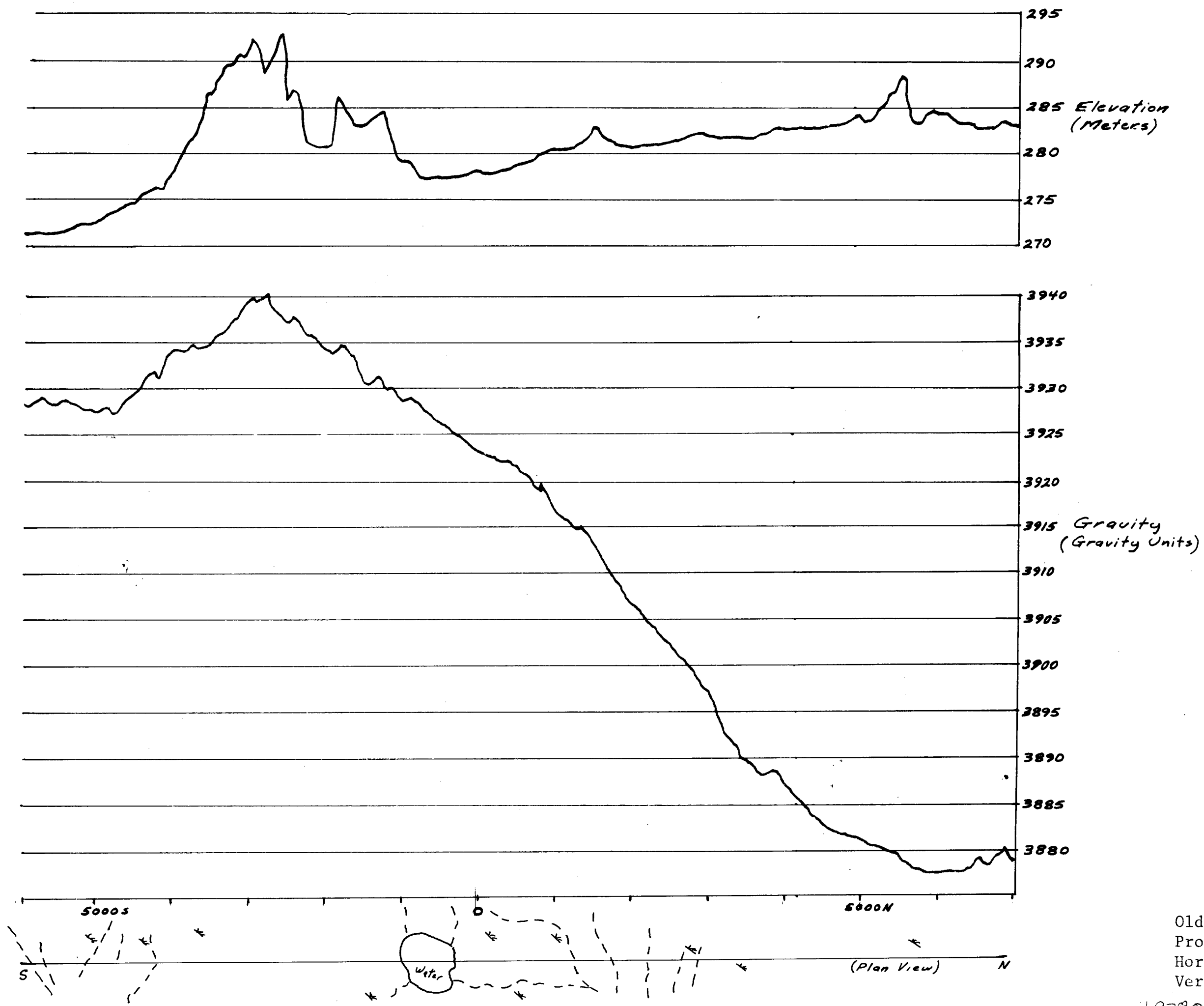
FIGURE 6 compares the recent gravity for line S to the refraction seismic profile of the Archean and/or Aphebian basement complex prepared by Kenting Exploration during April of 1978. It is readily clear that both surveys indicate a basement high corresponding to a thinning of the Athabasca sandstone near the 5,000 metre mark on the south end of the line. This, again, shows a tremendous amount of relief on the basement "surface" and, in fact, shows that the gravity is indicating physiography rather than lithology for the basement complex.

It would appear that the basement features mask any related supracrustal disturbances so nothing that might suggest such can be interpreted from the gravity profiles. This, however, doesn't rule out the possibility that they do not exist but rather that they are extremely difficult to determine using gravity as a tool. If it is possible to detect them at all, it would be necessary to survey a grid of a much tighter network so that definite trends might be distinguished from line to line.





Old Fort Project
 Profile Line No. "K"
 Horizontal Scale 1 cm = 500 m
 Vertical Scale (as indicated)



Old Fort Project
Profile Line No. "H"
Horizontal Scale 1 cm = 500 m
Vertical Scale (as indicated)
19780012 Figure 8

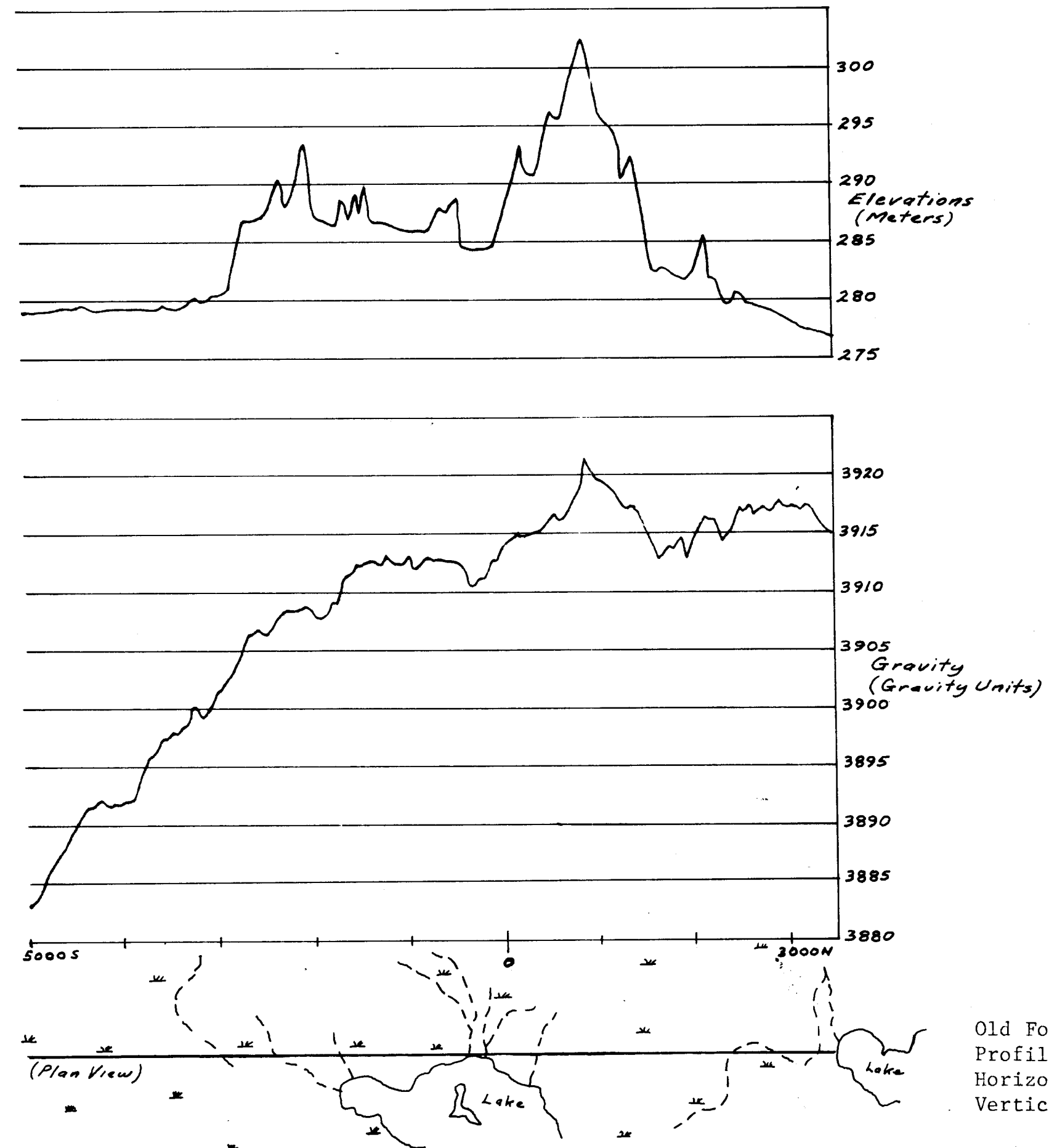
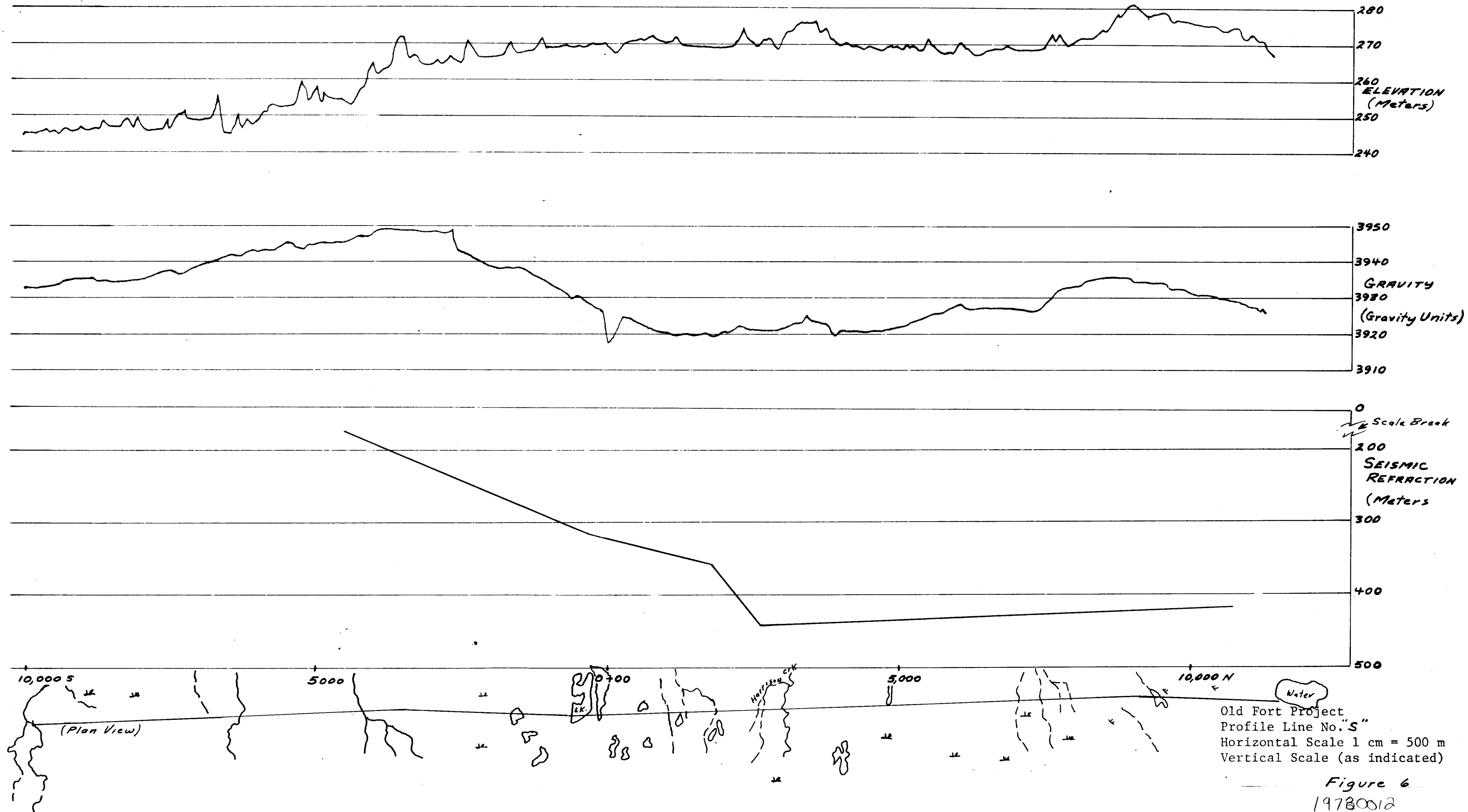
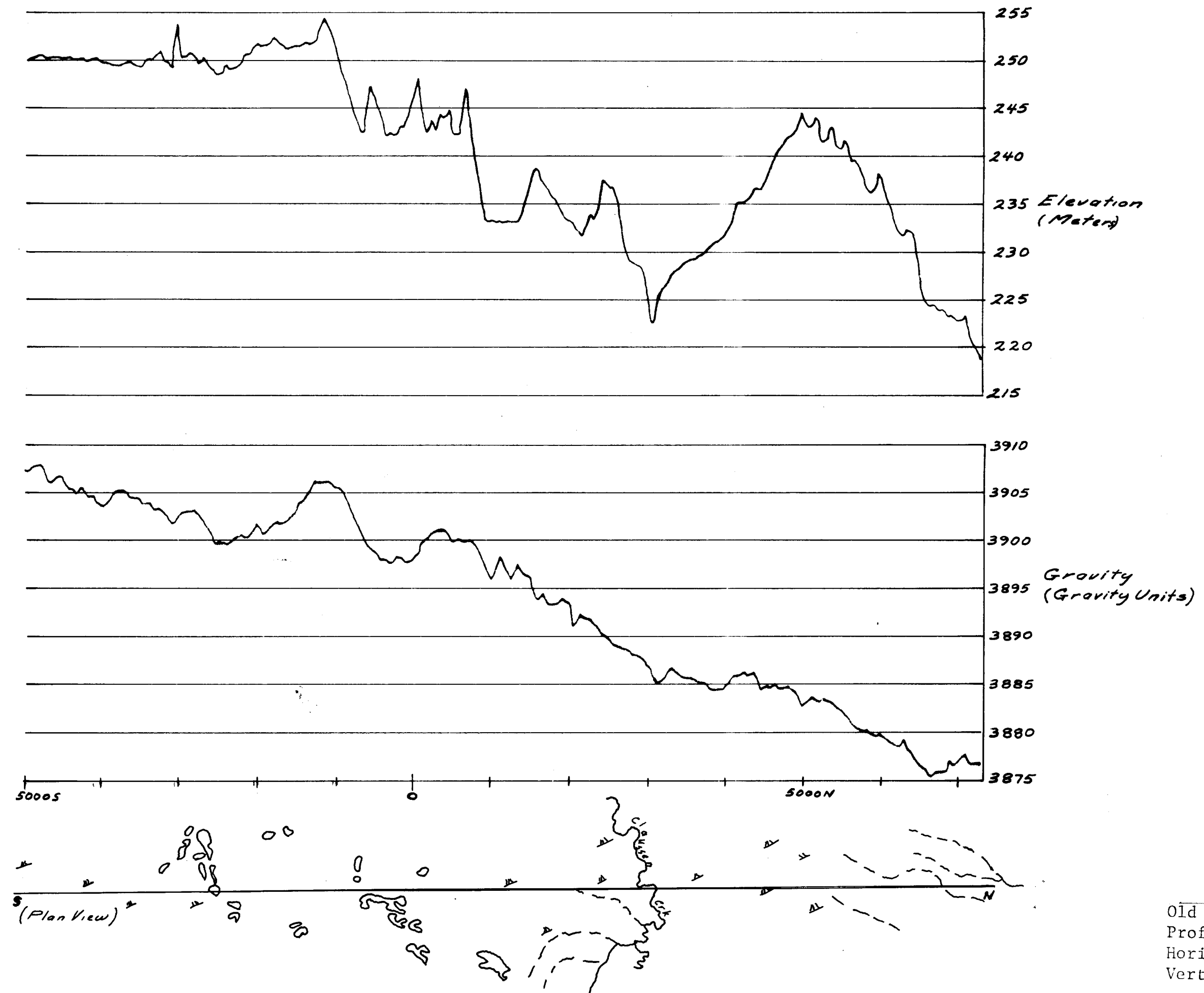
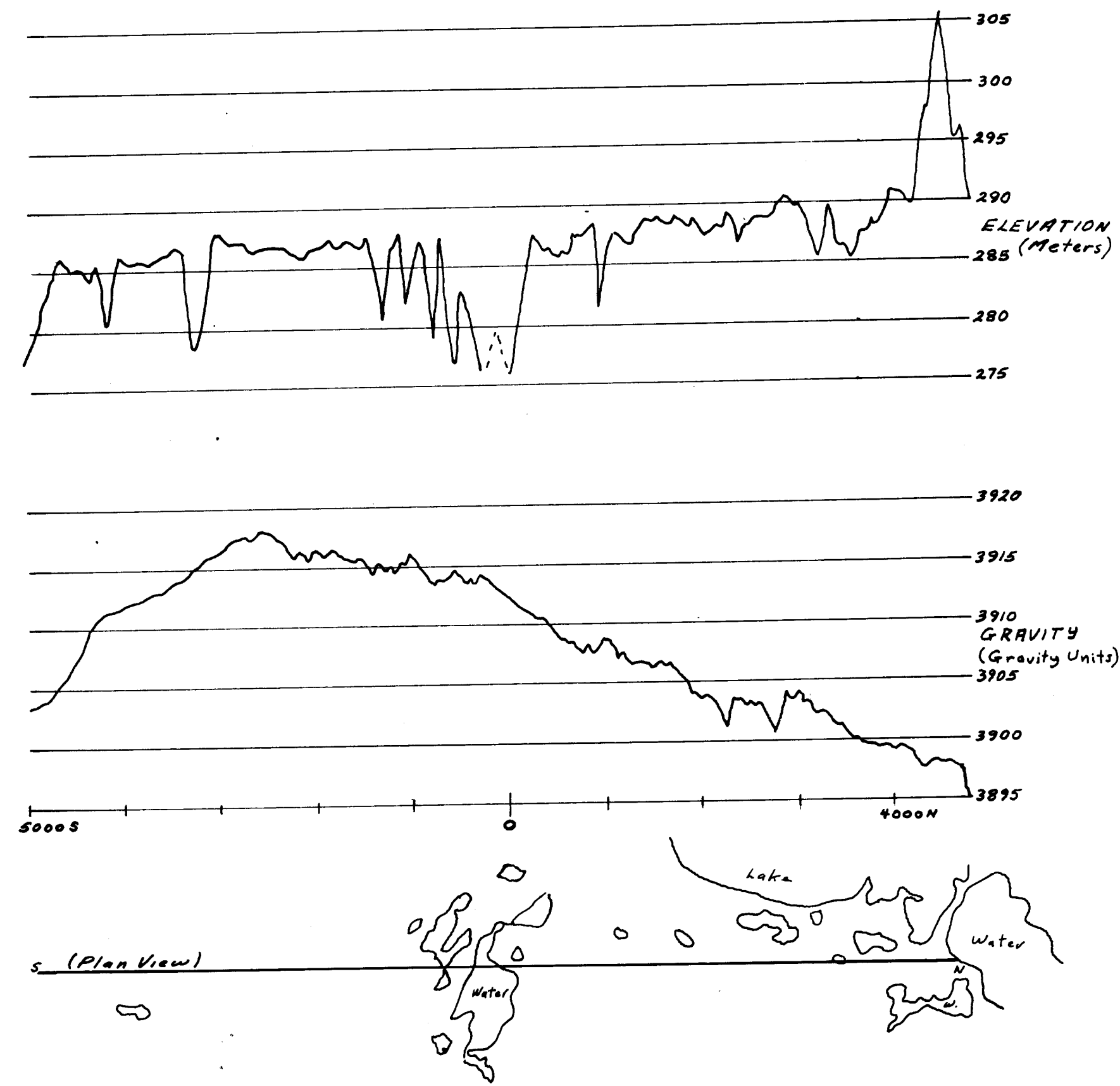


Figure 7
 19780012





19780012
Figure 5
 Old Fort Project
 Profile Line No. "D"
 Horizontal Scale 1 cm = 500 m
 Vertical Scale (as indicated)



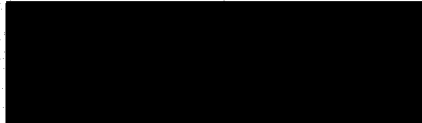
19780012 Figure 10
 Old Fort Project
 Profile Line No. "M"
 Horizontal Scale 1 cm = 500 m
 Vertical Scale (as indicated)

CONCLUSIONS & RECOMMENDATIONS

Using gravity, no doubt, supplies the explorationist with a tool in which he can conduct grass roots surveys, within the Athabasca basin, in order to determine major basement linears which might relate to possible uranium targets. The gravity survey conducted within the Old Fort Bay area, however, appears too broad for definite drill targets to be located. It is suggested that a tighter survey grid network be established so that more local effects can be distinguished.

Drilling of a few selected holes within both the gravity highs and lows and along the steeper gradients would yield better control for further surveys. Confirmation on the interpretation of basement lithostructure and/or possible related features in the overlying sandstone would also be established and help focus future exploration.

Morley G. Brown
Project Geologist



MGB/gf
21/09/78

BIBLIOGRAPHY

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- KIRWAN, L.D., (1977): Exploration - 1977, Old Fort Bay. Unpublished Report prepared for Imperial Oil Limited.
- MONDAY, R.J., (1978): Uranium Mineralization in Northern Saskatchewan. Paper presented at the C.I.M.M. Annual General Meeting, Vancouver, April 1978.
- OVERTON, A., (1977): Geological Survey of Canada, Report of Activities: Paper 77-1C, pp. 19-25.

APPENDIX I

FIELD PERSONNEL - OLD FORT PROJECT

ESSO MINERALS CANADA

Morley Brown	Project Geologist
Zig Doborzynski	Geophysics Adviser
** Susan Rowe	Geologist
* Gordon Cooper	Geophysicist - Gravity Operator
* Nancy McCandless	Geology & Geophysics Assistant
* Dave Proudfoot	Geology & Geophysics Assistant
* Wayne Spencer	Geology & Geophysics Assistant
* George Beauchamp	Geology & Geophysics Assistant
* Peter Vopel	Cook

ASSOCIATED HELICOPTERS LTD.

Rick Pearson	Pilot - Bell 47 G381 Helicopter
Simon Mears	Engineer

EXPEDITING SERVICES - URANIUM CITY, SASKATCHEWAN

Reg Brown	Expeditor
John LaRocque	Line Cutter
Henry LaRocque	Line Cutter
Bernard LaRocque	Line Cutter
Rudy LaRocque	Line Cutter

- ** Non-Permanent Summer Staff - Degree Personnel
- * Non-Permanent Summer Staff - Undergraduate Personnel

APPENDIX II

WORK HISTORY - MAIN DATES

June 5, 1978:

M. Brown and P. Vopel arrive in Uranium City. Logistics for mobilization and camp preparation.

June 7, 1978:

Leave Uranium City for Camsell Portage to pick up 4 line cutters (John, Bernard, Henry and Rudy LaRocque) then to permit area - Camp A.

June 8 to July 2, 1978:

Six (6) hand cut lines completed. Involving six (6) camp moves. Base camp established at Epler Lake. Prospecting and minor geochemistry carried out during line cutting phase.

July 3, 1978:

Associated Helicopter (Bell 47-G381) arrives with pilot, Rick Pearson, and engineer, Simon Mears. Gordon Cooper and Dave Proudfoot arrive from Montgomery Lake to begin gravity survey. Susan Rowe arrives in camp from Uranium City to aid in survey operations.

July 4 to August 30, 1978:

Gravity survey and reconnaissance lake bottom geochemical sampling. Prospecting completed over previous year's airborne radiometric anomalies.

July 11 to July 19, 1978:

Wayne Spencer and George Beauchamp hired from Imperial project out of Yellowknife to aid in project operations.

July 21, 1978:

Nancy McCandish hired from Uranium City to help with elevation survey for gravity calculations.

July 28, 1978:

Z. Doborzynski arrives in camp from Toronto to oversee operations and aid in gravity computations.

July 31, 1978:

Helicopter contract terminated - Rick Pearson and Simon Mears leave camp for Fort McMurray.

August 3, 1978:

Demobilization of Camp. Move to Uranium City. S. Rowe and N. McCandish terminated.

August 4, 1978:

M. Brown, Z. Doborzynski, G. Cooper, D. Proudfoot and P. Vopel leave Uranium City for Calgary.

August 5 to September 7, 1978:

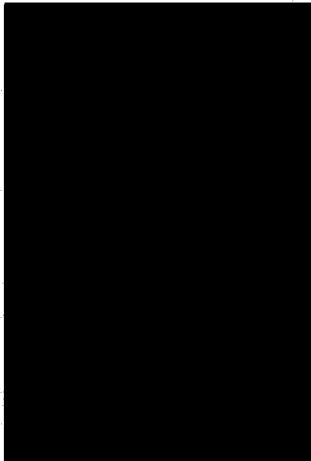
Field personnel complete gravity computations and profiles. Phase I complete.

MB/gf

APPENDIX III

COST BREAKDOWN - OLD FORT PROJECT

PERSONNEL WAGES & SALARIES:

	\$62.50/day - 86 days	\$ 5,375.00
	\$57.50/day - 30 days	1,725.00
	\$52.75/day - 60 days	3,165.00
	\$46.25/day - 15 days	693.00
	\$52.75/day - 10 days	527.50
	\$52.75/day - 10 days	527.50
	\$32.70/day - 50 days	1,635.00
	\$34.50/day - 78 days	2,691.00
	\$150.00/day - 21 days	3,150.00
Line Cutters		
- 		5,280.00
		<u>\$ 24,768.00</u>

GEOCHEMISTRY SURVEY:

174 samples @ \$4.50/sample for: U ₃ O ₈ analysis	783.00
174 samples @ \$2.00/sample for: Ni analysis	<u>345.00</u>
	<u>\$ 1,128.00</u>

TRANSPORTATION:

Chartered Aircraft	4,585.25
Scheduled Flights	1,385.00
Helicopter	<u>16,757.40</u>
	<u>\$ 22,727.65</u>

SUPPLIES & MISCELLANEOUS:

Groceries: 2 months	\$ 4,483.22
Fuel: 100/130 for helicopter - 2,258 gals @ \$1.50/gal.	3,387.00
Camp Supplies, Repairs & Shipping Charges:	<u>3,440.03</u>
	<u>\$ 11,310.25</u>

ACCOMMODATION & MEALS (While in Town): \$20.00/man/day for meals added
to Room Rate

Uranium City:

July 5 & 6:	M. Brown	\$40.00/day - 1 night	40.00
	P. Vopel	\$40.00/day - 1 night	40.00
August 2-4:	M. Brown	\$42.50/day - 2 days	85.00
	Z. Doborzynski	\$42.50/day - 2 days	85.00
	D. Proudfoot	\$42.50/day - 2 days	85.00
	G. Cooper	\$42.50/day - 2 days	85.00
	P. Vopel	\$42.50/day - 2 days	85.00

Calgary:

August 4-11:	P. Vopel	\$60.00/day -	480.00
August 4-15:	Z. Doborzynski	\$54.50/day -	654.00
August 4-25:	D. Proudfoot	\$37.25/day -	819.50
August 4-25:	G. Cooper	\$37.25/day -	819.50
August 25-30:	G. Cooper	\$47.00/day -	<u>235.00</u>
			<u>\$ 3,513.00</u>

PERSONNEL WAGES & SALARIES:	24,768.00
GEOCHEMISTRY SURVEY ANALYSIS:	1,128.00
TRANSPORTATION:	22,727.40
SUPPLIES & MISCELLANEOUS:	11,310.25
ACCOMMODATION & MEALS:	<u>3,513.00</u>
	<u>\$ 63,446.65</u>

APPENDIX IV

OLD FORT PERMITS - DESCRIPTION

PERMIT 225:

Optioned from C&E Exploration Ltd.
Anniversary Date: January 28, 1979

46 3/4 Sections = 29,920 Acres

Twp. 111, Rge. 2, W4 Sec.: 32
Twp. 112, Rge. 1, W4 Secs.: 19-21, 28-33
Twp. 112, Rge. 2, W4 Secs.: 5, 8-10, 13-28, 30, 34-36
Twp. 113, Rge. 1, W4 Secs.: 24, 25
Twp. 113, Rge. 2, W4 Secs.: 1-3, 10, 11, 13, 14,
S/2 + NE/4-15, 23

PERMIT 235:

Optioned from C&E Exploration Ltd.
Anniversary Date: May 18, 1979

46 3/4 Sections = 29,920 Acres

Twp. 111, Rge. 1, W4 Secs.: N/2 + SE/4-3, 9, 10, 13-36
Twp. 111, Rge. 2, W4 Secs.: 13-16, 21-28, 33-36
Twp. 112, Rge. 2, W4 Secs.: 2-4, 11

PERMIT 236:

Optioned from C&E Exploration Ltd.
Anniversary Date: May 18, 1979

46 3/4 Sections = 29,920 Acres

Twp. 112, Rge. 1, W4 Secs.: 1-18, 22-27, 34-36
Twp. 112, Rge. 2, W4 Secs.: 1, 12
Twp. 113, Rge. 1, W4 Secs.: 1-4, 7-12, S/2-13, 14-18,
21, SE/4-28.
Twp. 113, Rge. 2, W4 Sec.: 12

PERMIT 246:

Optioned from Flin Flon Mines Ltd.
Anniversary Date: June 15, 1979

46 3/4 Sections = 29,920 Acres

Twp. 110, Rge. 1, W4 Secs.: 14-36
Twp. 110, Rge. 2, W4 Secs.: 25-27, 34-36
Twp. 111, Rge. 1, W4 Secs.: 1, 2, SW/4 -3, 4-8, 11, 12
Twp. 111, Rge. 2, W4 Secs.: 1-4, E-2-5, 9-12

PERMIT 687701001:

Optioned from Flin Flon Mines Ltd.
Anniversary Date: January 4, 1980

78 Sections = 49,920 Acres

Twp. 108, Rge. 1, W4	Secs.: 19-21, 28-33
Twp. 108, Rge. 2, W4	Secs.: 22-27, 34-36
Twp. 109, Rge. 1, W4	Secs.: 3-10, 13-36
Twp. 109, Rge. 2, W4	Secs.: 1-3, 10-15, 22-27
Twp. 110, Rge. 1, W4	Secs.: 1-13

PERMIT 10L 77-479:

Optioned from Flin Flon Mines Ltd.
Anniversary Date: June 16, 1980

15 1/2 Sections = 9,920 Acres

Twp. 108, Rge. 1, W4	Secs.: NW/4-13, N/2-14, 15 N/2 + SE/4-16.
Twp. 109, Rge. 1, W4	Secs.: 1, 2, 11, 12

19780012

Line M

GRAVELY SILT

LEAD MINERAL CONCENTRATION

LINE M

Base level 1.50 m

Gravelly silt

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GRAVITY SURVEY
F550 MINERAL SURVEY
OLD FOR PRUDD

LINE 6

100 Meters

Surface Elevation
Top of Section
Base of Section
Mid-Section

Gravity
100

100

100

100

100

100

100

100

100

100

100

19780012
Line H

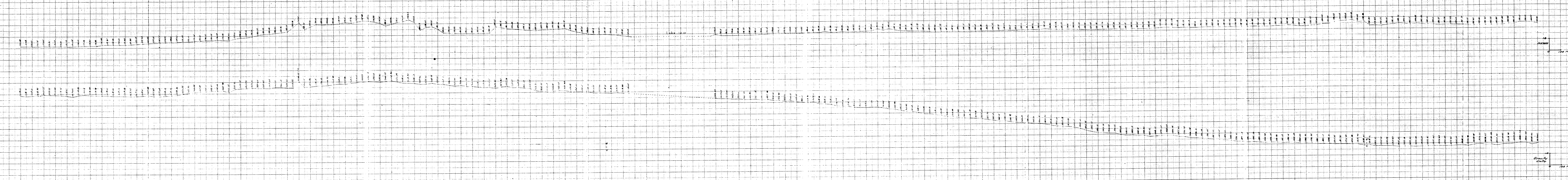
GRAVITY SURVEY
ES&O MINERALS CANADA
OLD FORT PROJECT

LINE-H

Surface Density: 1.82 g/cm³
Lat. Corr.: -00257 g.u/m
Flow Corr.: 2.3318 g.u/m
H.I. Corr.: 3.0853 g.u/m

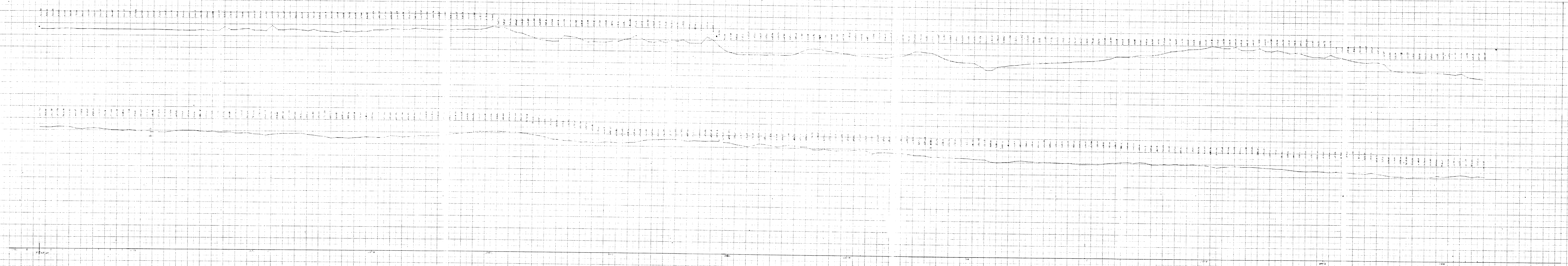
Vertical Scale: Gravity 1cm:5gu
Elevations 1cm:5m
Horizontal Scale: 1cm:50m

Date: July 1978



19790012

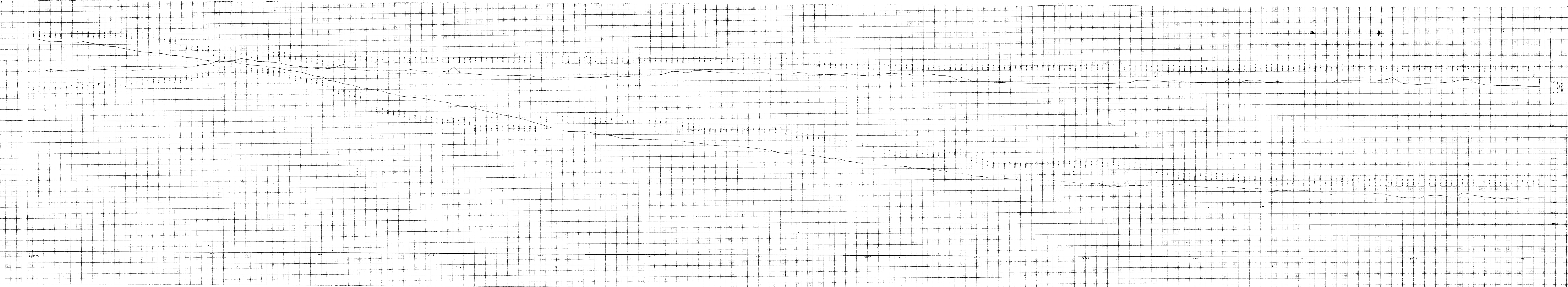
Line D



LINE D

100 FEET
100 METERS

19780012
Line BC



Scale
100 METERS

GRAVITY SURVEY
ESSEX MINERALS CANADA
DORSET PROJECT

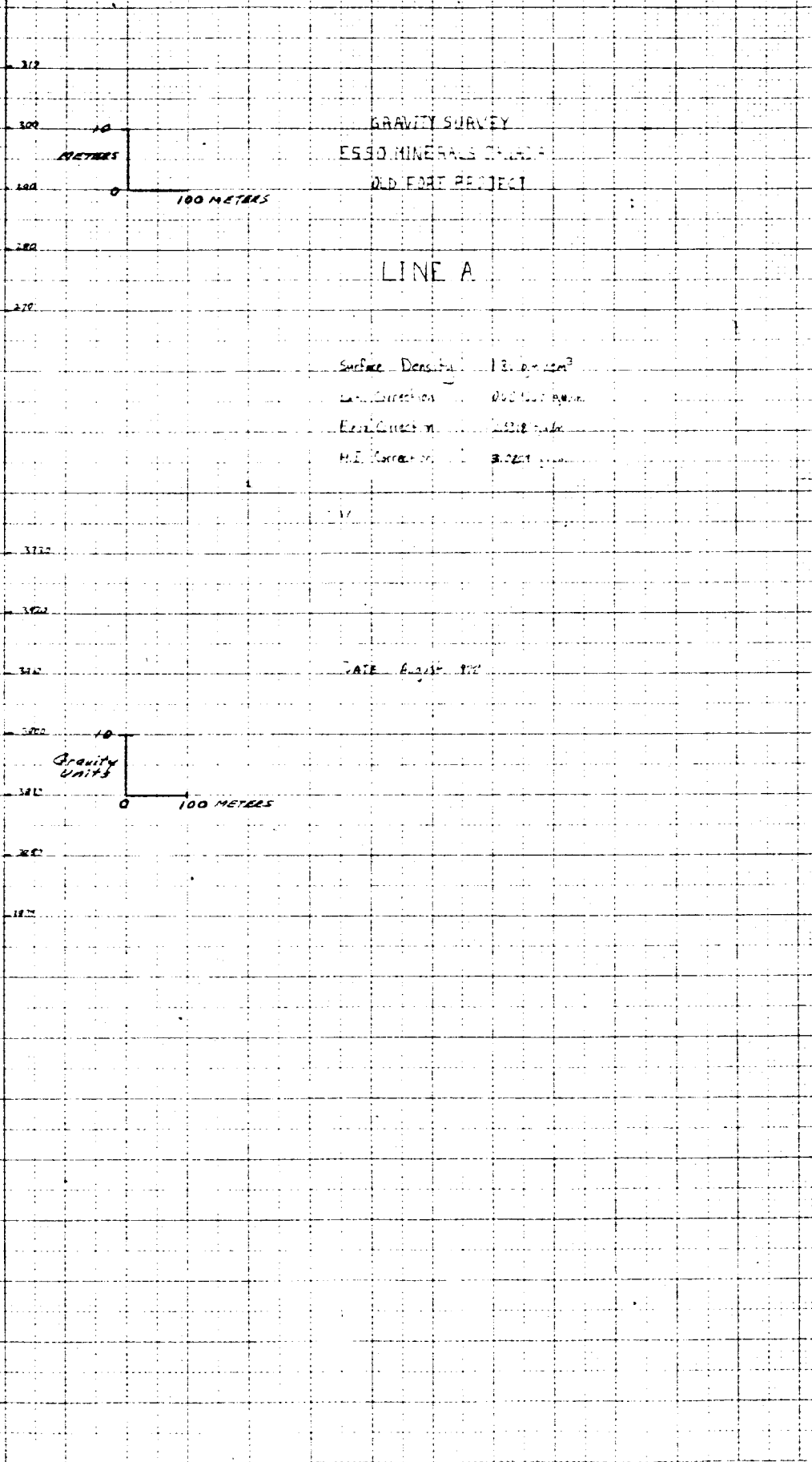
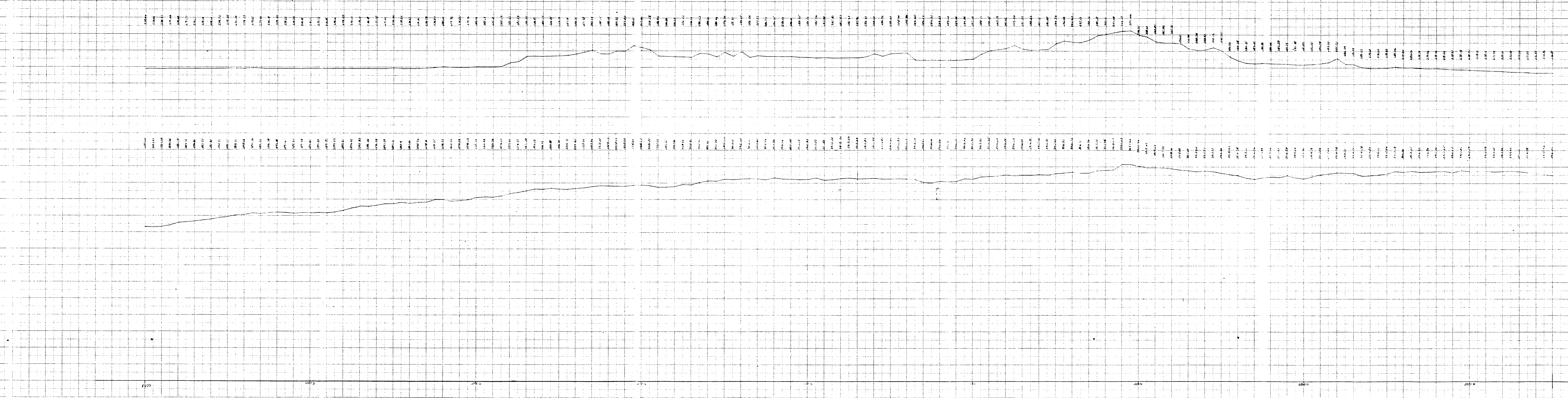
LINE BC

Surface elevation 1000
Sea level 0
Base level 1000
Top level 1000

Scale
100 METERS

19780012

Line A



GRAVITY SURVEY
ESB MINERALS INC.
W. DEPT. 100

LINE A

Surface Density: 1.8 g/cm³
Latitude: 42° 15' N
Longitude: 112° 15' W
M.T. Correlation: 0.721

DATE: 8-15-70

