MAR 19700003: STONE POINT

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RADIOMETRIC SURVEY

ON

PACIFIC SILVER MINES & OILS LTD. PERMIT #73

STONE POINT AREA, LAKE ATHABASCA, ALBERTA

Prepared For

Columbian Northland Exploration Ltd.

Calgary, Alberta

Prepared By

Angus G. MacKenzie Mining Consultants Ltd.

Calgary, Alberta

November, 1970

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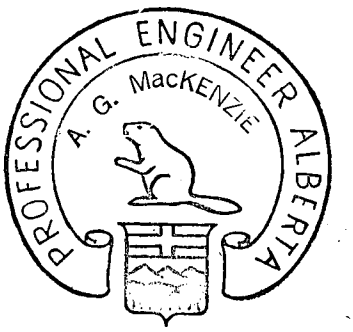

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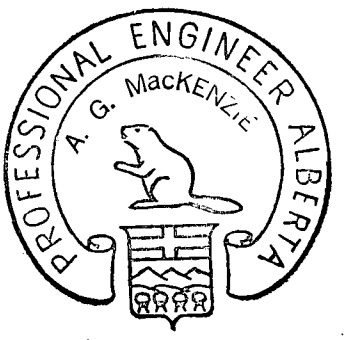


AUTHORITY

Authority to perform the work recommended in our report, "Geological Reconnaissance and Practical Prospecting on Permit 73, Alberta, October, 1969", was given to Angus G. MacKenzie Mining Consultants Ltd. by J. Wahl, President of Columbian Northland Exploration Ltd., present operator of the permit.

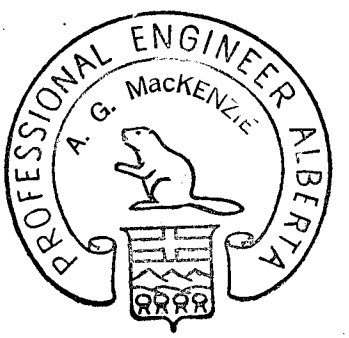
INTRODUCTION

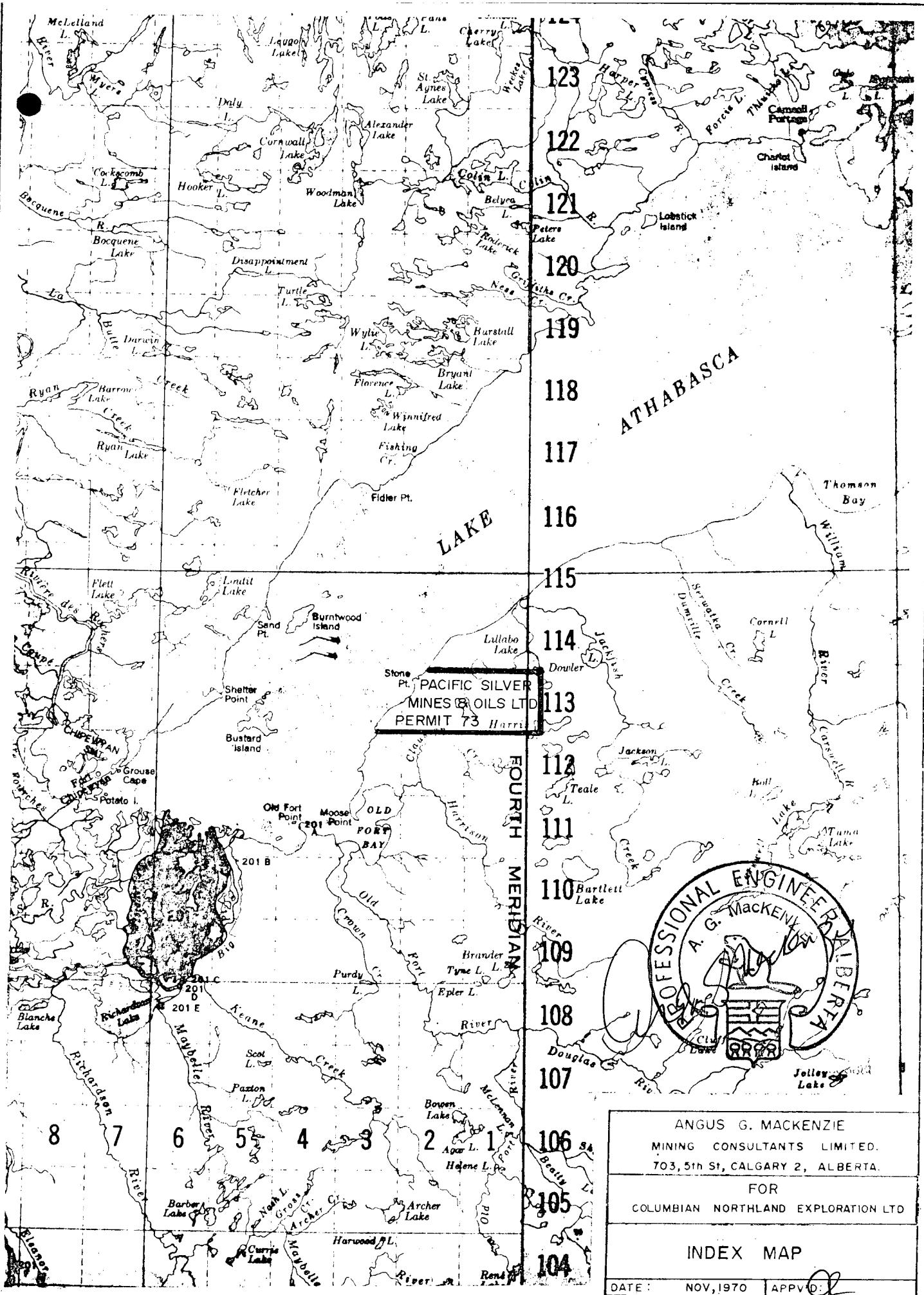
Since the introductory sections for the area have been discussed in the previous report, they are not repeated here. No discussion of Geology is made either. This report deals with the analysis of radiometric data gathered in this field work.

The survey was made by R. Lebrun, a professional line cutter and geophysical instrument operator. He and a helper cut the baseline and ran the radiometric survey between October 7th and 31st, 1970. The project was under the direction of Angus G. MacKenzie, P. Eng., MCIM and E. R. L. Kintanar, B. Sc. Geology, MCIM. Interpretation of the results was made by the supervisors.

OPERATIONAL LOGISTICS

The field party, with necessary equipment, left Calgary by commercial airline for Uranium City where an assistant was hired. From Uranium City the party chartered a plane to drop them at Stone Point on the southern shore of Lake Athabasca. A camp was established here.





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FOR
COLUMBIAN NORTHLAND EXPLORATION LTD

INDEX MAP

DATE: NOV, 1970	APPVD:
DWG NO:	SCALE: 1" = 12 miles

19700003 Map #1

Since the baseline was inland, and no prominent landmark was available to tie it to, a tie-point was spotted along the shore of Lake Athabasca south of Stone Point. From this tie-point a tie line, 6,500 feet long at a bearing of S55E, was cut. The end of the tie line was marked BL-0+00. The baseline was cut from this point at a bearing of N35E for 6,300 feet and at a bearing of S35W for 27,600 feet. The baseline is five feet wide and picketed every 100 feet.

The survey side lines were not cut. These lines were run by the Brunton-pace technique using the pickets on the baseline as control. No significant drift in the survey lines was noted. Radiometric readings were taken every 300 feet along the survey lines; these survey lines were 600 feet apart, i.e. a grid of 600' x 300'.

The baseline was cut the full length and survey lines were run only in areas where anomalies were indicated by the 1969 airborne reconnaissance radiometric and ground check surveys (See Figure 1).

INSTRUMENTATION

The instrument used in this survey was a McPhar Scintillometer, Model TV-1, Serial No. S/N 169-32.

The scintillometer measures the gamma rays emitted by radioactive minerals.

The gamma ray detecting principle lies in the sodium iodide crystal which, in this instrument, is $1\frac{1}{4}$ inches by 1 inch. The gamma ray entering the crystal interacts with the crystal atom, resulting in free electron and

light emission. An optically coupled photo multiplier converts the light emission to electrical pulses. The magnitude of electrical pulses bears a relationship to the energy levels of the intercepted gamma ray.

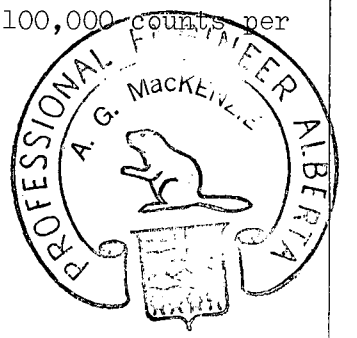
The instrument is designed primarily for reconnaissance. A selective threshold switch is, however, provided for differentiating between radiation emitted by Uranium, Thorium and Potassium by providing quantitative information relating to each.

Various radioactive elements have characteristic gamma energy spectra. Thorium emits gamma rays with energy levels exceeding 2.5 Mev. The highest energy radiation from Potassium is about 1.6 Mev.

The threshold switch in the TV-1 model is marked T_1, T_2, and T_3. Threshold T_3 is at 2.5 Mev setting and measures only those electrical pulses corresponding to gamma rays emitted by Thorium. T_2 at 1.6 Mev measures electrical pulses above 1.6 Mev level which are emitted by both Uranium and Thorium. T_1 at .2 Mev measures all radiation above .2 Mev level which includes all gamma rays emitted by Potassium, Uranium and Thorium.

From readings at T_1, T_2, and T_3, individual values for each, Potassium, Uranium and Thorium, can be computed. By comparing these values to empirical values of samples with known contents of Uranium and Thorium, a semi-quantitative estimate of the grade of a sample may be determined.

The meter that measures the electrical pulses derived from the interaction of the gamma ray and the sodium iodide atom 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 is built in to test the charge on the batteries. This variable range switch enables the instrument to measure electrical impulses from zero counts per minute to 100,000 counts per minute.

RADIOMETRIC SURVEY

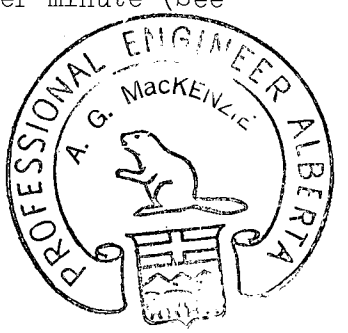
Three groups of survey lines were run perpendicular to the baseline to cover areas where anomalies were indicated by the 1969 airborne radiometrics. A total of 21.1 line miles of survey lines have been done.

Several anomalous areas were noted and these coincide with anomalies measured in 1969.

Figure 2 shows the results of our radiometric survey. The values taken at each station have been contoured. Values below 499 counts per minute are considered below background. Values between 500 and 999 are considered background and values between 1,000 and 1,499 are considered anomalous. Values above 1,500 counts per minute are considered strong anomalies.

The northeast group of survey lines were run to check anomalies 14, 15 and 16 indicated by last season's airborne radiometrics. A weak, isolated anomaly along Line 66+00NE, Station 21+00SE may represent anomaly 14. Anomaly 15 may be equivalent to the combined effect of anomalies noted in Line 66+00NE, Station 24+00NW; Line 54+00NE, Station 39+00NW; Line 48+00NE, Station 39+00NW; and Line 54+00NE, Stations 48+00NW and 51+00NE.

Anomaly 16 may be equivalent to the anomaly along Line 48+00NE, Station 63+00NW. The strongest anomalous value is 1,500 counts per minute (See Figure 2).



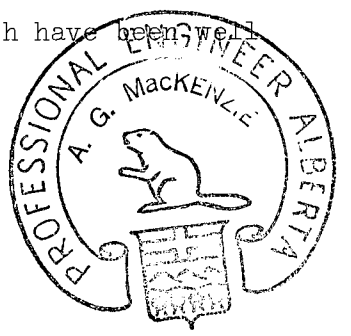
The middle group of survey lines were to check anomalies 18, 19, 20, 21 and 22 indicated by the airborne radiometrics.

Anomaly 18 was not picked up in the survey line crossing the area. Anomaly 19 was picked up along Line 6+00SW, Station 21+00NW and Line 12+00SW, Stations 21+00NW through 33+00NW. This anomaly has the highest reading of 1,500 cpm. Anomalies 20, 21 and 22 turned out to be one anomaly on the ground. The anomaly was picked up along Line 30+00SW, Station 3+00SE; Line 36+00SW, Stations 00+00, 3+00, 6+00, 9+00SE; Line 42+00SW, Station 12+00SE; and Line 48+00SW, Stations 9+00SE and 12+00SE.

Three other anomalies, not along the airborne radiometric flight line, were partially picked up. One was noted along Line 00+00, Stations 00+00, 3+00NW and 6+00NW; another at Line 6+00SW, Station 00+00, Line 12+00SW, Station 00+00 and Line 18+00SW, Stations 3+00 and 6+00SE; and another along Line 24SW, Stations 12+00SE and 15+00SE. All three anomalies are open to the northeast since no survey was run on that area. Another isolated anomaly was noted at Line 36+00SW, Station 18+00SE (See Figure 2).

The southwest group of survey lines were planned to test airborne anomalies 1, 2 and 3. However, towards the end of the field work, heavy snowfall caused a malfunction of the scintillometer. The survey lines to cover the airborne anomaly 1 and part of anomaly 2 were not run. No time was available to have the instrument fixed, and the survey continued, because the snow cover was getting thicker.

Anomaly 3, which is a broad anomaly indicated in the airborne radiometric survey, is represented by two broad anomalies which have been well



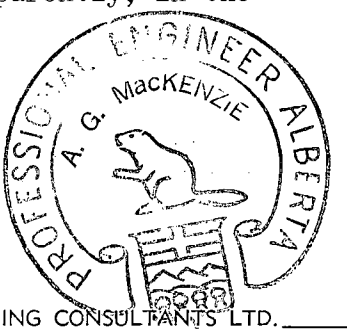
delineated by Lines 180+00SW, 186+00SW, 192+00SW, 198+00SW, 204+00SW and 210+00SW (See Figure 2). The highest value measured was 2,000 cpm and intermediate values of 1,500 cpm were common. These anomalies are the strongest in the entire area surveyed. A ground reconnaissance check of the airborne radiometrics for the above area in 1969 also indicated this anomaly.

Airborne anomaly 2 is partially indicated by anomalous readings along Line 210+00, Stations 60+00 and 3+00SE.

Another anomaly, not in the airborne radiometric flight line, is indicated to the north-northwest of Anomaly 3. Readings of 1,000 cpm were noted near the baseline at Lines 168+00SW, 174+00SW and 180+00SW. The anomaly is open to the northwest and could turn out to be a broad, strong anomaly.

ECONOMIC GEOLOGY

As discussed in our previous report, the present anomalies are in the general area where a southern extension of the Black Bay Fault was suspected. This fault is a known base for uranium mineralization; we believe we have established the validity of the extension of this fault into this area. The Black Bay Fault is, however, overlain by the Athabasca Sandstone which in itself is not uraniferous. The source of the radioactivity, therefore, is assumed to be the Tazin or Martin formations that underly the Athabasca Sandstone. In this area the Athabasca Sandstone is not very thick (less than 500 feet) as indicated by seismic survey. It would, therefore, not be too costly to drill through the Athabasca into the older rocks which have been found to host uranium minerals in the Beaverlodge area and now, apparently, in the



Clutt Lake area to the east of Permit 73.

At this stage of the exploration program, no uranium mineralization, per se, has been seen, but the radiometric survey has delineated strong anomalies of sizes that warrant additional work in the area.

CONCLUSIONS AND RECOMMENDATIONS

The present ground check of the 1969 rough, reconnaissance, airborne radiometric survey has indicated that most of the anomalies picked up are legitimate. In addition to this, other anomalous areas not along the flight line of the airborne survey have also been noted on the ground. The area, therefore, is worthy of further exploration. In addition to the above, it should be mentioned that to the southeast of the area, on the Saskatchewan side of the border, a diamond drilling program of some 60,000 feet is reported programmed. The target of the drilling is a horst block of the older rocks (Tazin and Martin formations) which do not have a thick, overlying Athabasca Sandstone cover. Initial diamond drilling (20,000 feet) was reported to have encountered uraniferous rocks underlying the Athabasca Sandstone.

In Permit 73, seismic surveys have shown that there is less than 500 feet of Athabasca Sandstone lying on the older rocks.

Therefore, we recommend that a detailed radiometric survey be done over anomalies 19 and 3 to pin-point the location of the highest radioactivity preparatory to drilling. We also recommend that the reconnaissance survey be continued to further delineate the present open anomalies. The ground in between the present groups of survey lines should also be surveyed on a reconnaissance basis.

If additional anomalies are delineated in this reconnaissance survey, these too should be detailed preparatory to diamond drilling.

The reconnaissance survey may be taken on the same grid of 600' x 300' but the detailed survey should be a 50' x 25' grid.

If the above detailed surveys indicate drilling, then at least two holes should be drilled into each anomaly. Each hole should be around 500 to 600 feet, depending on the thickness of the Athabasca Sandstone. The total footage necessary to test anomalies 19 and 3 would be approximately 2,400 feet.

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THE ASSOCIATION OF PROFESSIONAL ENGINEERS OF ALBERTA
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MINING CONSULTANTS LTD.

PROFESSIONAL ENGINEER ALBERTA
A. G. MacKENZIE

Angus G. MacKenzie, B.Eng., MCIM,
Consulting Mining Engineer & Mining Geologist

Calgary, Alberta.
November 27, 1970.

DECLARATION OF QUALIFICATIONS

OF

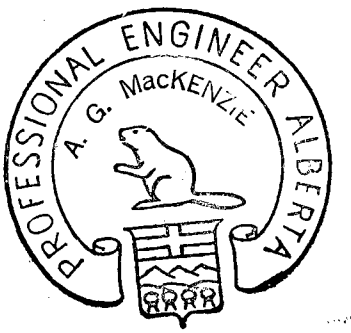
ANGUS G. MACKENZIE, P. ENG., MCIM

1. I, Angus G. MacKenzie, hereby certify that I am a Consulting Mining Engineer - Mining Geologist. I am a graduate (B. E.) in Mining and Metallurgy of Nova Scotia Technical College, Halifax, N. S. and I have taken post-graduate economic geology at Dalhousie University.

2. I have spent the past thirty years in the Mineral Industries as a Mining Engineer and/or Mining Geologist and have maintained responsible positions in these fields at mining properties in Newfoundland, Nova Scotia, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, the Yukon and Northwest Territories. I have also had considerable experience in the U. S. A. and Mexico.

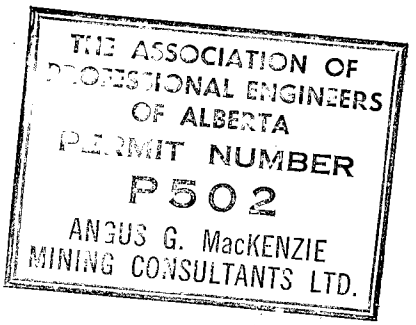
3. I am a Registered Professional Engineer in the Provinces of Alberta and Manitoba and the Yukon Territory and am licensed to practise in Saskatchewan and British Columbia. I have been registered in Nova Scotia, Quebec and in the State of Colorado, U. S. A.

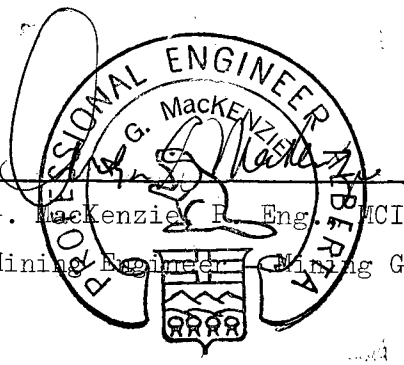
4. I have no personal interest directly or indirectly in the property herein reported on, nor in the securities of Columbian Northland Exploration Ltd. or any of its associated companies, nor do I expect to receive any such interest.



5. This report is the direct result of an examination by Angus G. MacKenzie Mining Consultants Ltd. over a period of approximately three weeks on Permit 73 of Columbian Northland Exploration Ltd., and a review of all pertinent literature for the area.

6. I have made this report on the radiometric survey at the request of Mr. J. Wahl, President of Columbian Northland Exploration Ltd., 1570 Elveden House, Calgary 2, Alberta.





Angus G. MacKenzie, P. Eng., MCIM,
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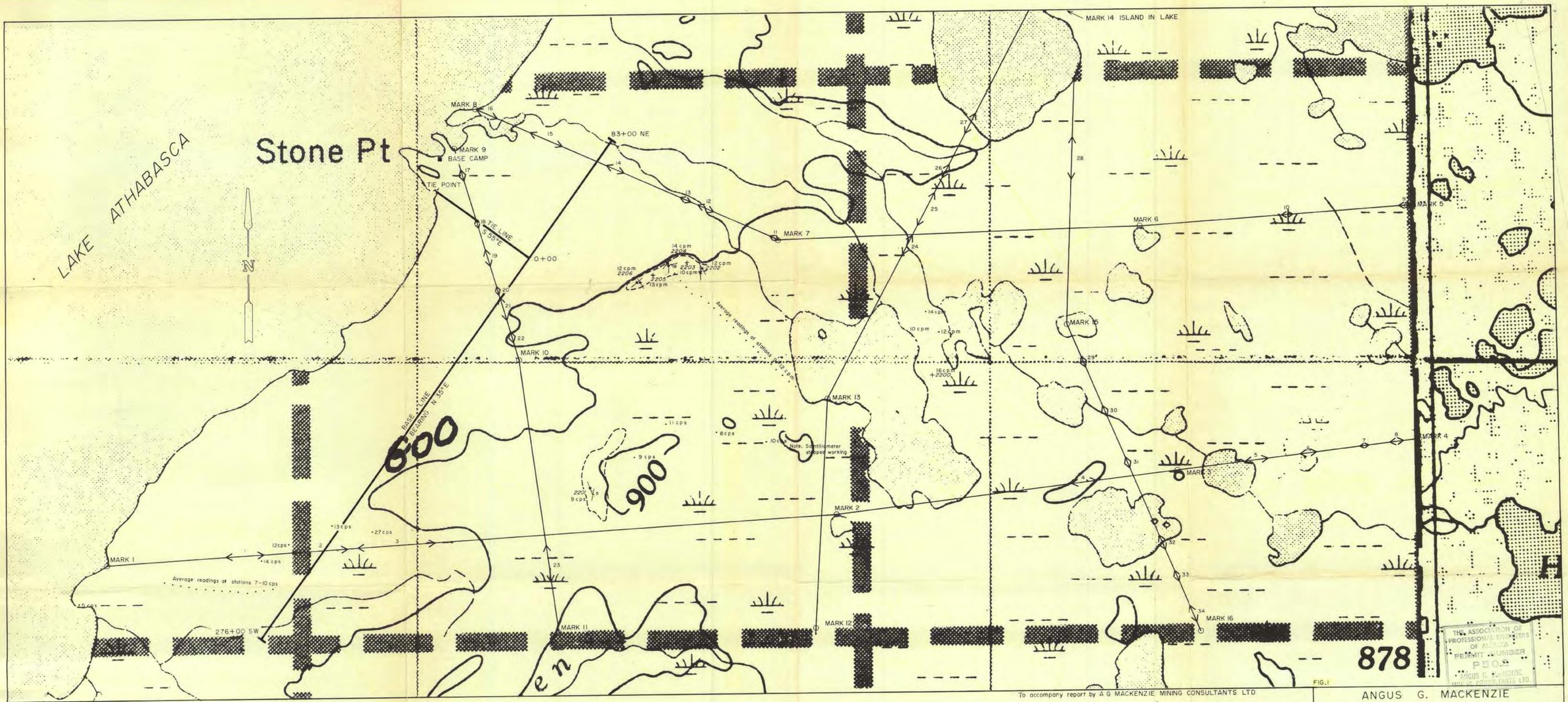

FIG. 1

To accompany report by A G MACKENZIE MINING CONSULTANTS LTD

LEGEND

- Joints vertical, bedding inclined.
- Approximate limit of outcrop.
- Broad anomalous zone.
- Restricted anomalous zone.
- Ground check point.
- Muskeg.
- ·10 cps — Counts per second with scintillometer.
- ·c p m — Counts per minute with Gieg-GIO counter.
- +2205 — Sample location.
- Flight line.

SCALE IN MILES

½ 0 ½ 1 1½ 2 2½

Note. Base map taken from Reconnaissance Geological Survey of Columbian Northland Exploration Ltd Permit 73 compiled by A G Mackenzie Mining Consultants Ltd in October 1969

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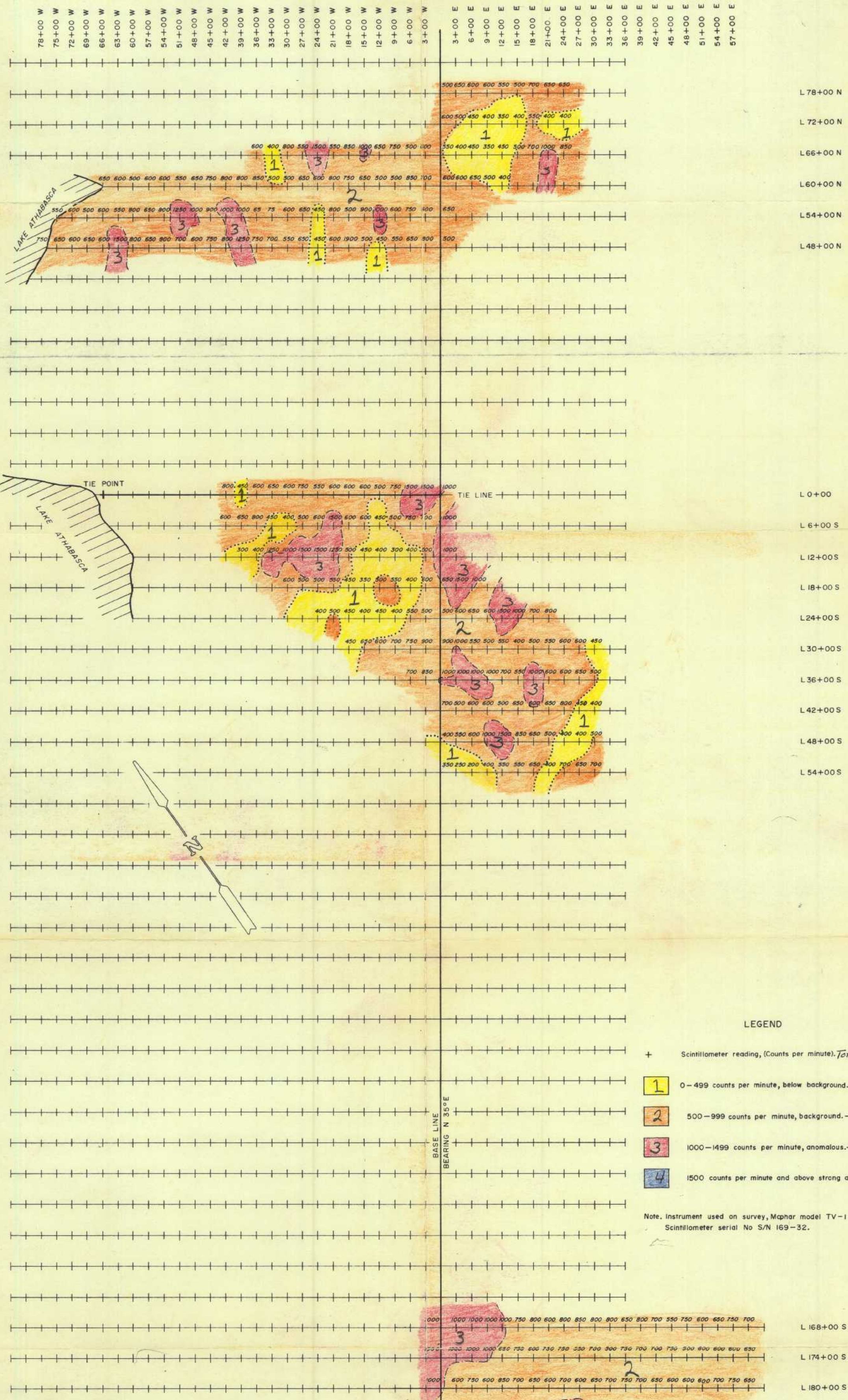
FOR

COLUMBIAN NORTHLAND EXPLORATION LTD

LOCATION MAP OF BASE LINE FOR RADIOMETRIC SURVEY PERMIT 73 LAKE ATHABASCA

DATE NOVEMBER, 1970	DRAWN BY D.J. RANDALL	APPROVED
REV DATE	SCALE 1" = ½ mile	DWG NO 14

19700003



LEGEND

+ Scintillometer reading, (Counts per minute). Total count

1 — 0 – 499 counts per minute, below background. ····· 499

2 — 500 – 999 counts per minute, background. — · — · — 999

3 — 1000 – 1499 counts per minute, anomalous. —— 1499

4 — 1500 counts per minute and above strong anomaly.

Note. Instrument used on survey, Mcphar model TV-1
Scintillometer serial No S/N 169-32.

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PROFESSIONAL ENGINEER A. G. MacKENZIE ALBERTA

FIG. 2

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FOR
COLUMBIAN NORTHLAND EXPLORATION LTD

RADIOMETRIC SURVEY PERMIT 73
LAKE ATHABASCA NORTHERN ALBERTA

DATE: NOV, 1970	DRAWN BY: D.J.R	APPVD:
REV DATE:	SCALE: 1" = 1200'	DWG NO. 148

To accompany report by A G MACKENZIE MINING CONSULTANTS LTD

1970003