83-#703 - 11697

1184

ASSESSMENT REPORT

ON

THE KAREN MINERAL CLAIM

MOUNT BEGBIE AREA

REVELSTOKE MINING DIVISION

NTS 82L/16E
LATITUDE 50°50'30"
LONGITUDE 118°06'20"

Owner: Aurun Mines Ltd.
Operator: Aurun Mines Ltd.
Author: E. Horne
Date: November 17th, 1983

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APPENDICES

1.0 INTRODUCTION

1.1 General

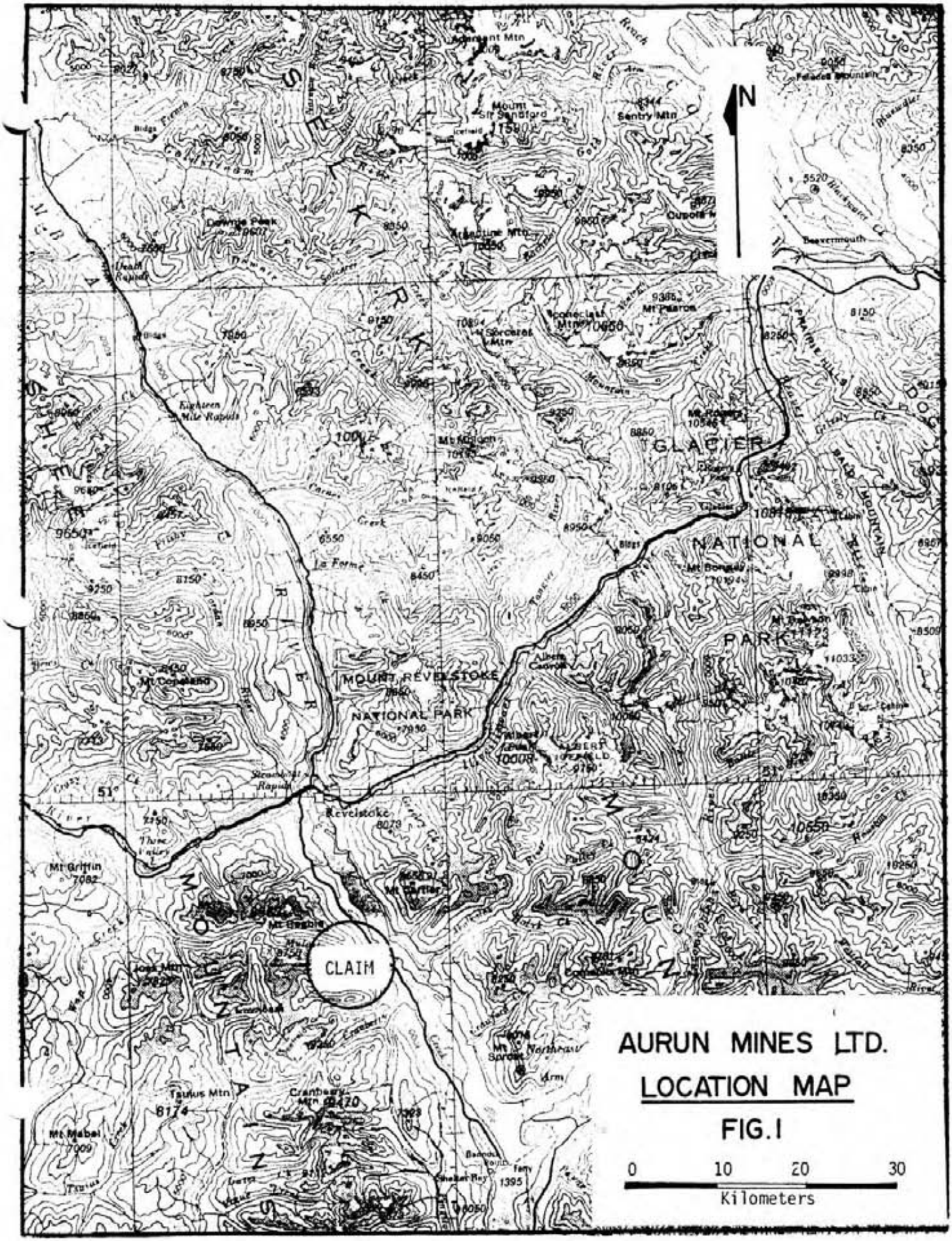
This assessment report on the Karen Claim is submitted to the British Columbia Department of Mines and Petroleum Resources in compliance with the Mines Regulation Act pertaining to application for assessment credit for all work done in 1982 and 1983.

The Karen Claim is located at latitude 50°50'30" north and longitude 118°06'20" west in the Mount Begbie area of the Revelstoke Mining Division; NTS 82L/16E; see Figures 1 and 2.

The property is comprised of a nine (9) unit Karen Mineral Claim staked three (3) units south and three (3) units east of the legal corner post; record number 1535, date of approval November 17th, 1983.

Approximately 10% of the claim area (south-east corner) is located within the Blanket Creek Recreational Reserve and does not carry title to mineral or surface rights (See Figure 3). A section of the claim adjacent to the Columbia River is also encumbered by British Columbia Order in Council Number 33. Aurun Mines Ltd. has signed the necessary release forms.

The mineralization previously reported in the area consisted of a narrow, strongly radioactive zone of muscovite schist that contained significant amounts of thorium and rare earth elements of the lanthanide series. The claim area is underlain by quartzite gneiss and schist of the Shuswap metamorphic assemblage, anomalous radioactivity believed to be due primarily to thorium and rare earth elements is evident in some of the quartzite and muscovite schist. The economic assessment of the property to date by Aurun Mines Ltd. is that the claim requires some further prospecting, sampling and mineralogical work for rare earth minerals, although no zones of high concentration have been encountered by personnel for Aurun Mines Ltd. up to this point in time.



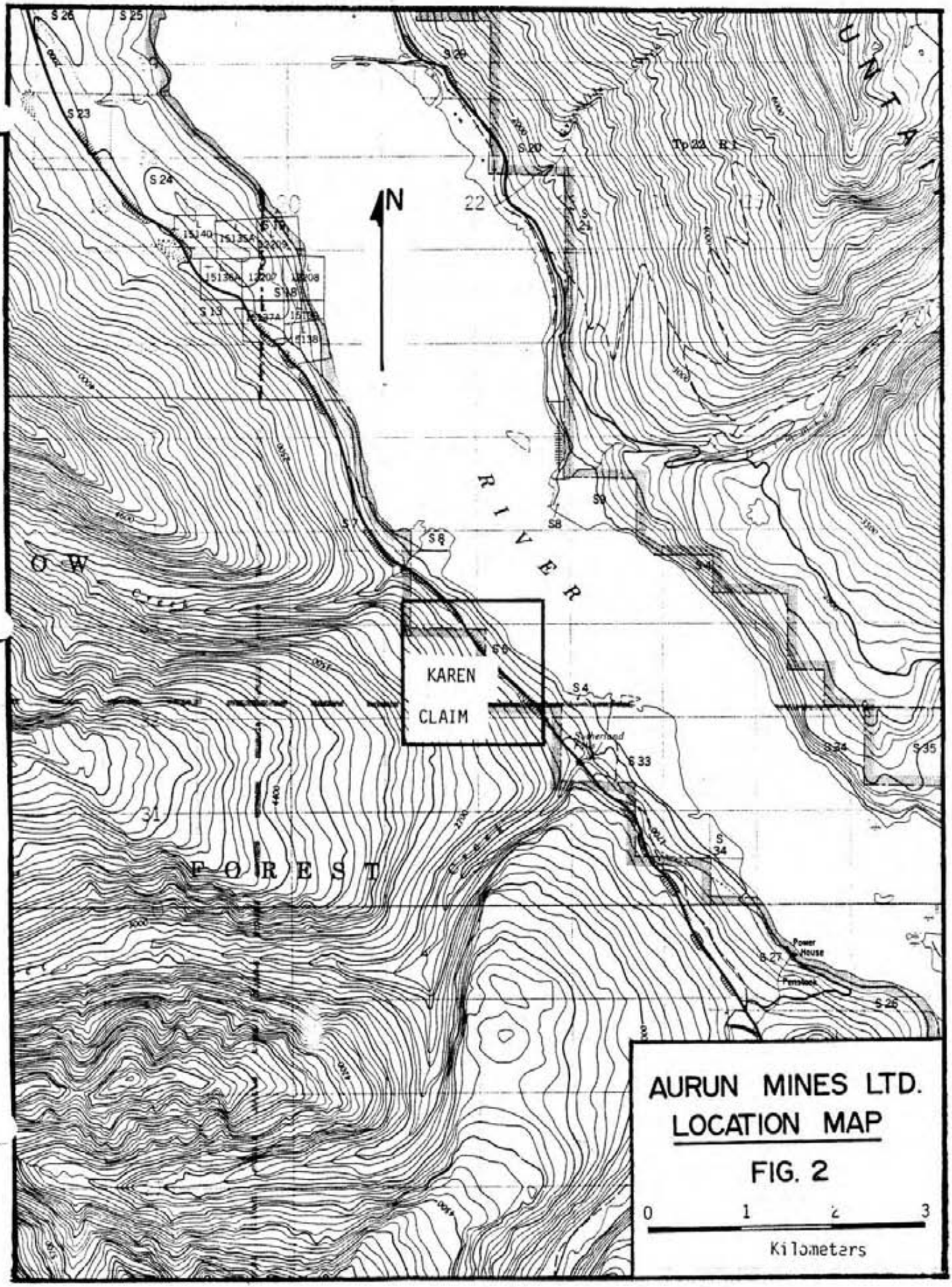
AURUN MINES LTD.

LOCATION MAP

FIG. I

0 10 20 30

Kilometers


S 26
S 25
S 23
S 24
S 29
S 20
Tp 22 R 1
22
N
S 19
S 18
S 13
S 7
S 8
S 9
S 17
S 16
S 4
S 33
S 34
S 35
S 27
S 28
KAREN
CLAIM
RIVER
FOREST
Power House
Penstock
AURUN MINES LTD.
LOCATION MAP
FIG. 2
0 1 2 3
Kilometers

1.2 Location Access and Topography

The Karen Claim is located at latitude 50°50'30" longitude 118°06'20" west in NTS 82L/16E of the Revelstoke Mining Division. The claim adjoins the Columbia River on the west approximately 22 kilometres south of Revelstoke on Highway 23. The claim is bounded to the north by Mulvehill Creek and to the south by Blanket Creek.

The topography ranges from approximately 425 metres on the Columbia River to 1005 metres (AMSL) on the southwest corner. The claim is heavily timbered and has approximately 20% outcrop. The area has undergone intense glaciation and outcrop surfaces exhibit numerous polished surfaces with glacial striation, chatter marks and roches moutonnees.

A portion of the claim falls within mineral reserve as established by Order in Council Number 33 on January 5th, 1961 and is held only under release to the Crown as it falls within an area of hydro-electric development. Part of the claim is also located within the Blanket Creek Recreation Reserve (as shown on Figure 3) and as such is not held by Aurun Mines Ltd.

The location of the claim as shown on Figure 3, which is as received from the Gold Commissioner, Mr. D.G.B. Roberts on January 24th, 1983, is after recent field examination possibly in error. The Gold Commissioner in Revelstoke has been notified on a separate basis in order to facilitate timely completion of this report.

1.3 History and Ownership

The Karen Claim is presently held by Aurun Mines Ltd. The claim was originally staked by Mr. J.E. Dagenais, assisted by the author of November 11th, 1982. The claim record was approved on November 17th, 1982 and transferred to Aurun Mines Ltd. by Bill of Sale on December 21st, 1982.

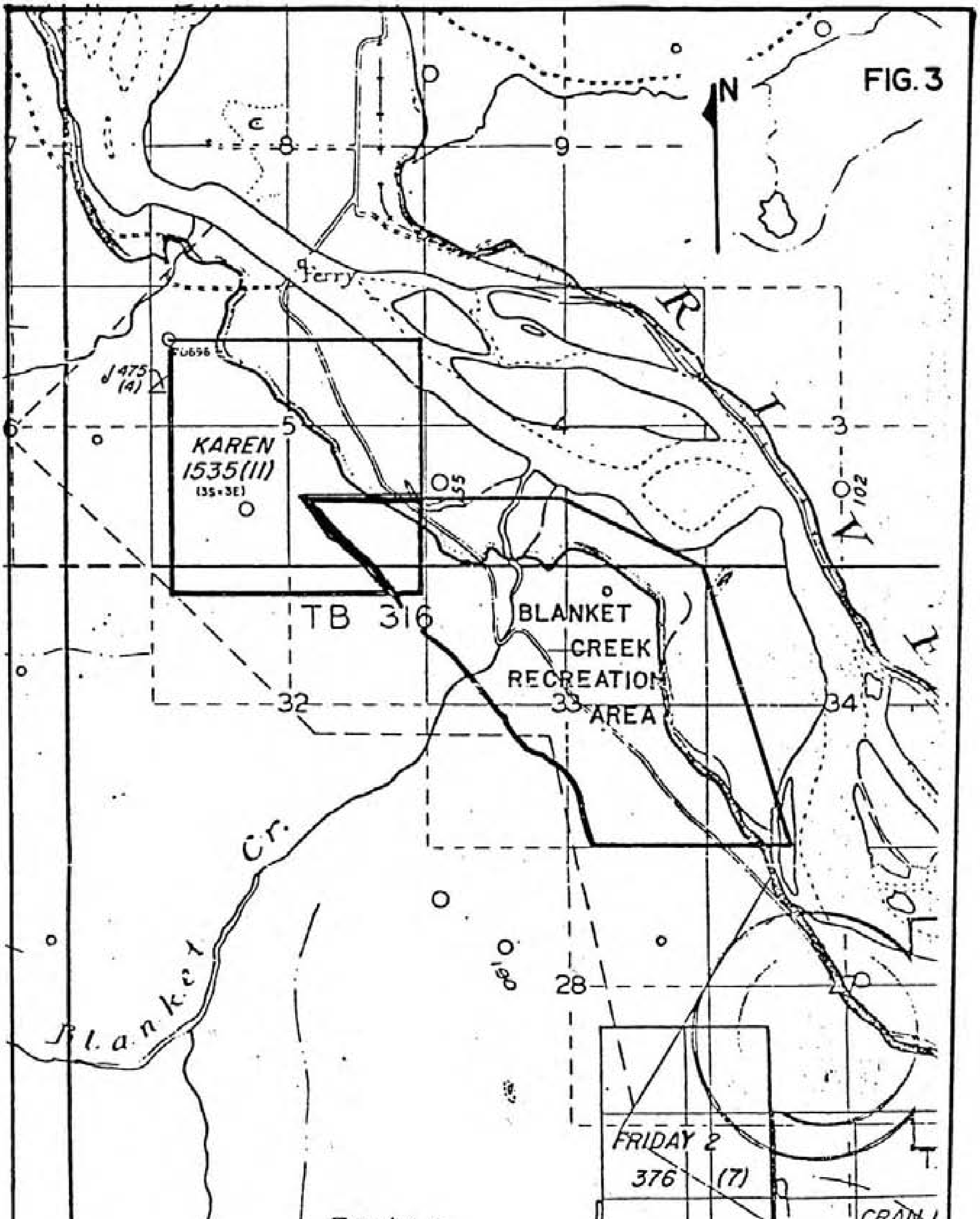


FIG. 3
N
Ferry
8
9
5
3
6
32
33
34
28
KAREN
1535(11)
(35-3E)
TB 316
BLANKET
CREEK
RECREATION
AREA
Blanket Cr.
FRIDAY 2
376 (7)
CRAN.I
387(9)
R I V E R

Previous claims in the vicinity were ARCL 1 & 2 staked by Guy Allen on April 16th, 1978. Far 6 316(12) and Thor-Obin 323(3).

The ARCL 1 & 2 claims were prospected by Mr. Walter Buller of Grand Forks, B.C. on behalf of Wollex Exploration Ltd. of Calgary, Alberta. A report titled "Prospecting Report on Mineral Claims", ARCL No. 1 & 2, Revelstoke Mining Division 82L/16 written by Guy Allen, P. Eng. dated March 31, 1979 is enclosed in Appendix 3 to assist the reader with some background data for this property. No assessment is claimed with submittal of this older report.

1.4 Summary of Work Done

1.4.1 General

The work done on the claim during 1982 and early 1983 consist of two visits to the property as follows:

a) J.E. Dagenais and E.J. Horne on November 10th and 11th, 1982 at which time the property was staked and some preliminary sampling was done. The weather was poor (rain and snow).

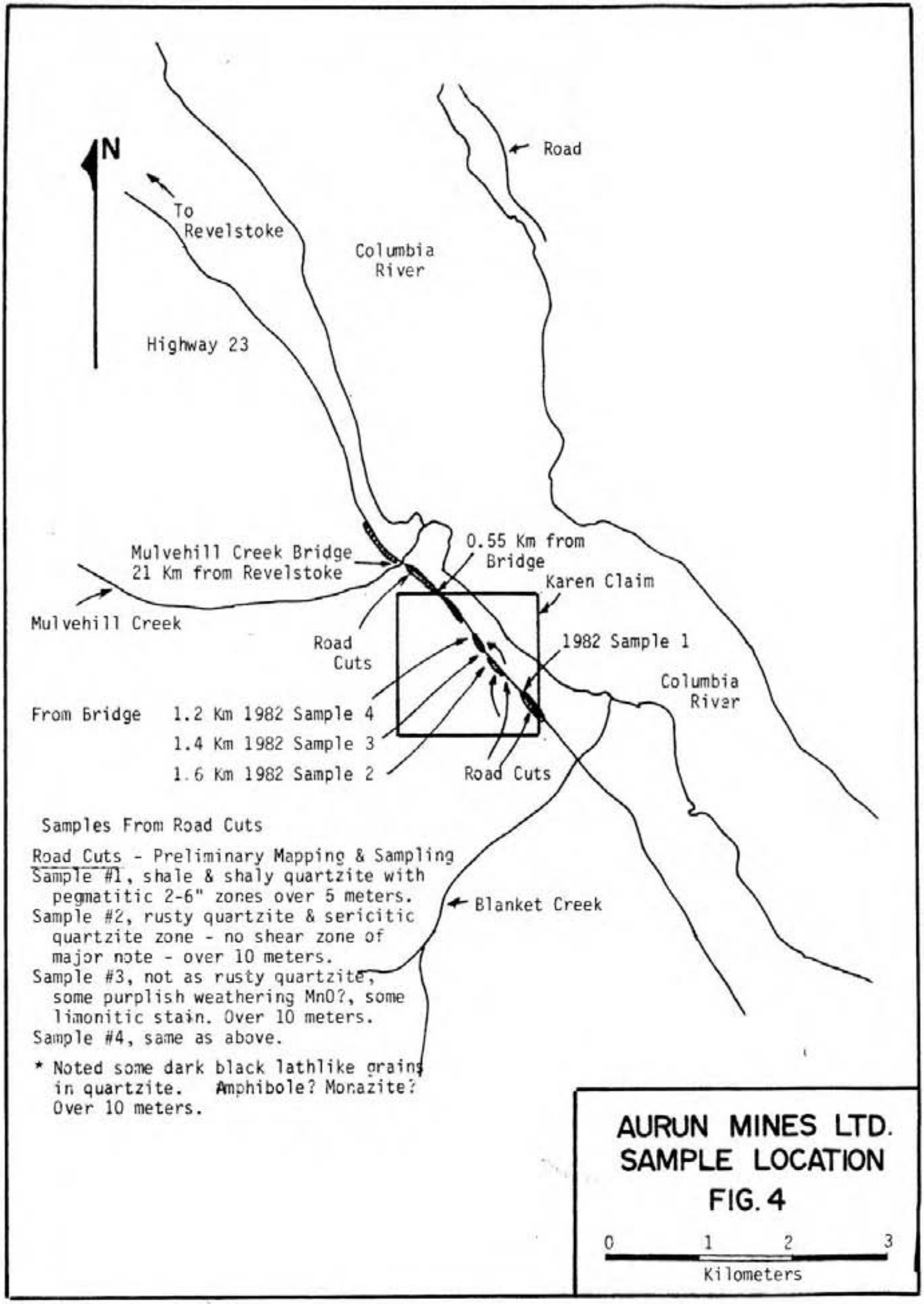
b) E.J. Horne and R. Dean on November 2nd and 3rd, 1983 for the purposes of sampling, model TV-1A spectrometer testing and geological mapping in the area of previously reported radioactivity as per Mr. Guy Allen's prospecting report enclosed in Appendix 3. The weather on both days was poor (rain).

In all of the visits access to the property was by two-wheel drive vehicle.

1.4.2 Geological Work

The geological work done to date consists of mapping outcrop along the highway road cuts. All principal outcrops were located by belt chain and compass. The results of this mapping is shown on Fig. 4 and Map 1-1 scale 1:2,000. Detailed attention was given to the road cuts for the following reasons.

a) The previously reported anomalous radioactivity was reported along the road cuts. All the previous sampling was also done along the road cuts.


N
To Revelstoke
Road
Columbia River
Highway 23
Mulvehill Creek Bridge
21 Km from Revelstoke
0.55 Km from Bridge
Karen Claim
Mulvehill Creek
Road Cuts
1982 Sample 1
Columbia River
From Bridge
1.2 Km 1982 Sample 4
1.4 Km 1982 Sample 3
1.6 Km 1982 Sample 2
Road Cuts
Samples From Road Cuts
Road Cuts - Preliminary Mapping & Sampling
Sample #1, shale & shaly quartzite with pegmatitic 2-6" zones over 5 meters.
Sample #2, rusty quartzite & sericitic quartzite zone - no shear zone of major note - over 10 meters.
Sample #3, not as rusty quartzite, some purplish weathering MnO?, some limonitic stain. Over 10 meters.
Sample #4, same as above.
* Noted some dark black lathlike grains in quartzite. Amphibole? Monazite? Over 10 meters.
Blanket Creek
AURUN MINES LTD.
SAMPLE LOCATION
FIG. 4
0 1 2 3
Kilometers

	T1	T2	T3
	Counts Per Minute		
NW corner Blanket Creek Bridge (held in holster)	3000	200	65
NW corner Blanket Creek Bridge (held to ground)	4000	200	80
SE corner Mulvehill Creek Bridge (held in holster)	4500	240	60
SE corner Mulvehill Creek Bridge (held to bedrock)	6000	400	85
Average background reading in holster	3750	220	62.5
Average background reading to ground	5000	300	82.5
Average overall background reading	4375	260	72.5

These background readings have not been subtracted from the measurement readings. The background is high by general standards and these stations were established for purposes of quick field reference. Most of the radioactive count would appear to be due to thorium. This can be determined as per Section 3 of Appendix 1 and using an average background reading of T3(thorium) of 72.5 CPM and T2 (uranium and thorium) of 260 CPM is T2 - 3.5 T3 or 6.25 CPM (uranium) approximately 1 PPM calculated uranium. It should be noted that calculations of uranium or thorium are not accurate if the uranium is not in equilibrium and laboratory determinations done to date in this regard indicate that it is not. However, they also indicate that the uranium values are very low.

2.0 DETAILED TECHNICAL DATA AND INTERPRETATION

2.1 Geological

The detailed geological mapping data is plotted on Map 1-1. The claim area is underlain by highly metamorphosed quartzite, biotitic schist (quartz-biotite schist) and quartz-muscovite schist of the Shuswap metamorphic assemblage of Archean or Paleozoic age. This assemblage is highly folded in the Mount Begbie area with major structures such as the Begbie anticline Tilley anticline and the Mulvehill syncline. In the immediate claim area, the assemblage appears to be folded along the easterly trending recumbent Begbie anticline. The rocks in the claim area form part of an easterly dipping sequence of quartzite, ptygmatic biotite schist, quartz-muscovite schist which are near the eastern limit of the Shuswap complex. The rocks are bounded to the east by the Columbia River fault zone. A major composite structure dipping 20-30° easterly and extending northerly for 250 kilometers form south of Nakusp, British Columbia.

The strike and dip of the exposures mapped along the highway cuts ranges from azimuth 130 to 180 with dips from 15-40° east. The mean strike is azimuth 150 with a dip of 25° east.

Conjugate joining is pronounced with joint repetition on a 1-5 metre spacing at azimuth 080 to 100 at 85° N to vertical and at azimuth 170 to 185 at 85° W to vertical. The joint surface often have minor limonitic staining which in very localized areas has slightly higher radioactivity. Conclusions so far, however, are that the rusty zones do not indicate values with higher than normal radioactivity on any patterned basis and could not be used as indicators for "richer" zones.

Some narrow zones and small patches of unaltered quartz-muscovite schist and banded quartzite show above background radioactivity believed to be due primarily to thorium and rare earth minerals. No structural definition to these radioactive zones was established; the radioactivity is spotty (discontinuous) and very local in nature.

No normal granitic rocks were noted in the area, however, there locally is up to 15% pegmatitic concordant lenses and sills within the biotite schist and quartz-biotite schist. No stronger radioactivity was noted within or adjacent to these pegmatitic lenses, which frequently have quartz zones with minor tourmaline mineralization. These pegmatites have a quartz-feldspar ratio of 2:1 or 3:1. Tourmaline crystals were noted up to 20 mm long but averaged 2-5 mm long. Other minerals noted in the pegmatites were coarse muscovite and minor garnet. The U_3O_8 (uranium) values determined by fluorimetric uranium analysis on samples collected in areas of high radioactivity counts returned values of 2.4 to 6.2 ppm U_3O_8.

The U_3O_8 (uranium) values determined by radiometric uranium analysis (uranium in dis-equilibrium) were from 0.004 to 0.006% calculated U_3O_8 which corresponds to 40 to 60 ppm chemical U_3O_8.

No areas encountered have uranium exceeding 0.05 Kg U_3O_8 per tonne of mineral in place. The uranium analyses were done to basically confirm this as the area has been prospected by radioactivity means to search for concentrations of rare earth elements.

One sample taken in November, 1982 (chip sample #3 on analysis by Loring Laboratories of Calgary, Alberta gave 0.006% calculated U_3O_8 by radiometric U_3O_8 analysis. This sample was sent to X-ray Assay Laboratories Limited in Ontario, Canada for rare earth lanthanide series elemental analysis. The data on this is summarized in Section 2.3. This sample confirmed the presence of some rare earth elements principally cerium (Ce) 110 ppm, lanthanium (La) 55 ppm, neodymium (Nd) 31 ppm and some thorium (Th) 40 ppm.

The principal suspected rare earth minerals are monazite (Ce, La, Di) PO_4 with Th O2, Allanite, Euxinite - Polycrase a Yttrotantalite group mineral subspecies and MacKintoshite - Thorogummite, - Gadolinite mineral subspecies of the datolite group. Gadolinite Be_2 Fe Y_2 Si_2 O_{10} which may contain cerium lanthanum and didymium may have been in fact considered to be tourmaline. Further work should include mineralogical identification.

2.2 Geophysical

Results of Radioactivity Readings - A list of all readings taken is provided in Appendix 2 and are shown on Map 1-1. All these readings were taken on November 2nd and 3rd, 1983.

The localities were the highest radioactive spectrometer readings were observed were also sampled after a second radioactive spectrometer reading was taken. These localities gave very sporatic and variable readings within 0.3-1.0 metres.

The sampled localities are as follows.

	TV-1A readings in cpm				Loring Laboratories Ltd. Fluorimetric U_3O_8
	T1	T2	T3	Sample No.	ppm
Bedrock at 1+49 metres	70000	3500	1000	6803	6.2
Bedrock at 2+20 metres	42000	3300	900	6802 Composite	5.6
Bedrock at 2+30 metres	65000	3100	950	6802 Composite	5.6
Bedrock at 3+32 meters	61000	3300	1100	6801	6.2
Bedrock at 4+40 metres	51000	2500	800	6804	2.4
Bedrock at 9+90 metres	42000	2200	620	6805	3.2
Bedrock at 12+30 "	14000	710	150	6806	3.6

Other high readings in areas not sampled are:

	T1	T2	T3	
Bedrock at 1+70 metres	52000	2600	650	No assay
Bedrock at 1+80 "	48000	2400	800	No assay
Bedrock at 1+90 "	52000	2500	900	No assay
Bedrock at 3+30 "	44000	2200	630	No assay
Bedrock at 4+30 "	27000	1400	440	No assay
Float at 6+10 metres	80000	4200	1400	No assay

Spectrometer readings taken in 1983 at localities of November, 1982, field sample numbers 1-4, selected chip samples.

	T1	T2	T3	Loring Laboratories Ltd. Calc. U_3O_8%
Bedrock in vicinity of 6+50	8000	600	110	0.005%
Bedrock in vicinity of 8+50	7800	500	80	0.004%
Bedrock in vicinity of 10+05	7500	430	110	0.006%
Bedrock in vicinity of 14+50	4500	280	40-85	0.005%

2.3 Laboratory Results

All laboratory results taken to date are included in Appendix 4. The analyses were performed by Loring Laboratories Ltd., 629 Beaverdam Road N.E., Calgary, Alberta. The results obtained to date are not conclusive, and further evaluation of the results should be done prior to requesting more analysis.

The samples sent to Loring Laboratories for radiometric analysis in 1982 gave results as follows.

	Beta Counts	Beta % U_3O_8	Gamma Counts	Gamma U_3O_8	Calculated
Sample 1	136	.004	321	.003	.005
Sample 2	188	.005	392	.004	.006
Sample 3	149	.004	468	.004	.004
Sample 4	163	.005	610	.005	.005

One conclusion that can be made is that the uranium is not in equilibrium. The other conclusion is that the samples contained a calculated 40 to 60 ppm U_3O_8.

The samples sent to Loring Laboratories in November, 1983 for fluorimetric uranium analysis gave results as follows.

Sample	U_3O_8 ppm
6801	6.2
6802	5.6
6803	6.2
6804	2.4
6805	3.2
6806	3.6

These samples were taken in localities of the highest radioactive spectrometer counts with as in the case of sample 6803 located at 1+49 metres (149 metres south of the north claim boundary on the west side highway 23 rockcut) which gave a 70000 cpm total count 3500 cpm (uranium and thorium) count and 1000 cpm (thorium) count. Sample #2 (from 1982) was sent to X-ray Assay Laboratories Ltd., 1885 Leslie Street, Don Mills, Ontario for rare earth lanthanide series analysis. The results are as follows.

Y - 20 ppm; La - 55 ppm; Ce - 110 ppm; Nd - 51 ppm; Sm - 18.0 ppm; Eu - 1.0 ppm; Tb - 1.4 ppm; Dy - 5.3 ppm; Yb - 1.5 ppm; Lu - 0.20 ppm; Pr - 4.0 ppm; U - 4.0 ppm; Th - 40.0 ppm.

2.4 Summary and Conclusions

Preliminary conclusions reached to date are that the banded quartzite and quartz-muscovite schist has localized "patchy" higher than normal or background radioactivity due primarily to thorium and rare earth minerals. The details on mineralogy are yet to be determined and the values are to date too low to warrant much more than further prospecting with the hope of encountering more favourable zones and perhaps mineralogical and chemical testing to assist in the formulation of guidelines to be used when prospecting the claim.

It is possible that some zones may in fact contain higher rare earth contents such as those previously reported to be in the order of 3600 ppm La, 8150 ppm Ce, 800 ppm Pr, 3800 ppm Nd per the certificate of assay enclosed in Appendix 3. No analyses by Aurun Mines Ltd. have shown values close to this as of yet but further rare earth elemental analysis may be requested on a composite sample of 6801, 6802 and 6803 during the winter months.

3.0 ITEMIZED COST STATEMENT

3.1 Wages

Number of mandays = 4.0	
2.0 days - 1 person on November 2nd and 3rd, 1983 @ $215/day	$ 430.00
2.0 days - 1 person on November 2nd and 3rd, 1983 @ $125/day	250.00
2 x $340.00	
Total	$ 680.00

3.2 Food, Accommodation and Supplies

Number of mandays = 4	
2.0 days - 2 persons on November 2nd and 3rd, 1983	
@$66.07 per manday	
4 x 66.07 = 264.28	
Total	$ 264.00

3.3 Transportation and Equipment Rental

Number of equipment days = 2	
For transportation from Alberta - British Columbia border to the site and work on the site as well as radiation spectrometer rental @ rate per day all equipment $70.00	
2 x $70.00 = 140	
Total	$ 140.00

3.4 Laboratory Testing

Number of tests = 10	
Flourimetric uranium analysis @$12.50	
10 x 12.50 = $125.00	$ 125.00
Number of tests = 1	
Rare earth analysis (lanthanide series) @$90.00	
1 x 90.00 = 90.00	$ 90.00

3.5 Cost of Report

Compilation and drafting	
2 days @ $215/day	
2 x 215.00 = 430.00	$ 430.00
Typing and xeroxing $70.00	$ 70.00
Total	$ 500.00
Grand Total	**$1,799.00**

3.6 Apportionment of Work Costs

Claim

Karen 100%

Field Sampling and Geological Mapping

2 man/days @ $215.00 or $430.00

Geophysical Work; 1.3 Line Kilometres; 417 Readings

2 man/days @ $125.00/day or $250.00; 0.60/reading

Analysis

11 for $215.00; Average $19.50

Cost of Report

$500.00

4.0 QUALIFICATIONS

4.1 Statement of Qualifications (Author)

I, Emmett J. Horne of the city of Calgary in the Province of Alberta and the city of Victoria, British Columbia do certify the following.

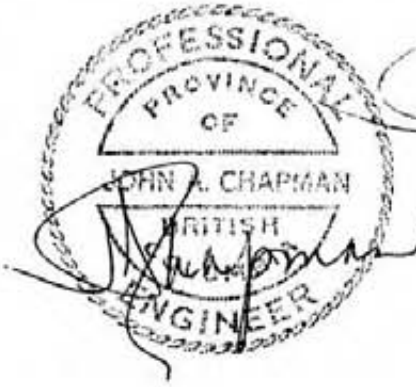
1. I have been employed as a geologist with Aurun Mines Ltd. since July of 1982, both as a permanent employee and as a contract geologist.
2. I am a graduate of the University of Saskatchewan with a degree in Geology in 1967 and have practiced my profession continually since then.
3. I am a member of the Canada Institute of Mining and Metallurgy.
4. Previous employers and positions are as follows:
   a) Saskatchewan Department of Mines and Resources (field season)
   b) Ontario Department of Mines (field season, Senior Geologist)
   c) Noranda Mines, Geco Division (two years Staff Geologist)
   d) Scurry-Rainbow Oil Ltd. and Bolivia Limitada (two years Project Geologist)
   e) Iron Ore Company of Canada (six years, Geologist and supervisory positions)
   f) Syncrude Canada Ltd. (four years, Senior Geologist, Operations)
   g) Alsands Energy Ltd. (one and a half years, Senior Geologist)
5. I visited the site with Mr. R. Dean (assistant) on the 2nd and 3rd of November, 1983.
6. I have no direct financial interest in the property, however, I will be receiving stock options in Aurun Mines Ltd. in the near future.

E.J. Horne
Geologist

4.2 Professional Certification

I, John Arthur Chapman of the City of Calgary in the Province of Alberta hereby declare:

1. That I am a registered professional engineer in the Province of British Columbia.
2. That I am an honours graduate in Mining Technology from British Columbia Institute of Technology (1967).
3. That I am an honours graduate in Mining Engineering from Colorado School of Mines (1971).
4. That I am a member of the Canadian Institute of Mining and Metallurgy, and the American Institute of Mining, Metallurgical and Petroleum Engineers.
5. That this report entitled "Assessment Report in the Karen Mineral Claim, Mount Begbie Area, Revelstoke Mining Division" is a summary of work performed on the subject claim during 1983.
6. That to the best of my knowledge the aquisition of the data and expenditure claimed for the performance of work as presented in the Statements of Exploration and Development dated November 14, 1983 is correct.
7. That I have a financial interest in the property described.



J.A. Chapman, B.Sc., P.Eng.

APPENDIX I

SPECIFICATIONS AND OPERATING MANUAL

FOR McPHAR TV-1A RADIATION SPECTROMETER

MODEL TV-1A

SPECTROMETER

CONTENTS

SECTION 1

INTRODUCTION

Model TV-1A is a three threshold spectrometer. Measurements are based on the spectral characteristics or energy levels of gamma radiation from radioactive elements. Selection of the operating threshold is made by means of the threshold selector switch.

The instrument is designed primarily for reconnaissance. The selective thresholds however provide the capability to differentiate between gamma radiations emanating from uranium and thorium and to provide quantitative information relating to each.

The meter is calibrated to display zero to 100 counts per minute. A four position scale multiplier switch provides four full scale ranges of 100, 1000, 10,000 and 100,000 counts per minute. A fifth position on this switch is employed to test the condition of the batteries.

The variable time constants are tied in with the threshold selector switch. In the wide open (maximum sensitivity) operation, a fast or slow time constant may be sele ted. In the upper thresholds (lower net count), the long time constant only is in effect.

The detecting element is a 1.5 by 1.5 inch sodium iodide crystal coupled to a photomultiplier tube. These are hermetically sealed, magnetically shielded and mounted in the forward end of the spectrometer housing.

A speaker provides a variable pitch output with changing radiation levels. A speaker control, mounted on the top of the instrument, can be used to adjust the pitch for any given level of radiation.

SECTION 2

SPECIFICATIONS

2 - 1 THRESHOLD POSITIONS

T_1 at 0.2 MEV. - measures the total count across the entire gamma energy spectrum for maximum sensitivity.

T_2 at 1.6 Mev. - measures characteristic uranium and thorium radiations.

T_3 at 2.5 Mev. - measures diagnostic thorium radiations only.

2 - 2 MEASUREMENT RANGES

Range Switch Position	Full Scale Counts
x 1	100
x 10	1,000
x 100	10,000
x 1000	100,000

2 - 3 TIME CONSTANTS

T_1 F (Fast) - 1 second

T_1 S (Slow) - 10 seconds

T_2 - 10 seconds

T_3 - 10 seconds

2 - 4 SPEAKER

A speaker is mounted in a top compartment of the instrument. The variable pitch output of the speaker is governed by the intensity of radiation and can also be adjusted by a speaker pitch control.

2 - 5 BATTERY SUPPLY

The instrument operates from two "c" size flashlight type cells, located in the handle. Ordinary zinc carbon cells may be used. From the standpoint of longer life and low temperature operation, the alkaline type should be employed wherever available. Both the high and low voltages, generated internally to operate the instrument, are regulated to a high degree of stability. The batteries can be allowed to drop to one half of their initial voltage without any effect on the operation of the instrument.

2 - 6 SENSITIVITY

The instrument, on threshold 2, registers approximately 50 counts per minute on an in-situ measurement, (2π geometry) over homogeneous material containing 5 parts per million uranium or thorium.

2 - 7 TEMPERATURE RANGE

The instrument has been designed to operate over the temperature range of -35 to +55 degrees centigrade. Low temperatures require the use of alkaline type batteries.

2 - 8 DETECTOR CRYSTAL

The sodium iodide crystal is 1.5 inch in diameter and 1.5 inches thick. The crystal is coupled to the photomultiplier in a permanent hermetically sealed housing.

2 - 9 WEIGHT

The total wieght of the instrument is 3 pounds. (1.4 Kg)

2 - 10 DIMENSIONS

The length including rubber end guards is 13 inches. (33 cm)

The maximum height is 8 inches. (20 cm)

2 - 11 ACCESSORIES

The spectrometer is supplied with a leather belt holster, a thorium calibrating source, spare batteries and an instruction manual.

SECTION 3

GENERAL DESCRIPTION AND APPLICATIONS

The gamma ray detecting principle lies in the sodium iodide crystal. Gamma rays entering the crystal, interact with the crystal atoms, resulting in free electrons and ight emission. The optically coupled photomultiplier converts the light emission to electrical pulses. The magnitudes of the electrical pulses bear a relationship to the energy levels of the intercepted gamma rays.

Various radioactive elements have characteristic gamma energy spectrums. The nature of the spectrum for a given element can be used to advantage in identifying it in the presence of other radioactive elements. Figure 1 shows spectral curves for the three main elements of interest in radioactive surveys; potassium, uranium and thorium.

Thorium emits gamma rays with energy levels exceeding 2.5 Mev. The highest energy radiation from potassium is about 1.6 Mev. The three vertical lines marked T_1, T_2 and T_3 show the location of the threshold settings of the TV-1A spectrometer after the instrument has been calibrated. Threshold T_3 at 2.5 Mev. allows only those electrical pulses to be registered whose amplitudes correspond to gamma rays with energy levels above 2.5 Mev. T_2 similarly responds to gamma energy levels above 1.6 Mev. When both thorium and uranium are

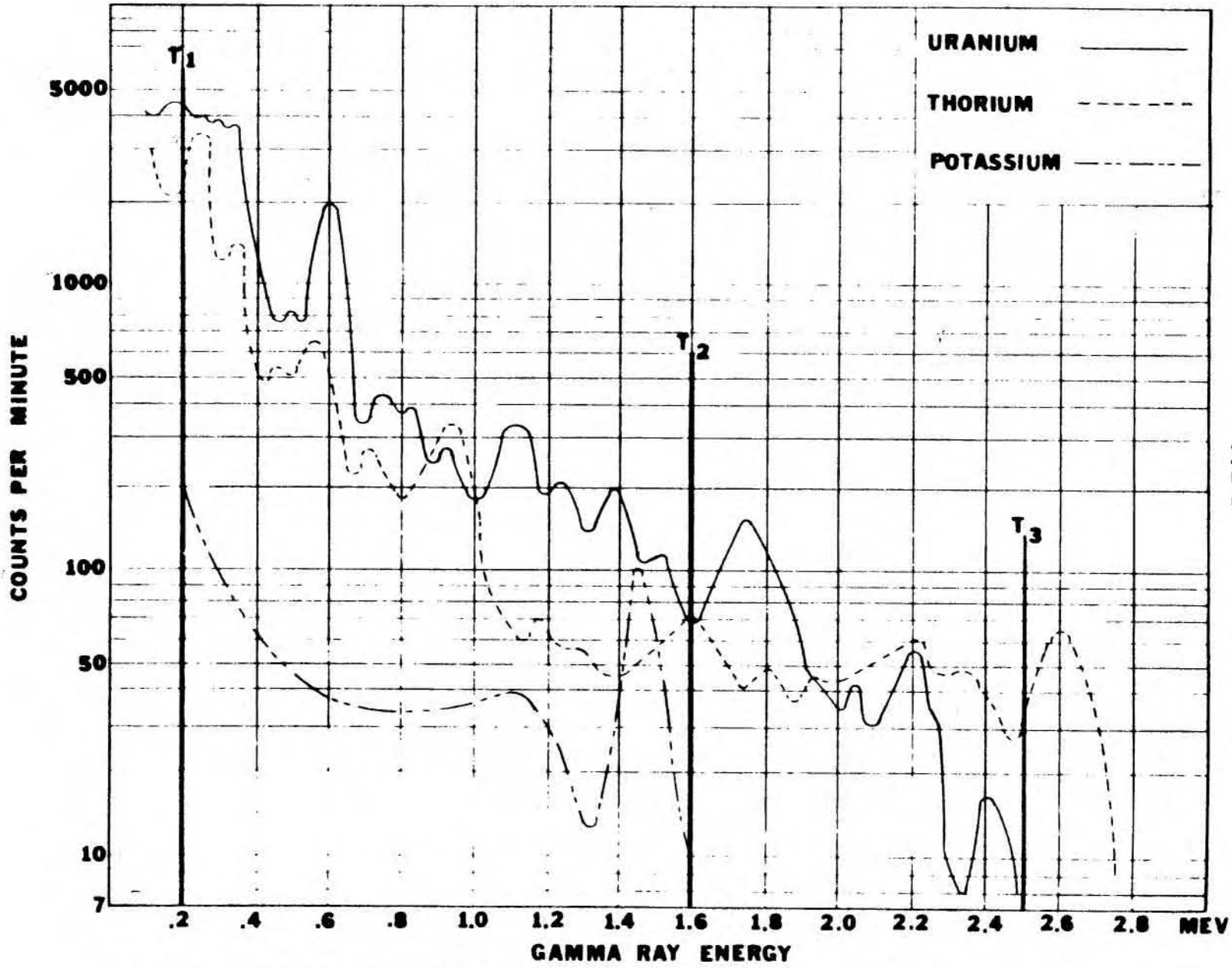


FIG-1

GAMMA RAY SPECTRA FROM NATURAL ORES OR THEIR CONSTITUENTS

present during a measurement, then the reading at T_2 contains counts resulting from both during a measurement, then the reading at T_2 contains counts resulting from both elements whereas T_3 contains counts from thorium only.

It is possible then, to subtract the count due to thorium in the T_2 reading, leaving the count from uranium only. The count representing thorium in the T_2 reading is a fixed multiple of the T_3 reading. In the TV-1A spectrometer, this multiple is 3.5. That is, the count in T_2 due to uranium is T_2-3.5 T_3. A thorium calibrating source and calibration procedure, provided with the instrument, ensures that this is always the case.

Once the count in T_2 has been resolved into net count for uranium, it is possible to arrive at a quantitative estimate of the material grade. This requires reference to certain conditions described n section 6-3.

SECTION 4

OPERATING INSTRUCTIONS

4-1 INSPECTION

After the instrument is unpacked, it should be carefully inspected for possible damage received during transit. If any shipping damage is detected, immediately file a claim for damage in shipment with the carrier.

4-2 CONTROLS AND THEIR FUNCTION

There are six controls on the instrument. Their functions are described below.

4-3 OFF-ON SWITCH

This is a slide switch located under the front barrel. The instrument is permanently turned on while this switch is in the on position.

4-4 TRIGGER SWITCH

This is a spring return on-off switch. Pulling the trigger will turn the instrument on. The instrument turns off when the switch is released.

Note: The trigger switch will over-ride the off-on slide switch when the slide switch is in the off position. The purpose of the trigger is to act as a battery saver when the instrument is used intermittently. The slide switch can be left in the OFF position.

4-5 METER SCALE SWITCH

This is a five position switch. Four positions are used to change the meter scale and the fifth is used to check the battery supply.

4-6 THRESHOLD SWITCH

This is a four position switch. The first two positions are used to select either the fast or slow time constant to be employed with threshold T_1. The remaining two positions select thresholds T_2 and T_3 to which the slow time constant, only, is applied.

4-7 SPEAKER CONTROL

This is a potentiometer control located at the top of the instrument. Rotation of this control performs the function of setting the sound pitch for any given radiation level. The setting of the control is at the operator's option and can be set to give zero output or a pitched

tone output at background levels. After a setting is selected, changes in repetition rate or frequency will indicate a change in background level.

4-8 CALIBRATION CONTROL

This control is concealed under the left hand vinyl covered panel. To expose the control, lay the instrument flat with the handle toward the operator and the meter to the right. Remove four panel retaining screws and note that there are two short screws and two long screws. The long screws fit the top and bottom holes. Lift the panel clear. This exposes the calibration control which is a small 10 revolution trimpot. A small screw driver is provided with the instrument to fit the adjustment screw on the potentiometer.

4-9 CALIBRATION PROCEDURE

1. Set the spectrometer on a flat surface with the calibration control facing up and the meter in an easily read position.
2. Turn the instrument ON with the slide switch.
3. Set the scale switch on the X 100 position.
4. Set the threshold switch on T_2.
5. Rest the thorium source on the barrel of spectrometer and move it forward or backward until the meter reads 90 divisions. This is 9000 counts per minute and well above the influence of any background.
6. Switch the threshold switch to T_3 and read the meter. It should read 25 divisions to have the necessary ratio of $\frac{T_2}{T_3} = 3.5$

7. If the meter does not indicate 25 divisions then adjust the calibration until a reading of 25 is obtained.

8. Return the threshold switch to T_2 and note that the T_2 reading will have changed. Shift the thorium source to again obtain a reading of 90 and again recheck T_3.

9. This is a back and forth adjustment procedure with the object of obtaining a ratio of 3.5 for T_2/T_3. The numbers of 25 and 90 are only used for convenience. Any set of figures may be used.

10. When a ratio of $\frac{T_2}{T_3} = 3.5$ is arrived at, the instrument is calibrated.

A first time calibration may appear lengthy and awkward, however, future calibrations will be considerably speeded up if the following is observed. Immediately following a calibration procedure, place the thorium source, with the small diameter side, up against the end of the spectrometer. Take a reading on T_3. Record this reading and refer to it in future calibration checks. If the future readings are high or low then calibration will be effected by adjusting the calibration control to obtain the same reading again.

SECTION 5

BATTERY TEST AND REPLACEMENT

To test the condition of the batteries, set the meter scale switch to the battery test position. Pull the trigger switch and read the meter.

Fresh batteries will read at or near full scale. When the meter reading drops below the red line, replace the batteries.

An additional feature has been incorporated into the speaker drive system such as to give an audible warning that the batteries are approaching the end of their useful life. The audible warning is in the form of an interrupted tone. When this warning tone occurs, it does not impair the operation of the instrument.

Alkaline batteries have a tendency to recover after a rest period and additional usage may be obtained if they are not discarded.

To replace the batteries, turn the knob at the bottom of the handle in a counterclockwise direction until it comes off. The batteries are now free to drop out. Insert new batteries, positive end first, and replace the battery cap.

When the spectrometer is to lay idle for a long time, remove the batteries to avoid corrosion problems which might result from battery leakage.

SECTION 6

DETERMINATION FOR URANIUM, THORIUM

6-1 EXPLANATION OF T_1, T_2 AND T_3 READINGS

Following a calibration procedure, the three thresholds are established on the gamma energy spectrum, in the positions shown in Figure 1.

T_3 is set at 2.5 Mev. and from the curves of the three elements displayed, it is noted that only thorium contains gamma radiation with energy levels above 2.5 Mev. The use of T_3 then forms the basis of a diagnostic test for thorium. The number of counts, measured under controlled conditions, can also form the basis of a quantitative evaluation for thorium.

T_2 is at 1.6 Mev. and from the curves, it is apparent that this threshold provides a diagnostic test for the presence of both uranium and thorium.

T_2 is at 1.6 Mev. and from the curves, it is apparent that this threshold provides a diagnostic test for the presence of both uranium and thorium. The number of counts due to uranium in a sample containing both is readily established by subtracting 3.5 times the T_3 counts. The difference represents the counts relating to uranium. The subtraction of 3.5 times the T_3 count is valid since this is the basis of the calibration procedure with the thorium source. The count remaining after the subtraction can further be related to the quantity of uranium (in equilibrium) that is present.

T_1 is at 0.2 Mev. and measurements with this threshold will include gamma counts from all three elements of potassium, uranium and thorium. This is the most sensitive threshold position since it includes practically the entire energy spectrum. It is common therefore to employ threshold one for general reconnaissance.

6-2 BACKGROUND MEASUREMENTS

So far, the influence of natural background radiation has not been introduced. It is recognized however, that measurements on any sample material include count contributions from background radiation. When the count yield from a sample or in-situ measurement is low, it is necessary to subtract the background count prior to any attempt at qualitative or quantitative evaluation.

For survey work, the background count on all thresholds should be recorded at an area away from any known source of radioactivity. For sample work, the background should be taken at the location of the measurement site but with radioactive samples removed to such a distance that random position changes of the samples do not influence

the general background level. In all cases, no radioactive articles, personal or otherwise, should be in the vicinity of the instrument. Background count levels are generally low and difficult to establish to any high degree of accuracy, particularly in the upper threshold settings. Extra care should be taken to measure the background. Fortunately the background does not have to be measured frequently so a longer time can be taken to arrive at a more accurate measurement. The background is recorded and subtracted from future readings. The background should be rechecked from time to time but the frequency of rechecking depends on the nature of the work.

6-3 ISOLATING URANIUM

From a sample or outcrop containing both uranium and thorium, the net count due to uranium is obtained as follows.

1. Measured background counts at $T_3 = C_{3B}$
   and background counts at $T_2 = C_{2B}$
2. Measured counts on sample at $T_3 = C_3$
   and counts on sample at $T_2 = C_2$
3. Counts at T_3 due to thorium = $C_3 - C_{3B} = C_{3Th}$
   Counts at T_2 due to thorium and uranium = $C_2 - C_{2B} = C_{2(U + Th)}$
4. Counts at T_2 due to uranium only
   $$= C_{2U} = C_{2(U+Th)} - 3.5\ C_{3Th}$$

C_{2U} = Net counts per minute in threshold 2 due to uranium after the subtraction of all background and thorium counts. C_{2U} can then be applied toward a quantitative estimate of grade as per Section 6-4.

C_{3Th} = Net counts per minute in threshold 3 due to thorium after the subtraction of the background counts.

6-4 QUANTITATIVE EVALUATION

The relationship between the counts per minute obtained from radioactive material and the assay grade of the material is subject to many variables.

Among these are; geometry of the material, distribution of the radioactive elements in the material, volume, density, distance of probe to source, background changes, and equilibrium state. The most dependable method of quantitative evaluation includes the control of as many of the variables as possible by establishing fixed procedures. The measurements on test samples are then related to accurately assayed samples of preferably the same or near the same grade as the grade of the test samples. In-situ measurements are more difficult to relate because of lack of control on the source. However, several considerations can be applied to minimize the variables.

To enhance the usefulness of the instrument on initial applications, an approximate relationship between counts per minute and grade is tabulated below. The operator is cautioned to use these as approximations only until verification with assayed samples can be obtained. Assumption is made that the uranium is in equilibrium.

TEST CONDITIONS

5 lb. Sample: The diameter of the container containing 5 lbs. of crushed material was 4-1/2 inches.

The probe was brought into contact with material through the top of the container.

In-Situ

The readings shown in the in-situ column were extrapolated from the approximate emperical relationship between hand samples and the same material of homogeneous consistency in-situ, as follows:

5 lb. Sample (probe in contact with sample material	2π Geometry (probe in contact with flat outcrop of the same material)	4π Geometry (probe recessed in ground so crystal is considered completely covered)
. c. p. m.	10 c. p. m.	20 c. p. m.

GRADE LEVELS (Parts per million)

Uranium p.p.m.	T_2 c.p.m. 5 lb. sample	T_2 c.p.m. 2π Geometry	Thorium p.p.m.	T_3 c.p.m. 5 lb. sample	T_3 c.p.m. 2π Geometry
10	5	50	10	-	15
100	50	500	100	15	150
1,000	500	5,000	1,000	150	1,500

T_2 = net counts for uranium = C_{2U} (Section 6-3)

T_3 = net counts for thorium = C_{3Th} (Section 6-3)

SECTION 7

INTERNAL INSPECTION
OF INSTRUMENT

Where it is necessary to examine the instrument internally the following procedures can be used to get at any part of the instrument.

The instrument is laid out in three sections. The main section is contained in the square tube and contains all the components and circuits important to the operation of the instrument. The speaker and speaker drive circuits are housed in the top compartment. The batteries and off-on switches are located in the lower or handle section.

To remove the main section lay the instrument flat and remove the panel concealing the calibration control. This also exposes a plug through which the battery and speaker connections are made. Carefully pull out the plug. This removes all electrical contact to the internal circuits. Next unscrew four studs which act as stops for the threshold switch and the meter scale switch. Slide off the rubber meter guard and lift the engraved escutheon or dial plate. Remove the rubber seal by lifting it out of position. Now, by grasping the two switch shafts at the threaded areas, pull towards the meter end. All the internal components are mounted on a tray and the tray will slide completely out of the tube.

To inspect the top and bottom compartment it is necessary to remove six screws that are exposed when the vinyl panel is removed. The instrument is then turned over on the other side and six additional screws are removed after lifting the vinyl panel. All parts of the spectrometer have now been exposed.

McPHAR GEOPHYSICS LIMITED

INSTRUMENT REPAIR SHEET

PLEASE FILL IN DETAILS BEFORE RETURNING INSTRUMENT FOR SERVICE.

DATE _____

INSTRUMENT TYPE _____ SERIAL NO. _____

FROM:- NAME _____

COMPANY _____

ADDRESS _____

FULL RETURN SHIPPING ADDRESS

NATURE OF DEFECT - _____

_____

_____

_____

_____

McPHAR TV-1A Radiation Spectrometer

A 3-channel instrument for reconnaisance use

Both meter and audio reading

Four count scales

Trigger on-off switch

Functional pistol design

Lightweight

Model TV-1A is a three channel, integral type radiation spectrometer. Measurements are based on the spectral characteristics of gamma radiation from radicactive elements. Selection of the operating threshold is made by means of the threshold selector switch.

The instrument is designed primarily for reconnaissance. The total count position provides for maximum sensitivity. Additional thresholds however, provide the capability to differentiate between gamma radiations emanating from daughter elements of uranium and thorium and provide quantitative information relating to each.

The meter is calibrated to display zero to 100 counts per minute. A four position scale multiplier switch provides four full scale ranges of 100, 1,000, 10,000 and 100,000 counts per minute. A fifth position on this switch is employed to test the condition of the batteries.

The variable time constants are tied in with the threshold selector switch. In the total count (maximum sensitivity) position, a fast or slow time constant may be selected. In the upper thresholds (lower net count), the long time constant only, is in effect.

The detecting element is a 1½ by 1½ inch sodium iodide crystal coupled to a photomultiplier tube. These are hermet-

Field use is convenient with leather holster

ically sealed, magnetically shielded and mounted in the forward end of the scintillometer housing.
A speaker provides a variable pitch output with changing radiation levels. A speaker control, mounted on the top of the instrument, can be used to adjust the pitch for any given level of radiation.

TV-1A spectrometer comes complete with a leather holster, thorium calibrating source and a foam fitted attache case.

Specifications

Measurement Ranges: Four switch positions provide full scale counts per minute of 100, 1,000, 10,000 and 100,000.

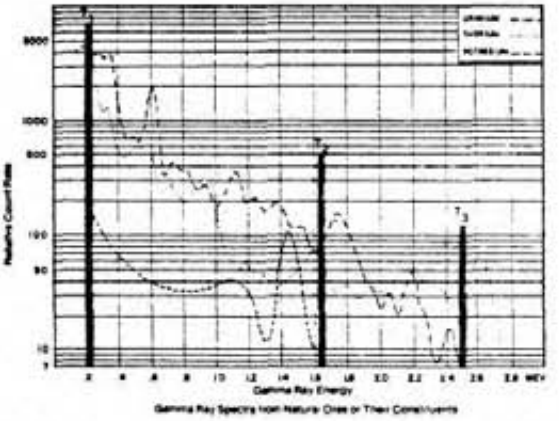
Time Constant: Threshold T_1: 1 and 10 seconds. Thresholds T_2 and T_3: 10 seconds.

Speaker: Variable pitch output governed by radiation intensity.

Temperature Range: −35 degrees to +55 degrees C.

Detector Crystal: NaI (T) 1⅜" x 1½" (43 cu. cm.) and matched photomultiplier hermetically sealed.

Battery Supply: Two "C" size flashlight cells located in handle. On-off control by either trigger or slide switch.



Voltage Regulation: Internally generated high and low voltages are highly regulated down to ½ initial battery voltage.

Accessories: Leather belt holster, thorium calibrating source, spare batteries, instruction manual, foam fitted attache case.

Weight: 3 pounds.

McPhar Instrument Corporation

Head Office:

55 Tempo Avenue
Willowdale, Ontario, Canada M2H 2R9
Tel: (416) 497-1700 Telex: 0623541
Cable: McPHAR TOR

Sales agents in:

Africa, Asia, Australia, Europe,
North & South America

Contact McPhar Instrument Corp. head office for the agent in your area.

APPENDIX 2

SUMMARY OF RADIATION SPECTROMETER READINGS

November 2, 1983

Readings for Background

Background	T1	T2	T3	Comments
	3000	200	65	At bridge, NW corner Blanket Creek (held in holster)
	4500	240	60	At bridge, SE corner Mulvehill Creek (held in holster)
	6000	400	85	At bridge, SE corner Mulvehill Creek (on bedrock adjacent)
	4000	200	80	At bridge, NW corner Blanket Creek (on ground)

Readings starting on intersection of north claim line and highway. Readings taken along rock cut on west side of highway at ten (10) metre intervals.

	T1	T2	T3	Readings Nov. 2nd (intermittent rain)
0 + 00	10000	500	125	
0 + 10	15000	800	200	
0 + 20	15000	700	200	
0 + 30				Culvert
0 + 40	15000	830	200	
0 + 50	18000	850	350	
0 + 52	26000	1200	350	High
0 + 55	14000	800	200	
0 + 60	12000	600	200	
0 + 65	23000	950	280	
0 + 70	15000	700	1[illegible]0	Red spray paint G29, 28 on rock
0 + 75	10000	480	110	End of road cut - exposure @ 0+73 m
0 + 80	9000	490	120	On rock but not ideal
0 + 90	14000	700	200	Float
1 + 00	10000	400	100	Held to ground -
1 + 20	14000	590	230	(thick overburden)
1 + 24				Culvert
1 + 25	48000	2000	800	Three tier (beds) oucrop 25 m upslope size large 1+24 to 1+30
1 + 50	64000	4000	1000	Partially moss covered outcrop
1 + 70	52000	2600	650	
1 + 80	48000	2400	800	
1 + 90	52000	2500	900	
1 + 97				Culvert
2 + 03	40000	1600	450	5 metres up slope
2 + 10	28000	1200	400	
2 + 20	47000	2500	780	
2 + 30	45000	2500	820	
2 + 40	30000	1500	540	
2 + 50	28000	1600	400	
2 + 60	20000	940	280	
2 + 70	8200	430	100	
2 + 80	9400	400	120	(Schist) Mica schist/milk qtz. inclusions (30%)
2 + 90	900	480	110	
3 + 00	11000	600	140	Block on face 5 meters up slope
3 + 08				Black crystals of tourmaline
3 + 10	10000	500	140	

	T1	T2	T3	Comments
3 + 15	33000	1400	630	Rusty zone 5 metres up slope
3 + 20	14000	700	160	
3 + 30	44000	2200	630	
3 + 37				Culvert
3 + 40	22000	970	280	
3 + 50	13000	670	200	
3 + 55	33000	1500	420	
3 + 60	13000	700	190	
3 + 70	16000	1000	290	
3 + 80	28000	1500	450	
3 + 90	15000	820	280	
4 + 00	16000	800	240	- along fracture plane (joint)
	21000			- into bed below plane
4 + 10	15000	950	333	
	20000			- rusty patch 0.5 m from above
4 + 20	17000	750	220	
4 + 30	27000	1400	440	
	20000			
4 + 40	29000	2000	520	
4 + 50	14000	700	160	
4 + 60	11000	540	150	
4 + 70	12000	700	200	
4 + 73				Culvert 4+78 to 4+80 - waterfall
4 + 82	11000	700	150	
4 + 89	11000	500	150	
5 + 01	8000	420	90	5+01 to 5+15 too much water runoff
5 + 15	7000	380	70	
5 + 20	8300	480	70-120	(very erratic)
5 + 30	6200	400	78	
5 + 40	5000	350	60-95	(say 80)
5 + 45				End of road cut
5 + 50	6200	350	120	Bedrock in band of ditch
5 + 60	5500	330	90	Large piece float (not moved far)
5 + 70	12000	750	200	Float block in creek
5 + 76	9000	720	180	Culvert
5 + 80	6800	320	90	Held to ground west side of ditch
6 + 00	5000	280	110	Held to ground west side of ditch
6 + 02	20000	1100	350	Held to ground west side of ditch
6 + 10	80000	4200	1400	Large flat rock in ditch 1" under water
6 + 25	7200	400	120	Large moss covered rock
6 + 42	17000	900	300	Large moss covered rock
6 + 50	8000	600	110	Best of outcrop 6+45 to 6+55
6 + 70	6000	300	100	Held to ground west side of ponded ditch
6 + 85	6500	370	100	6 m west of ditch in rock cairn of 1916 survey pin (pipe)
7 + 00				Culvert
7 + 36	7000	370	75	
7 + 50	9500	600	90	Start of road cut

	T1	T2	T3	Comments
7 + 60	11000	610	100	
7 + 70	9500	650	130	
7 + 80	8500	600	100	
7 + 90	8500	500	130	
7 + 95				End of road cut
8 + 10	4500	270	70 (50-100)	Held to moss covered ground
8 + 24				Culvert
8 + 30	6500	550	65	Held to mossy rock, possibly float
8 + 50	7800	500	80	10 m up 45° bank
8 + 60	7000	450	110	Down dip of same bed as above
8 + 55				Start of road cut
8 + 70	7500	500	98	Rusty face 5 m up road cut face
8 + 80	8000	500	110	
8 + 90	8000	470	110	
9 + 00	8000	600	85	
9 + 10	10000	600	100	
9 + 20	8600	530	110	
9 + 30	9200	620	120	
9 + 40	9100	540	88	
9 + 50	9200	540	130	3 m upface - 5m from line (west)
9 + 60	9000	470	110	Buff quartzite, sericitic schist,
9 + 70	17000	950	220	lighter color & cleaner than
9 + 80	22000	1000	330	rock to either side
9 + 90	30000	1700	450	
10 + 00	7500	430	110	One kilometre
				November 3rd, pouring rain & minor snow
10 + 10	6000	310	50	
10 + 20	6000	380	70	
10 + 30	6400	350	60 (erratic)	Dark biotitic schist with
10 + 40	7100	330	71 (erratic)	ptygmatic quartz lensed parallel
10 + 50	7000	440	70-95 (erratic)	bedding
10 + 90	6500	420	40-80 (erratic)	
11 + 00	5200	280	50 (erratic)	
10 + 70	7800	500	120	
11 + 06				Culvert
11 + 10	5000	220	50	Well stained rusty
11 + 20				No outcrop
11 + 30	7000	580	25	Well jointed flat rock
11 + 40	5500	250	50-90	
11 + 80	9500	550	165 (approx.)	
12 + 00	8000	400	40-80	
12 + 20	8800	530	130	
12 + 40	7400	370	80 (approx.)	
12 + 60	5000	350	40-70	
12 + 80	7000	400	95	5 m from line on joint plane 3 m up

	T1	T2	T3	Comments
13 + 00	5600	260	50-80	
12 + 27	9000	530	70	Rusty stain
11 + 94	6700	400	50-70	
11 + 68	5300	320	50-80	Moss covered (shallow) 30° bank
11 + 50	6200	360	40-75	
10 + 60	8000	540	50-100	
10 + 80	12000	620	130	
11 + 20	6500	420	95	Displaced block 10 m up bank
11 + 60	6000	350	90	Moss covered weathered clayey
11 + 70	6300	370	50-80	Moss covered weathered clayey
12 + 10	6500	410	60-100	
12 + 23	8800	510	130	Rusty slabbing
12 + 30	14000	710	150	5 m up face
12 + 50	4900	360	40-70	3 m up face
12 + 70	7500	420	90	Buff with dark Mn stain
12 + 90	5500	380	70	
13 + 50	6500	390	90 (approx.)	
14 + 50	4500	280	40-85	
15 + 00	4200	210	60	Best of rusty zone
15 + 35	4000			15+35 to 15+80
15 + 50	8000	450	100	Total count range 4000-8000
15 + 80				
15 + 60	6400	400	60-100 (erratic)	
16 + 00	8500	550	130	Local rusty stain

Repeats on sampling locations, November 3rd, 1983

9 + 90	42000	2200	620	Best found in vicinity of sample. Sample
6 + 10				chips of float taken for microscope
4 + 40	51000	2500	800	Best at 4+39 sample @ 4+40
3 + 32	61000	3300	1100	Best at 3+30 sample @ 3+32
2 + 30	65000	3100	950 (Composite)	Best at 2+30.5 in yellow-red
2 + 20	42000	3300	900 (Composite)	Stained patches. Sample 2+30
2 + 10				Creek over outcrop
1 + 49	70000	3500	1000	Best reading in reddish aleration
				Very localized patchy zones

McFar Model TV-1A Spectrometer
Method of Use; See Appendix 1

APPENDIX 3

REPORT BY GUY ALLEN FOR WOLLEX EXPLORATION LTD.

ALLE RESOURCE CONSULTANTS LTD.
GUY ALLEN, P.ENG. (B.C.), P.GEOL. (ALTA
CONSULTING GEOLOGIST

BOX 7248, POSTAL STATION "E" CALGARY, ALBERTA T3C 3M2 TELEPHONE (403) 266-6150

PROSPECTING REPORT ON

MINERAL CLAIMS ARCL Nos. 1 & 2

REVELSTOKE MINING DIVISION

82L/16E; Long. 118°07', Lat. 50°51'

British Columbia

Owner: Guy Allen
Operator: Wollex Exploration Ltd.
Consultant: Guy Allen, P. Eng.
Author: Guy Allen
Submitted: March 31, 1979

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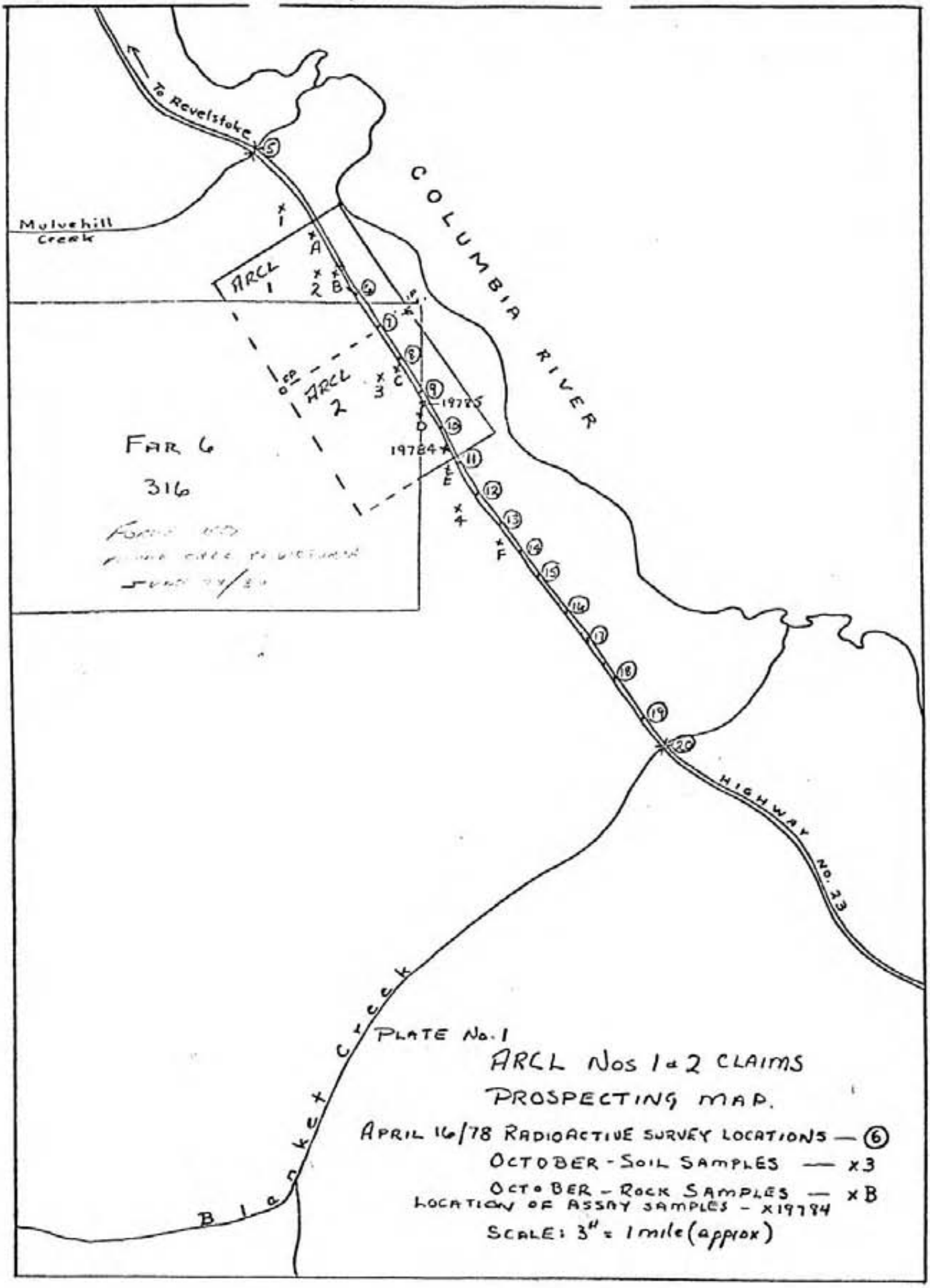
LIST OF ILLUSTRATIONS


To Revelstoke
Mulvehill Creek
COLUMBIA RIVER
ARCL 1
ARCL 2
FAR 6
316
19785
19784
HIGHWAY No. 23
BLACK CREEK
PLATE No. 1
ARCL Nos 1 & 2 CLAIMS
PROSPECTING MAP.
APRIL 16/78 RADIOACTIVE SURVEY LOCATIONS — ⑥
OCTOBER - SOIL SAMPLES — x3
OCTOBER - ROCK SAMPLES — xB
LOCATION OF ASSAY SAMPLES - x19784
SCALE: 3" = 1 mile (approx)

Introduction

Early in April, 1978, the author located an area of strong radioactivity along Highway No. 23, south of Revelstoke, between Mulvehill Creek and Blanket Creek. The 'hot' area covered an extension of about three-quarters of a mile along the Highway with maximum counts per minute reaching 10-12 times background. Examination of lithologies along the road cut revealed maximum radioactivity coming from a narrow zone of highly weathered muscovite schist which was flanked by an extensive zone of moderately radioactive quartzite. As a consequence, two two-post claims, ARCL Nos. 1 & 2 were staked, and samples were taken for assay.

An interest in this property was assumed by Wollex Exploration Ltd., of Calgary, who sent prospector Walter Buller of Grand Forks, B.C. into the area to carry out a program of prospecting and sampling in mid-October. Mr. Buller was hampered by bad weather, and hence was unable to successfully complete the program.

General Description

The claims area is located along Highway No. 23, which runs along the west bank of the Columbia River, approximately thirteen miles south of Revelstoke. The prospective area is roughly three-quarters of a mile in width from northeast to southwest. The rock exposures along this portion of Highway No. 23 extend from Mulvehill Creek to Blanket Creek, and the anomalous radioactive occurrences are located about three-quarters of a mile south of the Mulvehill Creek bridge. This is in NTS 82L/16.

Access to the area is by Highway No. 23, south of Revelstoke. No secondary roads could be located within the interest area.

The area slopes moderately to steeply up from the Highway to Mount Begbie. Elevations range from 1,800'ASL along the Highway to about 2,300' ASL along the southwest boundary of the claims.

ARCL Nos. 1 & 2 were staked April 16, 1978 by the author. They overlap, in part, mineral claim Far 6 (316).

Geology

The interest area is underlain by a metamorphosed rock assemblage collectively known as the Monashee Group. Age of these rocks is uncertain within the limits of Precambrian to Permian. Identified lithologies include gneisses, schists, marble, slates, and phyllites, in broad expanses, enclosing metasedimentary zones of limestones, quartzites and hornblende gneisses.

Along Highway No. 23, roadcut exposures of quartzite and muscovite schist were discovered to be sources of the detected radioactivity. The muscovite schist zone, which is relatively narrow, was found to be the most radioactive.

Field Examination - April 16, 1978

To define the anomalously high radioactive area, a road traverse was made by automobile, taking total count, and uranium-plus-thorium readings on a differential gamma ray spectrometer. All readings were taken along the road. The following results were obtained.

Location	Total Count (cpm)	Uranium + Thorium (cpm)
Going north		
1. Intersection Cranberry Creek & Highway No. 23	250	15
2. 1.9 mi. north of (1)	210	15
3. 3.9 mi. north of (1)	240	15
4. 5.7 mi. north of (1)	240	18
5. Intersection Mulvehill Creek & Highway No. 23	280	20
Going south from 0.0 miles at the intersection of Mulvehill Cr. & No. 23		
6. 0.45 mi. south	850	50
7. 0.65 mi. south	650	27
8. 0.75 mi. south	1400	55
9. 0.85 mi. south	700	35
10. *0.95 mi. south	350	20
11. 1.05 mi. south	350	15
12. **1.15 mi. south	330	20
13. 1.25 mi. south	600	32
14. 1.35 mi. south	370	22
15. 1.45 mi. south	300	22
16. 1.55 mi. south	250	18
17. 1.65 mi. south	260	17
18. 1.75 mi. south	220	20
19. 1.85 mi. south	240	16
20. 1.95 mi. south (intersection Blanket Cr. & Highway No. 23)	240	19

* A reading taken on the outcrop at 0.95 miles south gave 2100 cpm on total count, 45 cpm on uranium-plus-thorium, and 20 cpm on thorium. The lithology at this location is a micaceous quartzite, quite hard and massive.

** A reading taken on the outcrop at 1.15 miles south gave greater than 10,000 cpm on total count, 2200 cpm on uranium-plus-thorium, and 650 cpm on thorium. The lithology at this location is a well-weathered, crumbly micaceous schist. This zone is 4' - 10' wide.

The off-road area west of the road was prospected along the claim line. No readings significantly higher than those taken on the quartzite zone along the Highway were found.

Field Examination - Oct. 7-13, 1978

Walter Buller, Box 1733, Grand Forks, B.C. was contracted by Wollex Exploration Ltd. to prospect with scintillometer, and sample, the claims area, and additional areas to the west. The following material is quoted directly from Mr. Buller's journal.

"Oct. 7/78
Arrived in Revelstoke from Grand Forks via Highway No. 97 & #1. Outlying motels filled for weekend, stayed at Travelodge. Weather sunny up to Sicamous. Started to drizzle 25 mi. E of there to Revelstoke."

"Oct. 8
Dense fog and drizzle in A.M., heavy rain in P.M. Drove out to locate prospect area SE of Mulvehill Creek. Avg. background of scint. in truck from Revelstoke to Mulvehill Cr. 50-60 cps. BG increases to 120-150 cps as soon as one crosses the bridge over Mulvehill Cr. and continues for approximately 1 mile SE of the bridge where it drops back to 50-60 cps.

"Oct. 9
Heavy rain all day. Moved from Travelodge to Lamplighter Motel. Didn't go out to prospect area."

"Oct. 10
Dense fog in A.M. Drizzle and rain showers the rest of the day. Took soil sample #1 150' SW of road, 40' above road level, slope 40°NE, depth 10", grayish gravel from B zone, 500' SE of bridge. Soil sample #2 taken 400'SE of #1, 100'SW of road, 30' above road level, slope 35°E, depth 12", light brown gravel from B zone. Rock sample A taken from rock cut about 600 feet SE of bridge on the SW side of the road. Outcrop of muscovite-quartzite gave 300 cps. Rock sample B are boulders of muscovite-schist in ditch on both sides of road 100 feet SE of A, fairly reddish and appears to have been blasted from the rock cut. Not found in place and may be in a dirt slide close by. Boulders gave 300 cps."

"Oct. 11
Heavier rain than yesterday. Took soil sample #3 about 1,800 ft. SE of #2, 200 ft. SW of the road and 60 ft. above the road level. Slope 50° NE, depth 10" in B zone, greyish gravel. Soil sample #4 about 1,200 ft SE of #3, 50 ft. SW of road, 20 ft. above road level, orange-brown rusty band in roadside overburden cut, slope 20°E, depth 10" in B zone, orange-brown limy material. Twisted left leg when sliding down hill looking for outcrop above soil sample #3 Heavy fog down to road level. Called it a day."

"Oct. 12
Best day yet weatherwise, saw sun for 5 minutes around noon. Fog 300 ft. above road level, the highest it's been since we first came here. Still no outcrop showing on hillside, except in road cuts and exposed in Mulvehill Creek. Rock samples C and D are very much the same from muscovite-quartzite. Sample C is about 1,800 ft. SE from sample B, from a roadcut on the northeast side of the road, near vertical, rusty fractures. Gave up to 1,500 cps. Sample D is about 500 ft. south of C in a rock cut on SW side of the road with near-vertical rusty fractures with up to 1,000cps. The unfractured muscovite quartzite goes between 300 to 750 cps. Sample E is about 700 ft. SE of D from a road cut on the SW side of the road, which goes around 350 cps. Sample F is 400 ft. SE of E from another rock cut on the SW side of the road. Both samples E and F are from muscovite-quartzite outcrops. Radioactivity from area where F was taken was 250 cps and drops off to 50 - 60 cps to the SE. The shallow dip of the strata also seems reversed. Possibly a synclinal axis"

"Oct. 13
Heavy rain again. Tried to phone Calgary from 8 to 11 AM, but operator can't get through as lines down somewhere. No use trying to prospect in this weather, so headed back to Grand Forks via Hwy. #23. Got through to Calgary by phone from Castlegar. Weather cleared 40-50 miles south of Revelstoke."

"I believes the area warrants further prospecting in more favorable weather with the aid of air photos, better footgear than I had, and possibly an auger for soil sampling."

" Walter Buller"
Oct. 15, 1978"

Conclusions and Recommendations

Two of the rock samples were assayed (see Appendix). A sample from the highly radioactive muscovite schist was analyzed for uranium, thorium and rare earths, whereas a sample from the moderately radioactive quartzite was assayed for uranium and thorium only. The source of the radioactivity is essentially thorium, as thorium concentrations are at least ten times that of uranium.

The area to the west requires radiometric prospecting. The October program was hampered by poor weather, and hence was ineffective in evaluating the off-road areas.

Guy Allen, P. Eng.
March 22, 1979

APPENDIX - Assay Certificate

To: WOLLEX EXPLORATIONS LTD.,
810, 715 - 5th Avenue S.W.,
Calgary, Alberta
ATTN: Ken Lintott
cc: G. Allen

File No. 15729
Date August 28, 1978
Samples Chip

Certificate of ASSAY

LORING LABORATORIES LTD.

SAMPLE No.	OZ./TON GOLD	OZ./TON SILVER	Chemical PPM U3O8	Chemical % ThO2	% Cu	% Pb	% Zn
"Chip Samples"							
19776	-	.08	-	-	.05	.04	.05
19777	Trace	.32	-	-	.02	.02	.02
19778	-	-	8.9	.008	-	-	-
19779	-	-	9.4	.005	-	-	-
19780	-	-	8.2	.007	-	-	-
19781	-	-	5.7	Trace	-	-	-
19782	-	-	9.1	Trace	-	-	-
19783	Trace	.32	-	-	.01	.04	.01
Mount Begbie Area							
19784	Highly radioactive muscovite schist		42.6	.060	-	-	-
19785	Moderately radioactive quartzite	-	13.6	.035	-	-	-

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.
Pulps Retained one month unless specific arrangements made in advance.

A. M. McGuire
Licensed Assayer of British Columbia

APPENDIX – Assay Certificate

To: WOLLEX EXPLORATIONS LTD.,
810, 715 – 5th Avenue SW.,
Calgary, Alberta

ATTN: Ken Lintott

File No. 16334
Date December 15, 1978
Samples Chip
Old File # 15729

Certificate of ASSAY

LORING LABORATORIES LTD.

SAMPLE No.	PPM La	PPM Ce	PPM Pr	PPM Nd	PPM Sm	PPM Eu	PPM Gd
Mount Begbie Area – Highly radioactive muscovite schist							
"Rare Earth"							
19784	3600	8150	800	3800	500	12	500

SAMPLE No.	PPM Tb	PPM Dy	PPM Ho	PPM Er	PPM Tm	PPM Yb	PPM Lu
19784	10	150	10	40	40	13	2

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.

Pulps Retained one month unless specific arrangements made in advance.

A. J. McLeod

Licensed Assayer of British Columbia

APPENDIX

STATEMENT OF EXPENDITURES

1. Prospecting Excursion - W. Buller		
(a) Wages - 5 days @ $55 per day		$275.00
(b) Motels		$117.60
(c) Meals: 2 men @ $10 each per day, 5 days		$100.00
(d) Express		$6.80
	Sub-Total	$499.40
2. Assays		
(a) Rare Earths		$200.00
(b) Uranium & Thorium		$56.00
	Total	$755.40

Guy Allen

Guy Allen, P. Eng.
March 22, 1979

Mount Begbie Area — Revelstoke BC.

Wages - 5 days at $55 per day	275.00
Motels - Travelodge 2 days	67.20
Lamplighter 3 days	50.40
Meals for 2 at $10 each - 5 days	100.00
Express	6.80
Total	499.40

Walter A. Bulla

3.226

LORING LABORATORIES LTD.

629 BEAVERDAM RD. N.E. CALGARY, ALTA. T2K 4W2

WOLLEX EXPLORATIONS LTD.,

810, 715 - 5th Avenue S.W.,

Calgary, Alberta

ATTN: Ken Lintott

INVOICE № 16334

DATE December 15, 1978

Old File # 15729

Chip SAMPLES

1	Rare Earth Determination	@	200.00
		@	
		@	
		@	
		@	
		@	
		TOTAL	$ 200.00

DEC 18 1978

RECEIVED

APPROVED

PROJECT 3.226

BILL TO

THIS IS YOUR INVOICE

PLEASE PAY THE AMOUNT SHOWN

TERMS — 30 DAYS

LORING LABORATORIES LTD.

629 BEAVERDAM RD. N.E. CALGARY, ALTA. T2K 4W2

WOLLEX EXPLORATIONS LTD.,
810, 715 - 5th Avenue S.W.,
Calgary, Alberta

BILLED
NO.

INVOICE № 15729

DATE August 28, 1978

ATTN: Ken Lintott

Chip SAMPLES

2	Gold & Silver	@ 8.00	16.00
1	Silver Only	@ 7.00	7.00
7	U3O8 Chemical Assays	@ 11.00	77.00
7	ThO2 Chemical Assays	@ 17.00	119.00
3	Copper	@ 4.50	13.50
3	Lead	6.00	18.00
3	Zinc	@ 6.00	18.00
		TOTAL	$ 268.50

SEP 14 1978
RECEIVED
APPROVED
PROJECT 3.226

BILL TO
THIS IS YOUR INVOICE

PLEASE PAY THE AMOUNT SHOWN

TERMS — 30 DAYS

* Two uraniums and two thoriums total $56.00

CHEMEX

CALGARY 2021 - 41 AV N.E. CALGARY, CANADA T2E 6P2
TELEPHONE (403) 276-9627 TELEX 038-25541
EDMONTON 6112 DAVIES ROAD, EDMONTON, CANADA T6E 4M9
TELEPHONE (403) 465-9877 TELEX 037-41596

CERTIFICATE OF ANALYSIS

• MINERAL • GAS • WATER • OIL • SOILS • VEGETATION • ENVIRONMENTAL ANALYSIS

WOLLEX EXPLORATION

DATE OCT. 17, 1980

PROJECT NO. 9348-1-1186

PARAMETER	COLUMBIA 1	COLUMBIA 3	COLUMBIA 4
AG (OZ/TON)	0.12	0.08	0.14
AU (OZ/TON)	0.012	.010	0.014
PT (OZ/TON)	<0.003	<0.003	<0.003
CE %	0.017	0.051	0.206
LA %	0.003	0.015	0.046
TA %	<0.001	<0.001	0.002
NB %	<0.001	0.004	0.002

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by .....

APPENDIX 4

RESULTS OF ANALYSES

To: AURUN MINES LTD.,
910, 640 - 8th Avenue S.W.,
Calgary, Alta. T2P 1G7

ATTN: E. Horne

File No. 24211
Date December 7, 1982
Samples Rock Chip

Certificate of ASSAY

LORING LABORATORIES LTD.

SAMPLE No.	Beta Counts	Beta %U3O8	Gamma Counts	Gamma %U3O8	Calculated %U3O8
"Chip Samples"					
9756B (3)	149	.004	468	.004	.004
1	136	.004	321	.003	.005
2	188	.005	392	.004	.006
4	163	.005	610	.005	.005

1982 SAMPLING

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.

Pulps Retained one month unless specific arrangements made in advance.

Assayer

X-RAY ASSAY LABORATORIES LIMITED

1885 LESLIE STREET, DON MILLS, ONTARIO M3B 3J4

PHONE 416-445-5756 TELEX 06-986947

CERTIFICATE OF ANALYSIS

TO: LORING LABORATORIES LIMITED
ATTN: MR. BERAR
529 BEAVERDAM ROAD NORTH EAST
CALGARY, ALBERTA
T2K 4W2

CUSTOMER NO. 377

DATE SUBMITTED
22-DEC-82

REPORT 16938

REF. FILE 12566-J2

1 PULP P.O. #1084 PROJECT #24211

WAS ANALYSED AS FOLLOWS:

	METHOD	DETECTION LIMIT
Y PPM	XRF-G	10.000
LA PPM	NA	1.000
CE PPM	NA	3.000
ND PPM	NA	5.000
SM PPM	NA	0.100
EU PPM	NA	0.100
TB PPM	NA	0.300
DY PPM	NA	0.500
YB PPM	NA	0.500
LU PPM	NA	0.050
U PPM	DNC	0.100
TH PPM	NA	0.500

X-RAY ASSAY LABORATORIES LIMITED

DATE 21-JAN-83 CERTIFIED BY .....

*** UNLESS INSTRUCTED OTHERWISE WE WILL DISCARD PULPS AND REJECTS ***
90 DAYS FROM DATE OF THIS REPORT

X-RAY ASSAY LABORATORIES 21-JAN-83 REPORT 16938 REF. FILE 12568-J2 PAGE 1

SAMPLE	Y PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM
#2. 2	20	55	110	61	18.0	1.6

SAMPLE	TB PPM	DY PPM	YB PPM	LU PPM	U PPM	TH PPM
2	1.4	6.3	1.5	0.20	4.0	46.0

#2

To: AURUN MINES LTD.
910, 640 - 8th Avenue S.W.,
Calgary, Alberta T2P 1G7
Attn: J. Dagenais

File No. 25599
Date November 25, 1983
Samples Rock

Certificate of ASSAY

LORING LABORATORIES LTD.

SAMPLE No.	PPM U_3O_8
Rock Samples	
6801	6.2
6802	5.6
6803	6.2
6804	2.4
6805	3.2
6806	3.6

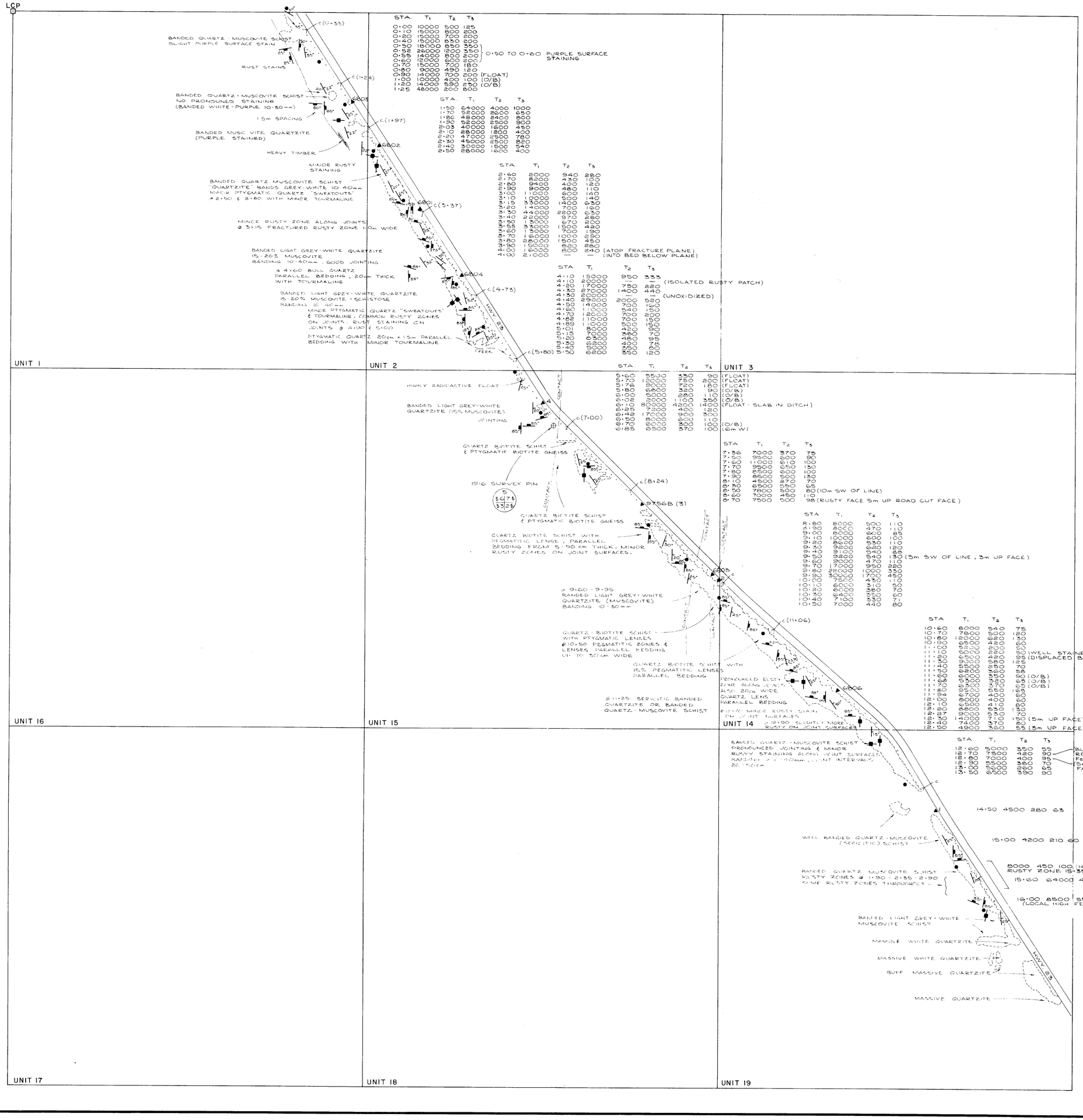
1983 Sampling

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.

Pulps Retained one month unless specific arrangements made in advance.

Assayer



STA.	T_1	T_2	T_3	SAMPLE LOC.	SAMPLE No.
3+32	61000	3300	1100	◀	6801
2+20	42000	3300	900	◀	6802
2+30	65000	3100	950		
1+49	70000	3500	1000	◀	6803
4+40	52000	2500	800	◀	6804
9+90	42000	2200	620	◀	6805
12+30	14000	710	150	◀	6806

STA.	BETA COUNTS	BETA % U308	GAMMA COUNTS	GAMMA % U308	CALC % U308	SAMPLE LOC.	SAMPLE No.
8+50	149	.004	468	.004	004	◀	97568 (3)
14+50	136	.004	321	.003	005	◀	1
10+05	188	.005	392	.004	006	◀	2
6+50	163	.005	610	.005	.005	◀	4

SAMPLE No 2 LANTHANIDE RARE EARTH SERIES IN APPENDIX 4

NOTE: CLAIM POSTS AND TRAVERSE ESTABLISHED BY BELT CHAIN, BRUNTON COMPASS AND KNOWN SURVEY MARKERS AND TOPOGRAPHIC FEATURES.

LEGEND

- POWER POLE
- OUTCROP
- JOINT (VERTICAL)
- JOINT (INCLINED) WITH MAGNITUDE
- STRIKE AND DIP, WITH DIP MAGNITUDE
- LINEATION, SCHISTOCITY
- CULVERT

GEOLOGICAL BRANCH
ASSESSMENT REPORT

11,697

KAREN MINERAL CLAIM

MOUNT BEGBIE AREA
REVELSTOKE MINING DIVISION

RECORD NUMBER 1535

MAP No. 1-1
NTS 82L/16E

RADIATION SPECTROMETER READINGS AND GEOLOGICAL MAPPING

COMPILED BY: E. HORNE, R. DEAN	SCALE 1:2000
DRAWN BY: B. SANDERS	DATE: NOV. 17, 1983