MAR 19770010: NORTHEASTERN ALBERTA

Received date: Dec 31, 1977

Public release date: Jan 01, 1979

VAF-136(1)

NORCEN ENERGY RESOURCES LIMITED

FINAL REPORT

1977 EXPLORATION PROGRAM

QUARTZ MINERAL EXPLORATION PERMIT
NORTHEASTERN ALBERTA

208, 210, 211

November, 1977

G. McWilliams

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SUMMARY

Norcen Energy Resources Limited, on behalf of the uranium joint venture with Campbell Chibougamau Mines Limited, E & B Explorations Limited and Ontario Hydro holds two blocks of Quartz Mineral Exploration Permits in Northeastern Alberta. The Archer permits which cover 179,200 acres include permits 208, 209, 210 and 211 which were acquired on January 28, 1976. The five Richardson Permits totalling 229,600 acres include permits 6 876 120002 to 6 876 120006 acquired on December 23, 1976.

A surface prospecting and geochemical survey conducted over the Archer permits during the summer of 1976 indicated that the edge of the Athabasca Formation was further west than anticipated. This survey also revealed that the pervasive cover of glacial overburden in the area prevented the useful application of any further surface prospecting in the area. In evaluating the situation, the authors felt that present exploration techniques limited the search for unconformity type Athabasca sandstone uranium deposits to areas where the unconformity between the Athabasca Formation and the underlying basement was less than 152.5 metres (500 feet) below the topographic surface. As a result, 2 permits 212 and 213 were surrendered to the Crown and the five Richardson permits were acquired.

The lack of outcrop and the far travelled nature of the overburden in Northeastern Alberta coupled with the importance of locating the margin of the Athabasca Formation indicated to the authors that a reconnaissance stratigraphic drilling program would be required to narrow search area. The 1977 drilling program over the permit areas was designed to:

a) define the edge of the Athabasca Formation

b) outline the areas where the combined thickness of Athabasca sandstone and overburden was less than 152.5 metres (500 feet).

c) examine the unconformity at the base of the Athabasca Formation

d) determine whether the Athabasca Formation in Norcen permit areas contained a favourable physical and chemical environment for uranium deposition

e) determine whether the cause of the lake sediment anomaly on permit 210 was due to local mineralization or part of a halo "down ice" from the Cluff Lake Deposit.

f) examine the basement for its potential as a site for trapping uranium from supergene solutions percolating along the unconformity.

A total of 1245 metres (4082 feet) of BQ (1 3/8 inches in diameter) drilling in 8 holes was carried out between August 15 and October 2, 1977. Core recovery from all holes was near 100 percent with the exception of short sections of unconsolidated sand within the Athabasca Formation where recovery was approximately 50 percent.

Drilling results indicate that the combined thickness of the overburden and Athabasca Formation underlying the Archer permits exceeds 121.2 metres (500 feet).

No further work is recommended for the Archer permits and those Richardson Permits lying to the west of the Richardson River. These areas should be either optioned or returned to the Crown. The 76 sections of permit 687612002 and the 6 sections of permit 687612000 should be retained. On the basis of the success of the electromagnetic method in locating conductors associated with the uranium deposits at Key Lake, Maurice Bay either an airborne electromagnetic or reconnaissance ground electromagnetic survey is recommended for this area in 1978.

INTRODUCTION

History

Exploration for uranium in northeastern Alberta was sparked by the announcement by Gulf Minerals of their discovery of a uranium deposit at Rabbit Lake, Saskatchewan in 1968. A massive land acquisition covering most of the Athabasca Sandstone Basin attracted various companies to conduct airborne spectrometer surveys in northeastern Alberta. The absence of outcrop in this area produced discouraging results and very little ground follow-up was attempted. The following list of companies were active in the area:

R.H. King, 1969

Pacific Silver Mines & Oil Ltd., 1969

Fort Reliance Limited & Ensign Oils Ltd., 1969

National Nickel

Geo X

Velocity Surveys

Meyers & Paulson, 1970

MacIntyre Mines, 1969

Canada Southern Petroleum, 1969

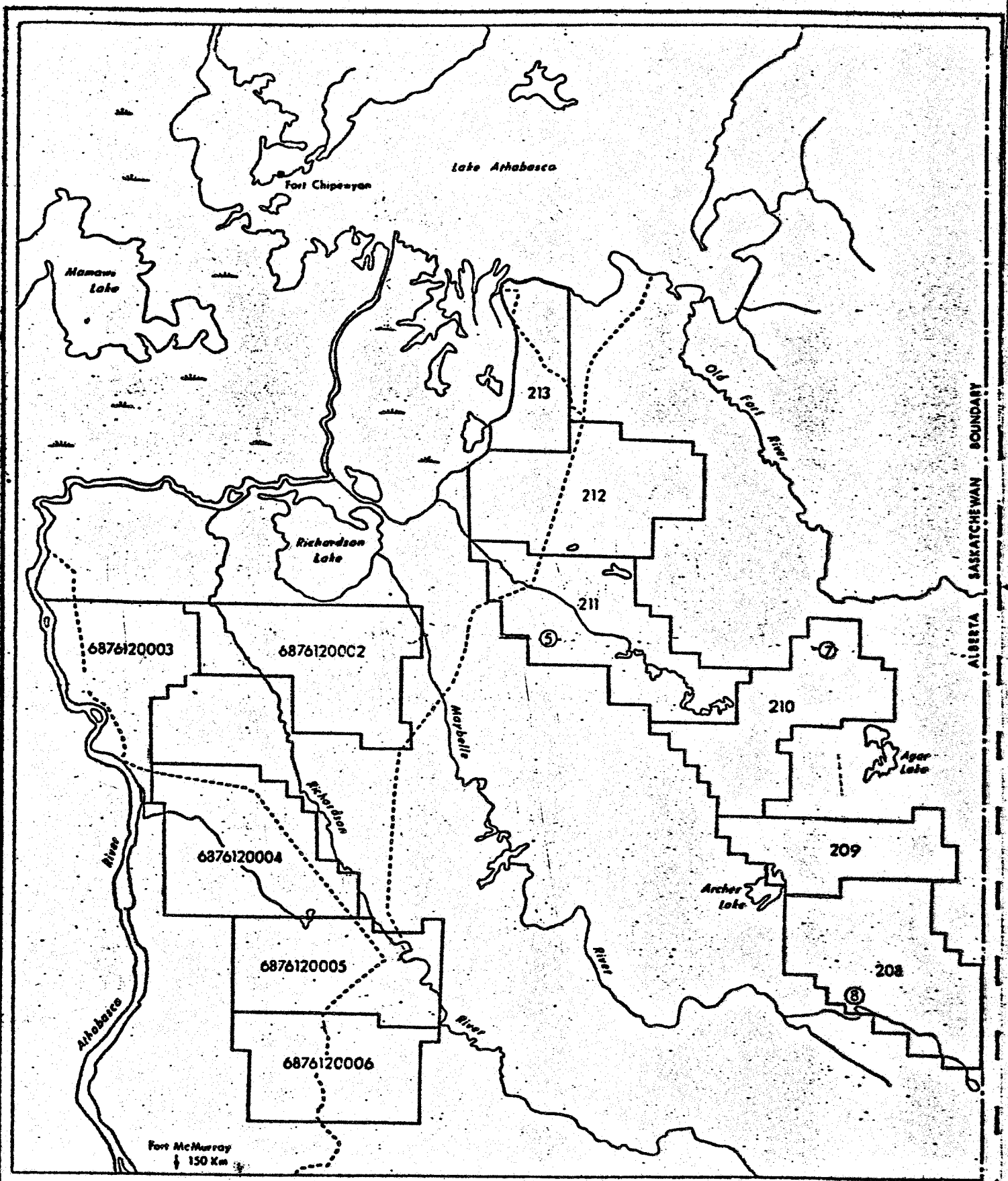
Anco Exploration Ltd., 1968

North Canadian Oils Ltd., 1969

Leal Mines, 1969

Radex Minerals, 1969

In 1974 Eldorado Nuclear acquired several permits in northeastern Alberta initiating a second phase of uranium exploration and prospecting. Norcen, under the name of its wholly owned subsidiary, Great Plains Development Company Limited, acquired 6 permits in January of 1976. Several other companies acquired permits and by June, 1976 most of the area available for acquisition over the Athabasca Formation in northeastern Alberta was covered by exploration permits. (Consult the accompanying map for details on the land status in northeastern Alberta and northwestern Saskatchewan).



② DRILL SITES

19770010

FIGURE 2

LOCATION OF DRILL SITES

0 5 10 15 Km.
0 5 10 Miles
SCALE : 1 : 500,000

Previous Exploration by Norcen

This report covers two blocks of permits which the authors, for the purpose of simplification, refer to as the Archer Permits and the Richardson permits. The Archer Permits, Quartz Mineral Exploration permits numbered 208, 209, 210, 211 are named after Archer Lake which, due to its central location, was the site of the camp used during the geochemical and surface prospecting program conducted during the summer of 1976. The Richardson Permits numbered 687612002 through 687612006 are named after the Richardson River which represents the dominant topographic feature of the area.

The Archer permits originally consisted of 6 permits covering the western margin of the Athabasca Formation as it is indicated on Research Council of Alberta, Map of Bedrock Geology of Alberta, 1970. During the summer of 1976 the author conducted a combined prospecting, surficial geology and lake bottom geochemical study over this area. The authors concluded from this study that the margin of the Athabasca Formation was located much further to the west than indicated on the geological map published by the Research Council of Alberta or indicated by the reconnaissance seismic study by Hobson and McAulay (1969). (For details on last year's exploration see Norcen Energy Resources Limited, 1976 yearend Report Quartz Mineral Exploration Permits NE Alberta and Athabasca River Areas by G. McWilliams and D.H. Sawyer). The recommendation by the authors in this report were that large sections of the permit area should be dropped and that additional permits south of Richardson Lake be acquired as soon as possible.

Drilling

3 PPK'P

The 1977 exploration program on the Norcen Quartz Mineral Exploration permits consisted of eight diamond drill holes totalling 1221.7 metres (4006 feet). One hole was drilled on each of the five Richardson Permits and three holes on the four Archer permits. Drilling commenced on August 18 and the last hole completed on September 29, 1977. The drill was mobilized from Leduc to Fort McMurray via truck and from Fort McMurray to Embarras via barge down the Athabasca River. The winter road southeast to Embarras provided good access to the first four drill sites. The drill mounted on a Nodwell trailer and a camp consisting of three 10 x 18 foot tents mounted on trailers provided good mobility. Moves and crew changes to the four holes not accessible by road were carried out with a Bell 206B helicopter from a base camp located at the Embarras air strip.

DRILLING SUMMARY

Hole #5

Location: Tp. 107 R5 Sec. 20 SE West of the 4th Meridian
Permit No. 211 N.T.S. 74L
Started: September 3, 1977 Completed: September 10, 1977
0-115 feet 0-35.1 metres - overburden
115 827 feet 35.1 252.2 metres - Athabasca sandstone

Hole #7

Location: Tp. 107 R2 Sec. 28 NE West of the 4th Meridian
Permit No. 210 N.T.S. 74I
Started: September 20, 1977 Completed: September 24, 1977
0-156 feet 0-47.6 metres - overburden
156 604 feet 47.6 - 184.2 metres - Athabasca sandstone

Hole #8

Location: Tp. 104 R2 Sec. 9 NE West of the 4th Meridian
Permit No. 208 N.T.S. 74L
Started: September 26, 1977 Completed: September 29, 1977
0-114 feet 0-34.8 metres - overburden
114 747 feet 34.8 - 227.8 metres - Athabasca sandstone

REGIONAL GEOLOGY

The northeast corner of Alberta is occupied by 6,000 square miles of the Canadian Shield, consisting of a complex of igneous, metamorphic and sedimentary rocks ranging in age from 1.7 to 2.3 billion years and forming part of the Churchill Structural Province.

South of Lake Athabasca lie rocks of the Athabasca Formation within the Athabasca intracratonic basin. This Formation covers an area of 40,000 square miles mainly in Saskatchewan and reaches a thickness of 6,000 feet. However, approximately 1,200 square miles of this Athabasca Sandstone occurs in Alberta and appears on islands in Lake Athabasca as well as small peninsula's located as Shelter Point and Fidler Point on the north shore of Lake Athabasca.

The Athabasca Formation is considered to belong to the Paleohelikian Era (1.3 - 1.7 billion years).

DESCRIPTION OF THE ATHABASCA FORMATION

The formation consists of quartz sandstone with minor interbeds of shale and siltstone and a basal gritty sandstone conglomerate unit. The formation lies in an oval shaped basin coverin in excess of 98,800 square kilometres (38,000 square miles) in northwestern Saskatchewan and approximately 31,000 square kilometres (12,000 square miles) in northeastern Alberta. The formation dips toward the centre of the basin where it reaches a thickness of 1,800 metres (6,000 feet). A pronounced unconformity underlies the Athabasca Formation and in some localities probably depending on the composition of the Archaean basement rocks a regolith is developed.

DESCRIPTION OF THE ATHABASCA FORMATION IN THE NORCEN CORE

Composition

The sandstone is composed almost entirely of quartz grains bound together by selica and/or clay cement. Shale and argillaceous siltstone beds occur as minor interbeds of 1 to 20 centimetres (0.5 to 8 inches).

Colour

The sandstone ranges in colour from a white buff colour to a dark maroon colour with light buff and pink, the most common. Colour banding is common with alternating pink

white and maroon. Red and pink colours are due to a surface coating of hematite on the sand grains and on the cementing clay minerals. The dark maroon colour appears to be caused by a concentration of fine specular hematite grains in the matrix of the sand. There would appear to be an increase in hematite content with depth. In hole number 8, there was a distinct concentration of hematite in the sandstone above and at the basement unconformity. Dark grey colours are caused by tar and bitumen coating the sand grains. Dark grey coloured sand occurs in porous horizons adjacent to fractures.

The siltstone beds occur in tan buff colour, chlorite green colour or deep hematite red colour. Locally these beds are laminated with fine millimetre thick alternating laminations of dark red and light green.

CEMENT HARDNESS AND PERMEABILITY

Both silica and clay cement occur in varying abundance. Where silica cement is present the sandstone is hard and non-friable, when clay minerals form the cement the sandstone is moderately friable and when little of either is present the sandstone is extremely friable or as in a short section of hole number 8, unconsolidated. The permeability of the sandstone is affected by the amount of cement present, the presence of impermeable siltstone beds and locally by secondary fracturing. Locally permeable horizons are clearly indicated by leaching of the hematite in the sandstone creating colour banding.

Grain Size and Sorting

The sediments range from fine sand through fine pebbles, but medium grained sand is the most abundant. In holes 5 and 6 there appeared to be a gradual increase from fine to medium grained at the top to medium to coarse and coarse grained sand at depth. Locally some beds show distinct textural laminations in which there is a marked contrast and grain size in adjacent laminae and layers.

Structures

Inclined and truncated laminae are prominant features and occur on a large scale and on a small scale as represented by festoon cross-laminations with individual laminations several millimetres thick. In hole number 5 a sandstone breccia unit 1.6 metres (5.2 feet) thick was

intersected which showed distinctive intrusive relationship with the surrounding sandstone. Fractures in the sandstone above the breccia unit are filled with a mudstone identical to the matrix of the breccia. The breccia consists of extremely angular fragments of sandstone and siltstone up to 5 centimetres (2 inches) in diameter in brick red to orange sandy mudstone matrix.

Fractures in the sandstone are locally a prominent feature and intersect the core axis at 10 to 15 degrees. These fractures are filled with clay, silica or tar.

Unconformity

6 - See cross-section in VAF-137(3)

The unconformity underlying the Athabasca Formation was only encountered in hole number 5. The unconformity was outlined by a concentration of hematite in the matrix of the sandstone and in the highly altered basement rock. The upper level of the granitic basement rock is highly altered by insitu chemical alteration of feldspars and micas and replacement by hematite. This zone of alteration and replacement gradually decreases downward over a depth of 10 metres (30 feet).

Radioactivity

Background levels of radioactivity as measured with a hand held McPhar TV-1A spectrometer were low, less than 1,000 counts per minute, and no readings above 1.5 times background were over the sandstone or over the granitic basement rock.

CONCLUSIONS

The primary objective of the 1977 drilling project in northeastern Alberta was to outline the western margin of the Athabasca Formation. In objectively assessing the state of the art geophysical and geochemical methods, the authors estimate 152.5 metres (500 feet) is the maximum depth below the surface at which a uranium ore body could be detected. If we use this arbitrary depth limit to evaluate the Norcen permits, the four Archer permits are located too deep within the basin to have potential of detecting uranium ore zones located along the Athabasca Formation - Archaean basement unconformity.

Drill hole number 7 was located within a lake sediment geochemical anomalous zone, with values of 18.8 parts per million uranium as compared to a regional background of less than 2 parts per million. This hole reached a depth of 184.2 metres (604 feet) without encountering any anomalous radioactivity. The author concludes that this anomaly is not due to local mineralization, but rather, is due to uranium in the glacial overburden which originated from the Amok uranium deposit at Cluff Lake, Saskatchewan.

RECOMMENDATIONS

The Athabasca Formation Archean conformity underlies the Archer permits at depths in excess of 153 metres (500 feet). It is the understanding of the authors that the state of the art geochemical and geophysical tools are unable to detect uranium mineralization at this depth. Since the primary exploration target in the Athabasca basin is uranium mineralization located along the unconformity the chance of discovering uranium deposits in this area is remote. These permits should be surrendered to the crown on their January 28th anniversary date.

APPENDIX 1

Drill Logs

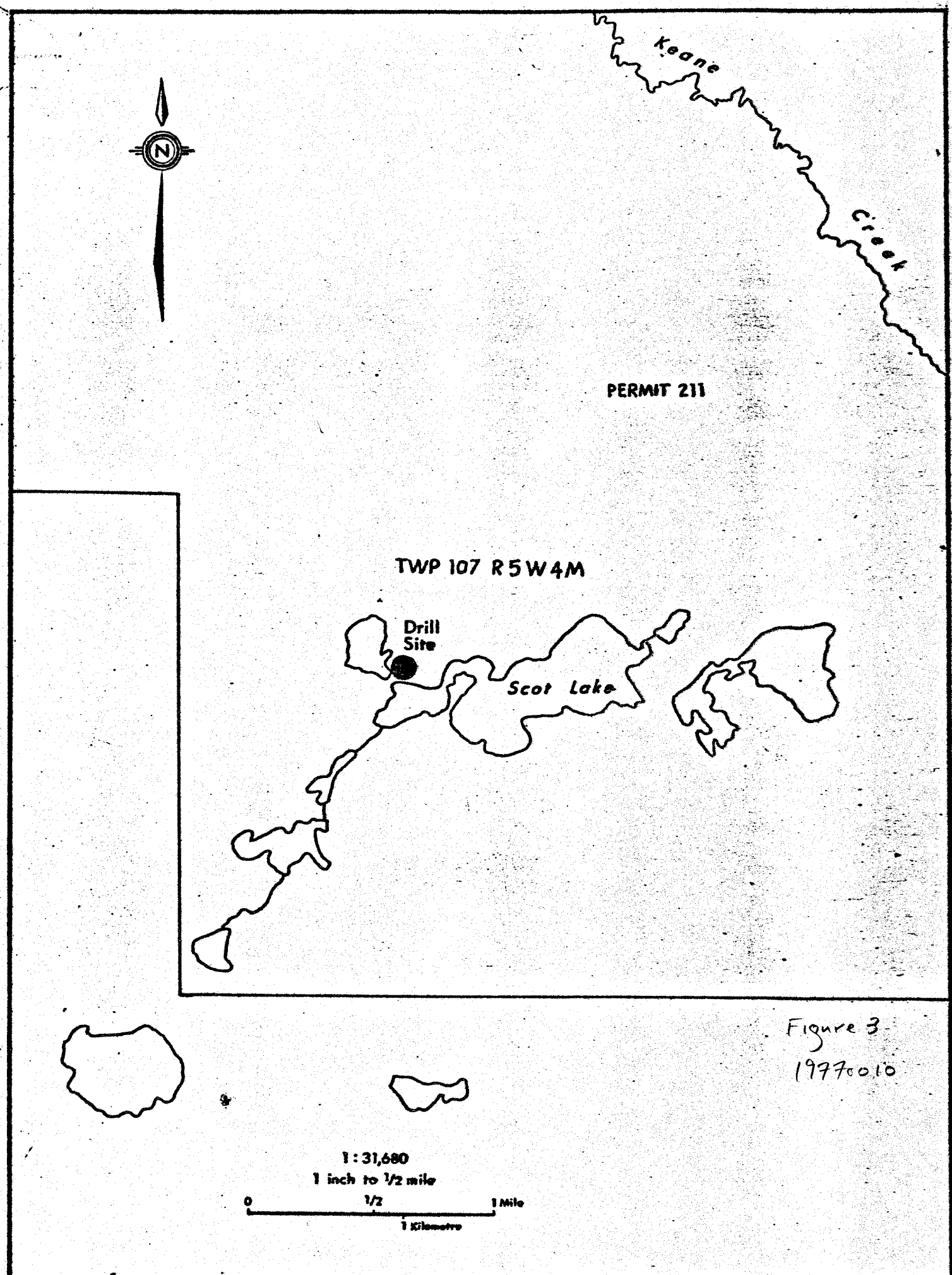


Figure 3
1977-010

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

PROPERTY: ARCHER QUARTZ MINERAL PERMITS HOLE NO. R 5

SHEET NUMBER 1 N.T.S. NO. 74L STARTED September 3, 1977

COLLAR Tp 107 R5 Sec 28 SE CLAIM NO. Permit 211 COMPLETED September 10, 1977

W of the 4th Meridian BEARING ULTIMATE DEPTH 827 feet/252.2 meters

ELEVATION 950 feet/390 meters DIP - 88 PROPOSED DEPTH

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay
0-35.1	Overburden - glacial outwash.			
	- sand with small boulders above outcrop			
35.1-36.0	Sandstone-massive pink fine grained well sorted clay and silica		0.9	
	cement			
36.0-37.2	Sandstone-as above with maroon sections and brick red clay		1.2	
	minerals in fractures			
37.2-38.1	Sandstone-massive white medium grained silica cement		0.9	

LOGGED BY _____ DRILLED BY _____ CORE STORED _____

904 6/77

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 2 PROPERTY ARCHER QUARTZ MINERAL PERMITS HOLE NO. R 5

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay				
38.1-44.5	Sandstone-massive to weakly banded,white, textural laminations		6.4					
	due to contrasts in grain size							
44.5-45.5	Sandstone-cross-laminated, white to pink, cross-laminations are		1.0					
	indicated by inclined truncated colour laminations							
	up to 4 cm apart							
45.5-58.6	Sandstone-massive white grey, tar in fractures and in irregular		3.1					
	blotches adjacent to fractures thin laminated beds of							
	siltstone claystone occur at 48.2 and 55.4							
58.6-59.8	Sandstone-massive to weakly banded pink fine grained, clay		1.2					
	cemented, local bands of purple laminated siltstone							
	claystone.							

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 3 PROPERTY ARCHER LAKE QUARTZ MINERAL PERMITS HOLE NO. R 5

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay
59.8-60.7	Sandstone-massive, white maroon		0.9	
60.7-63.6	Sandstone-massive pink fine grained with local laminations purple siltstone claystone		2.9	
63.6-63.9	Sandstone-massive white-grey medium grained		0.3	
63.9-64.1	Sandstone-Siltstone laminated pink sandstone and light brown to yellow siltstone		0.2	
64.1-65.4	Sandstone-massive white medium grained sandstone minor silt-stone		1.3	
65.4-66.5	Sandstone-massive pink fine to medium grained tar in fractures and in adjacent sandstone		1.1	
66.5-68.6	Sandstone Siltstone-pink sandstone and laminated yellow-brown siltstone		1.1 50%	

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 4 PROPERTY ARCHER LAKE QUARTZ MINERAL PERMITS HOLE NO. R 5

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay
68.6-69.2	Sandstone-massive light grey medium grained		0.6	
69.2-69.4	Sandstone-Siltstone laminated grey, pink and maroon siltstone and fine pink and white sandstone		0.2	
69.4-70.9	Sandstone-massive grey white		1.5	
70.9-71.1	Sandstone Siltstone-laminated grey and maroon siltstone and fine grey sandstone		0.2	
71.1-73.2	Sandstone-massive to weakly banded grey white		2.1	
73.2-75.3	Sandstone-massive pink 50% recovery		2.1	
75.3-75.6	Sandstone-cross-laminated white pink		0.3	
75.6-77.2	Sandstone-massive to weakly banded pink-grey		1.6	

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 5 PROPERTY ARCHER LAKE QUARTZ MINERAL PERMITS HOLE NO. R 5

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay				
77.2-79.9	Sandstone-massive white medium to coarse grained with local cross-laminations		2.7					
79.9-82.4	Sandstone-massive grey maroon medium grained		2.5					
82.4-83.3	Sandstone-massive pink local cross-laminations		0.9					
83.3-83.7	Sandstone-fractured. Cuts core axis at 15° carbonate and clay minerals on fracture surface		0.4					
83.7-85.9	Sandstone - massive white grey		2.2					
85.9-86.5	Sandstone-Siltstone-bedded pink white fine sandstone with local beds of siltstone		0.6					
86.5-93.0	Sandstone-massive-grey white oil stains adjacent to fractures		6.5					

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 6 PROPERTY ARCHER LAKE QUARTZ MINERAL PERMITS HOLE NO. R 5

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay
93.0-110.7	Sandstone-massive pink irregular grey bands due to tar		17.7	
110.7-110.9	Sandstone-massive maroon coarse grained		0.2	
110.9-112.6	Sandstone-massive fractured white pink fractures filled with clay minerals		1.7	
112.6-114.7	Sandstone-graded bedding pink		2.1	
114.7-125.4	Sandstone-massive local cross-laminations pink turning grey or purple around fractures tar in fractures dark hematite staining occurs at 122.9 (8 cm); 123.0 (10 cm); 123.5 (5 cm)		10.7	
125.4-126.0	Sandstone-fracture zone light green clay minerals and tar in fractures.		0.6	

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 7 PROPERTY ARCHER LAKE QUARTZ MINERAL PERMITS HOLE NO. R 5

Depth (ft/m)	Description	Mineralization	Core Recov.	Assay
126.0-137.4	Sandstone-banded pink with irregular purple hematite or grey tar bands		11.4	
137.4-138.8	Sandstone-cross-laminated white pink		1.4	
138.8-142.4	Sandstone-banded grey pink bands		3.6	
142.4-151.0	Sandstone-cross-laminated pink and grey bands		9.6	
151.0-152.8	Sandstone-banded pink and grey bands medium grained		1.8	
152.8-168.4	Sandstone-cross-laminated pink with purple bands hamatite concentrated in beds 161.4 (15 cm); 161.6 (45 cm); 162 (20 cm)		15.6	
168.4-173.6	Sandstone-banded white with irregular purple and grey bands		5.2	

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 8 PROPERTY ARCHER LAKE QUARTZ MINERAL PERMITS HOLE NO. R 5

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay				
173.6-184.2	Sandstone-cross-laminated pink and white		10.6					
184.2-184.4	Sandstone-Siltstone-laminated pink fine sandstone and green soapy siltstone		0.2					
184.4-195.2	Sandstone-cross-laminated white pink with fracture zones with concentrations of tar and clay in fractures occurring at 188.8 to 189.1 and 190.2-190.3		0.8					
195.2-195.5	Siltstone-massive green soapy siltstone		0.3					
195.5-196.2	Sandstone-massive grey black due to tar in matrix medium to coarse grained		0.7					
196.2-199.7	Sandstone-banded pink white bands		3.5					
197.7-199.8	Sandstone Siltstone-fine green sandstone and siltstone		0.1					

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 9 PROPERTY ARCHER LAKE QUARTZ MINERAL PERMITS HOLE NO. R 5

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay
199.8-207.4	Sandstone-cross-laminated pink white with bands of green silt-		7.6	
	stone occurring at 200.8 (3 cm); 201.4 (13 cm); 201.5 (13			
	cm); 203.3 (13 cm); 204.2 (5 cm); 206.1 (15 cm)			
207.4-208.4	Sandstone Siltstone-alternating beds of pink sandstone 60%		1.0	
	and green siltstone 40% beds vary from			
	2 mm to 10 cm			
208.4-223.3	Sandstone-cross-laminated white pink, white siltstone at		14.9	
	212 (23 cm), 214 (13 cm) tar filled fractures			
	214.6 (0.4 m) 221.7 (13 cm)			
223.3-226.3	Sandstone massive white coarse grained with tar filling frac-		3.0	
	tures.			
226.3=228.5	Siltstone Sandstone-interbedded, purple colour due to hematite		2.2	

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 10 PROPERTY ARCHER LAKE QUARTZ MINERAL PERMITS HOLE NO. R 5

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay
228.5-230.1	Sandstone-Breccia-very fine brick red to orange sandstone con-		1.6	
	taining extremely angular clasts of siltstone and			
	sandstone			
230.1-234.6	Sandstone-massive, grey, medium to coarse grained sandstone,		4.5	
	fractures filled with tar			
234.6-251.9	Sandstone-massive to weakly banded, grey sandstone with abun-		17.3	
	ant white or pink clay cement			
251.9-252.0	Sandstone-highly fractured pink sandstone abundant tar in		0.1	
	fractures			
252 END	Unconsolidated sand and tar in the hole halted drilling			

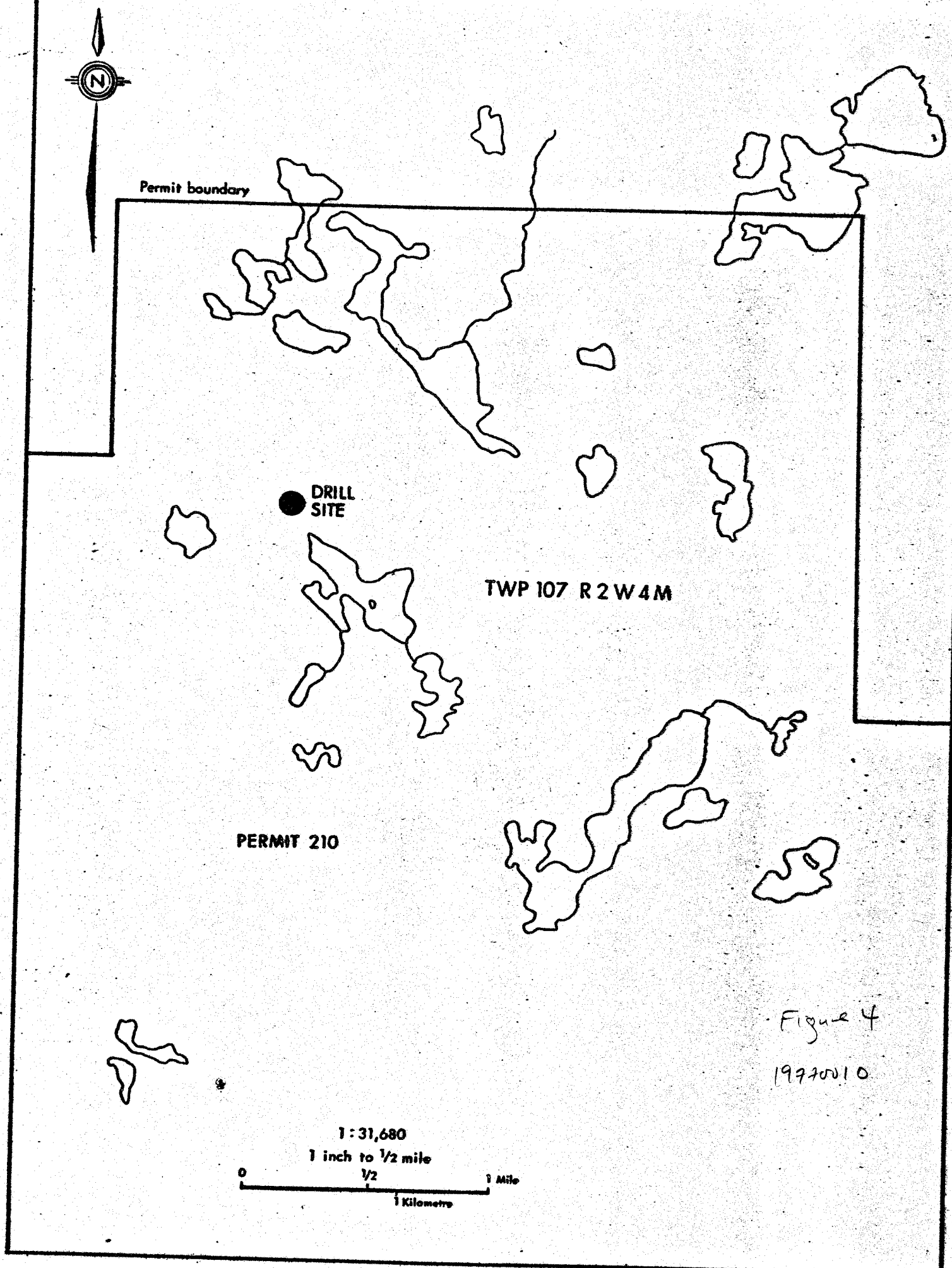


Figure 4

1977-00110

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

PROPERTY: ARCHER QUARTZ MINERAL PERMITS — HOLE NO. R 7

SHEET NUMBER 1 — N.T.S. NO. 74 L — STARTED September 20, 1977

COLLAR Tp 107 R2 Sec. 28 NE — CLAIM NO. Permit 210 — COMPLETED September 24, 1977

West of the 4th Meridian — BEARING — ULTIMATE DEPTH 604 ft/184.2 m

ELEVATION 1000 ft/305 m — DIP — PROPOSED DEPTH

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay
0-47.6	Overburden - glacial outwash composed of sand with some boulders above outcrop			
47.6-107.5	Sandstone - massive, white, well cemented		59.9	
	Cement consists of silica or white clay minerals, locally rock is highly fractured some of these annealed, fracture zones 48.8-49.1, 56.1-57.3, 58.3-58.4, 64.4-64.6, 65.9-66.1, 73.8-74.4, 83.3-84.2, 89.2-101.6			

LOGGED BY _____ DRILLED BY _____ CORE STORED _____

904 3/7

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 2 PROPERTY ARCHER QUARTZ MINERAL PERMITS HOLE NO. R 7

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay
107.5-108.0	Sandstone Siltstone-laminated grey medium grained sandstone with yellow white siltstone		0.5	
108-108.8	Sandstone Siltstone - as above except siltstone is red due to abundance of hematite		0.8	
108.8-109.2	Sandstone - grey sandstone with thin <1 mm bands of fine grained hematite		0.4	
109.2-110.1	Sandstone-banded red and white sandstone bands vary from 1 to 10 mm in width		0.9	
110.1-117.1	Sandstone-massive white well cemented sandstone, local fractures trend 15^{o}-45^{0} to core axis		7.0	
117.1-117.2	Siltstone-Mudstone - laminated green and red mudstone		0.1	

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 3 PROPERTY ARCHER QUARTZ MINERAL PERMITS HOLE NO. R 7

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay
117.2-165.3	Sandstone-massive fine to medium grained white, well cemented with yellow and white clay minerals, local fracture zones.		48.1	
165.3-179.0	Sandstone - banded grey and maroon sandstone		13.7	
179.0-180.6	Sandstone-cross-laminated, grey white		1.6	
180.6-181.5	Sandstone-banded, red-maroon, bands up to 5 cm wide		0.9	
181.5-184.2	Sandstone - festoon cross-laminations, grey white with outlining the cross-laminations, local spherical banding		2.7	
184.2	END OF HOLE DIP TEST -88			

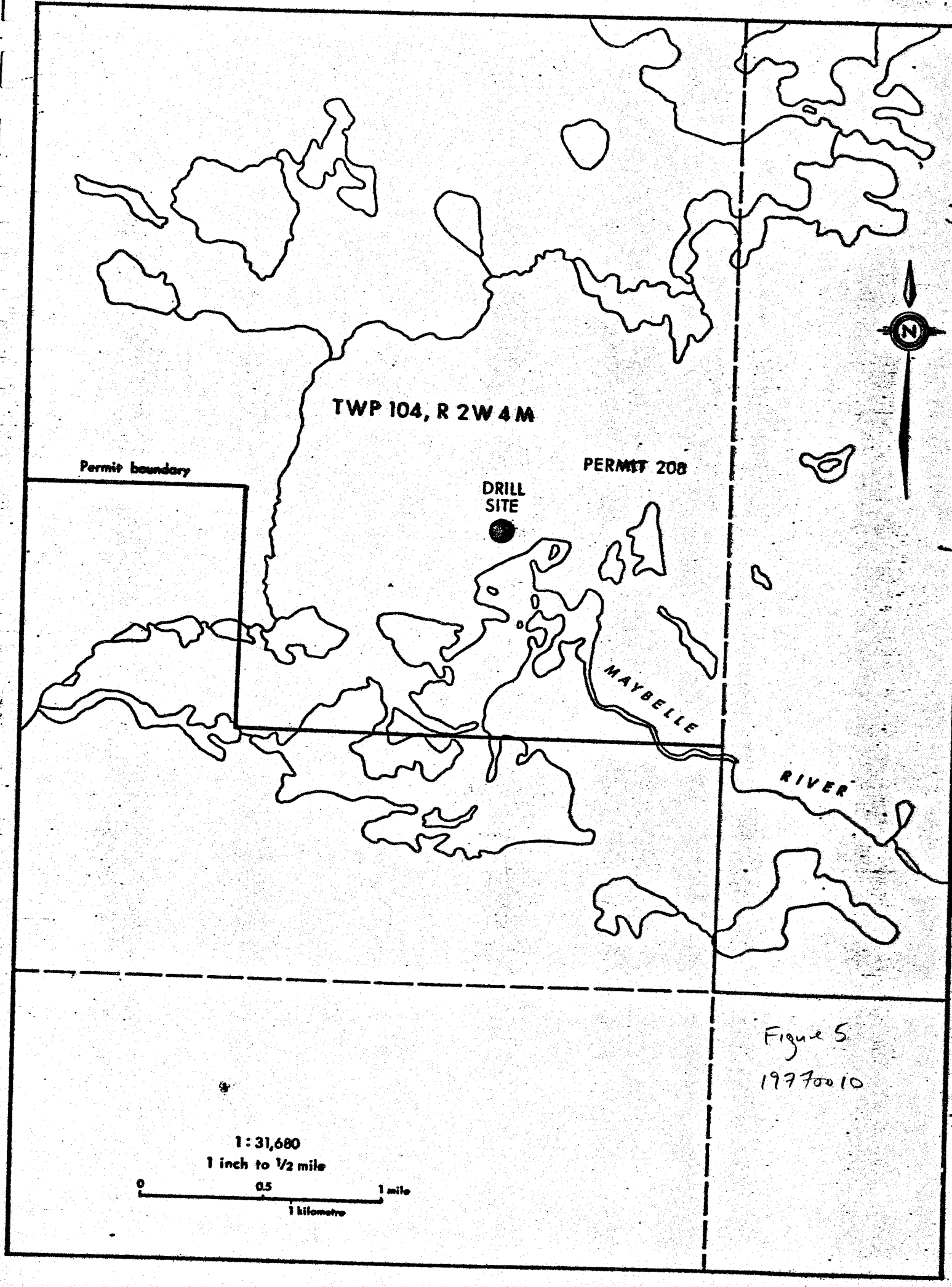


Figure 5
1977 00 10

NORCEN ENERGY RESOURCES LIMITED

DIAMOND DRILL RECORD

PROPERTY: ARCHER QUARTZ MINERAL PERMITS

SHEET NUMBER 1 N.T.S. NO. 74 L

COLLAR Tp 104 R2 Sec 9 NE CLAIM NO. Pemit 208

West of the 4th Meridian BEARING

ELEVATION 1200 feet/366 m DIP -90

HOLE NO. R 8

STARTED September 26, 1977

COMPLETED September 28, 1977

ULTIMATE DEPTH 747 feet/227.8 m

PROPOSED DEPTH

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay
0-34.8	Overburden - glacial outwash, sand with some boulders above bedrock			
34.8-37.1	Sandstone - cross-laminated, grey red thin beds		2.3	
37.1-65.3	Sandstone - cross-laminated, red white and pink, very friable, concentrations of hematite produce deep red-maroon bands at 43.9 (9 cm, 46.2 (36 cm), 53.3 (9 cm), 56.4 (6 cm); Sandstone Siltstone 47.0 to 48.2		28.2	

LOGGED BY DRILLED BY CORE STORED

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 2 PROPERTY ARCHER QUARTZ MINERAL PERMITS - PERMIT 208 HOLE NO. R 8

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay
65.3-77.8	Sandstone - cross-laminations, grey white with hamatite outlining cross-laminations, beds thicker than previous unit		12.5	
77.8-80.2	Sandstone - massive, grey, medium to coarse grained		2.4	
80.2-81.3	Sandstone - cross-laminated, white and red, fractures filled with tar		1.1	
81.3-101.9	Sandstone - massive with local cross-laminations, medium to coarse grained, pink white, local thin coarse grained horizons		20.6	
101.9-104.3	Sandstone - cross-bedded, grey with fine hematite bands outlining cross-laminations festoon cross-laminations, eliptical banding		2.4	

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 3 PROPERTY ARCHER QUARTZ MINERAL PERMITS - PERMIT 208 HOLE NO. R 8

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay				
104.3-113.8	Sandstone - massive, grey pink, weak colour banding medium to coarse grained, friable		9.5					
113.8-115.6	Sandstone - cross-laminated, red pink colour very friable		1.8					
115.6-116.8	Sandstone - massive, pink, beds up to 50 cm thick		1.2					
116.8-129.2	Sandstone - festoon cross-laminations, white pink, very friable fine to medium grained		12.4					
129.2-130.0	Sandstone - unconsolidated pink fine grained sand		0.8					
130.0-160.1	Sandstone - cross-laminations, white pink very friable		30.1					

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 4 PROPERTY ARCHER QUARTZ MINERAL PERMITS - PERMIT 208 HOLE NO. R 8

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay
160.1-160.7	Sandstone - extremely friable, pink poor recovery 50%		50% 0.3	
160.7-183.9	Sandstone - cross-laminations, white-pink red hematite spots up to 2 cm diameter 163.4 (9 cm) band of white siltstone; tar impregnates matrix of the sandstone at 162.8 (3 cm), 164.1 (15 cm), 166.2 (3 cm), 167.1 (3 cm), 168.2 (3 cm); 170.2 (3 cm) 171.0 (3 cm), 172.7 (3 cm), 173.2 (15 cm) 174.5 (3 cm), 175.5 (3 cm), 177.5 (6 cm), 177.8 (3 cm), 183.2 (6 cm), 183.6 (6 cm)		23.2	
183.9-193.4	Sandstone - massive, pink-white, local cross-laminations, red hematite spots up to 2 cm diameter, local sections of tar impregnating matrix occur at 183.9 (3 cm), 189.3 (3 cm)		9.5	

NORCEN ENERGY RESOURCES LIMITED
DIAMOND DRILL RECORD

SHEET NO. 5 PROPERTY ARCHER QUARTZ MINERAL PERMITS - PERMIT 208 HOLE NO. R 8

Depth (ft/m)	Description	Mineral-ization	Core Recov.	Assay
193.4-227.8	Sandstone - cross-laminations, pink white with red blotches, very friable grey bands containing tar occur at 196.7 (3 cm), 197.2 (6 cm), 210.1 (3 cm)		34.4	
227.8	DIP TEST -89°			

APPENDIX 2

Summary of Expenditures

SUMMARY OF EXPENDITURES 1977

QUARTZ MINERAL PERMIT 208

Drilling Costs

Mobilization and demobilization	$ 1,116.00
Drilling 747 feet 228 metres	$10,518.00
Additional drilling costs (labour core boxes, etc.)	$ 1,043.00

Helicopter Bell 206B

Total hours 36.7	
Cost of fuel and transportation of fuel to Embarras	$11,377.00
	$ 1,469.00

Other Costs

Salaries geologist in field and report writing	$ 1,216.00
Telephone	$ 78.00
Transportation (Norcen personnel)	$ 43.00
Shipping Core	$ 107.00
Accommodation	$ 147.00
Spectrometer rental	$ 44.00
	$27,011.00

SUMMARY OF EXPENDITURES 1977

QUARTZ MINERAL PERMIT 210

Drilling Costs

Mobilization and demobilization	$ 1,116.00
Drilling 604 feet 184 metres	$ 8,562.00
Additional drilling costs (labour, core boxes, etc.)	$ 3,012.00

Helicopter Bell 206B

Total hours 28.8 hours	$ 8,920.00
Cost of fuel and transportation of fuel to Embarras	$ 1,153.00

Other Costs

Salaries (geologist in field and report writing) 5 days	$ 1,073.00
Telephone	$ 78.00
Transportation (Norcen personnel)	$ 43.00
Shipping Core	$ 70.00
Accommodation (5 days)	$ 105.00
Spectrometer rental	$ 44.00
	$24,176.00

SUMMARY OF EXPENDITURES 1977

QUARTZ MINERAL PERMIT 211

Drilling Costs

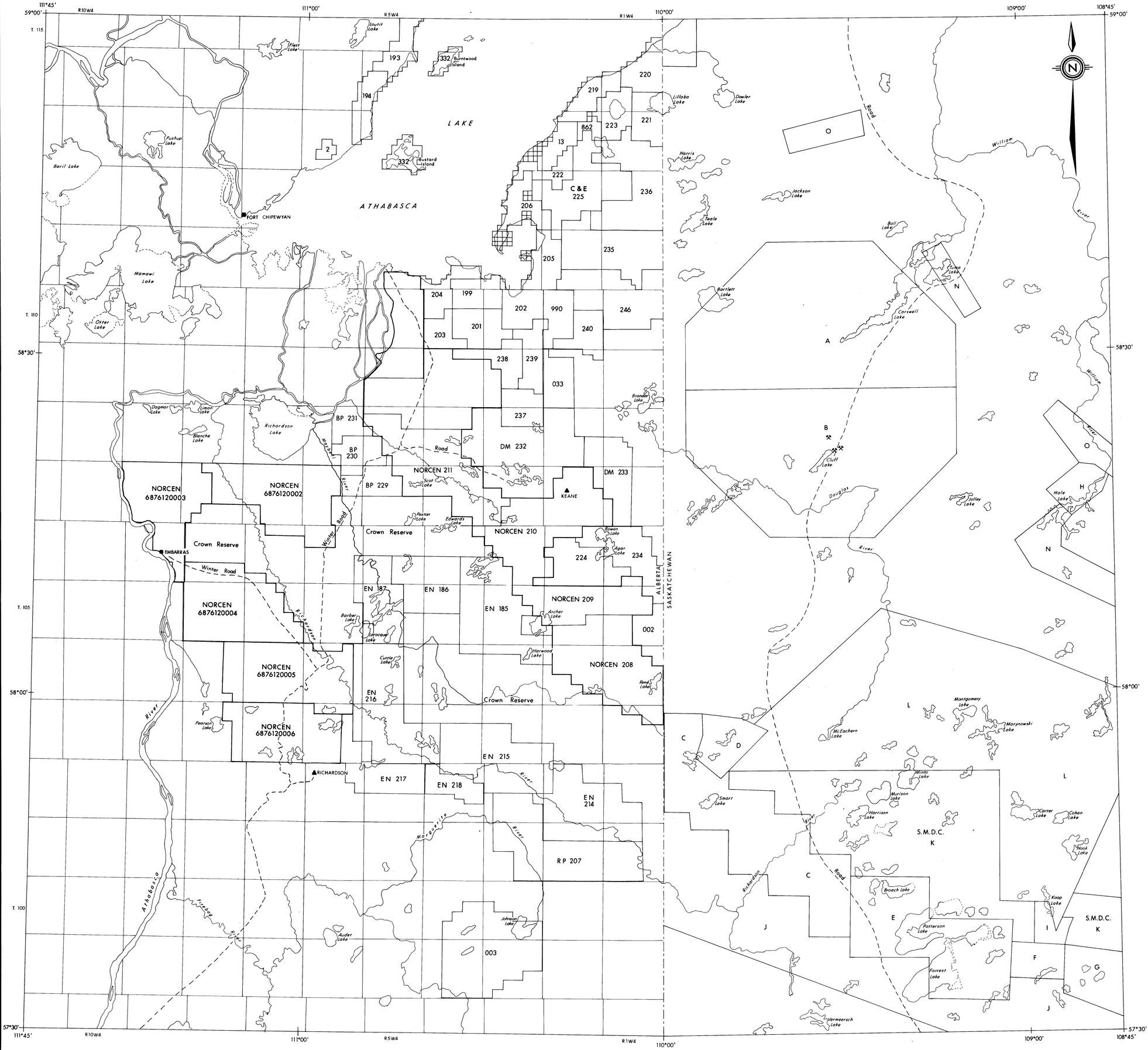
Mobilization and demobilization	$ 1,116.00
Drilling 827 feet 252 metres	$20,008.00
Additional drilling costs (labour, Core boxes)	$ 1,443.00

Helicopter Bell 206B

Total hours 23.7	$ 7,347.00
Cost of fuel plus transportation of fuel to Embarras	$ 869.00

Other Costs

Salaries (geologist in field and report writing) 16 days	$ 1,144.00
Telephone (mobile radio telephone)	$ 78.00
Transportation (Norcen personnel)	$ 43.00
Shipping Core	$ 73.00
Accommodation	$ 189.00
Spectrometer rental	$ 38.00
	$32,348.00



ALBERTA QUARTZ MINERAL EXPLORATION PERMIT

185 - 187	Eldorado Nuclear Limited
188	Urago Corporation Ltd.
189	S.M.D.C.
190	Uranerz Exploration & Mining Co. Ltd.
191 - 194	Uranerz Exploration & Mining Co. Ltd.
	Inexco Oil Company
	S.M.D.C.
201 - 206	George Albert Bleiler
207	Ram Petroleums Ltd., &
	Vipond Oil & Gas Ltd.
208 - 213	Norcen Energy Resources Limited
214 - 218	Eldorado Nuclear Ltd.
219 - 223	Flin Flon Mines Limited
224	Chevron Standard
225	C & E Exploration Limited
226	Enex Resources Limited
229 - 231	B.P. Minerals Limited
232 - 233	Dennison Minerals Limited
234	Chevron Standard
235 - 236	C & E Exploration Limited
237	Emil Krvsko
238	Stephen Yanik
239	Albert Alley
240	Milton Patton McDougal
244	C & E Exploration Ltd.
246	C & E Exploration Ltd.
033	Frank Albert Camsell
002 - 003	Taiga Consultants Ltd.
68760002 - 0006	Norcen Energy Resources Limited

QUARTZ MINERAL LEASE

1 - 2	North Canadian Oils Ltd.
4	Athabasca Exploration & Mining
13	Pacific Silver Mines & Oils Ltd.

SASKATCHEWAN PERMITS

A	Amok
B	Amok
C	Hudson Bay Exploration
D	Uranex
E	Canadian Occidental Petroleum
F	Uranerz, Inexco, SMPC
G	Kerr Addison
H	E Partridge
I	New Cinch
J	Hudson Bay Oil and Gas
K	S.M.D.C.
L	Imperial Oil
M	Flin Flon Mines
N	Wollex Exploration

Norcen
Energy Resources Limited

CAMPBELL CHIBOUGAMAU MINES LTD. and E&B EXPLORATIONS LTD.
JOINT VENTURE

ATHABASCA SANDSTONE PERMITS

ALBERTA-SASKATCHEWAN

SCALE - 1:250,000

10 0 10 Miles

10 0 10 Kilometers

NTS: 74 E, F, K, L

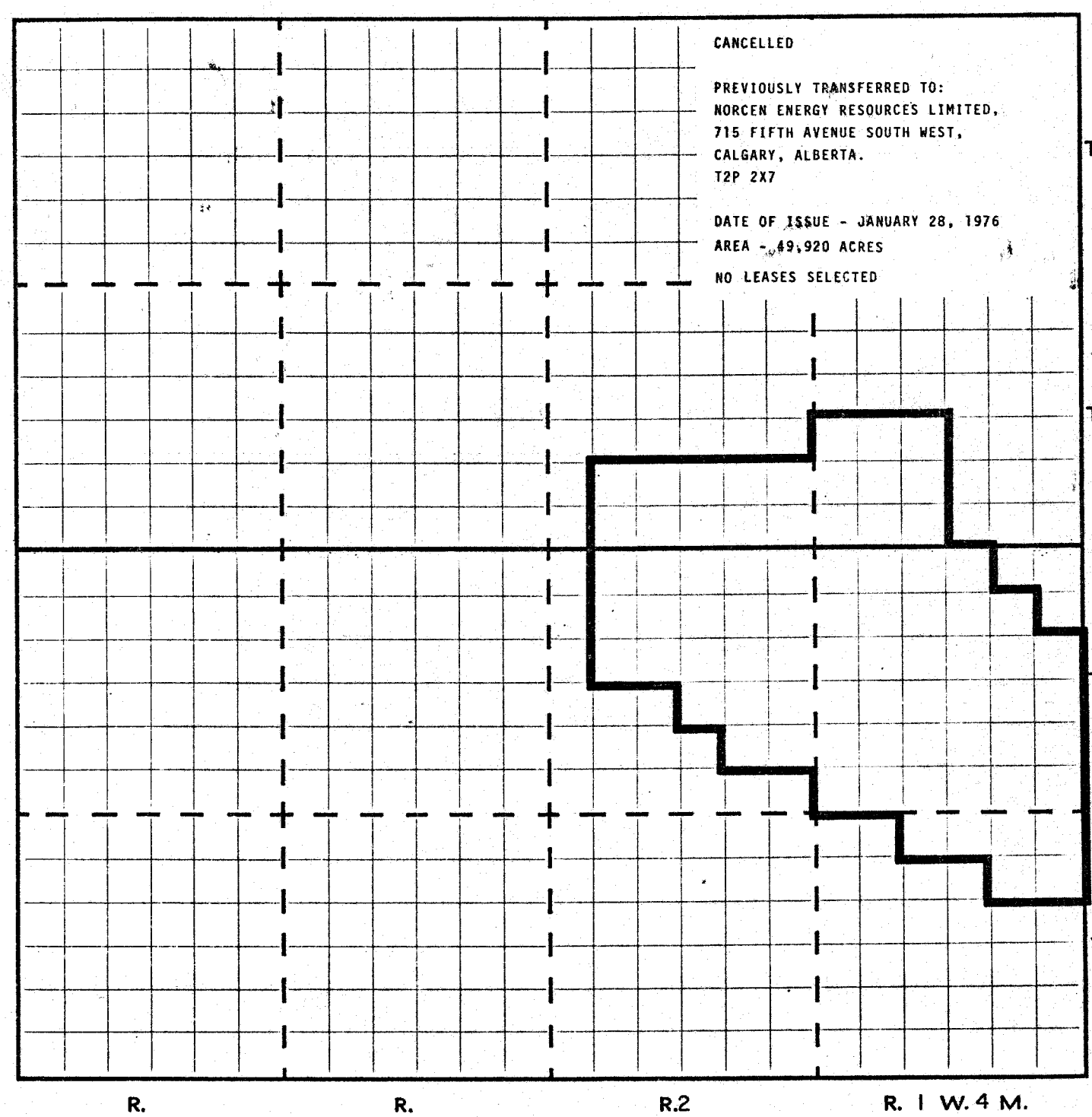
NOVEMBER, 1977

Figure 6
1977-10.

(163)

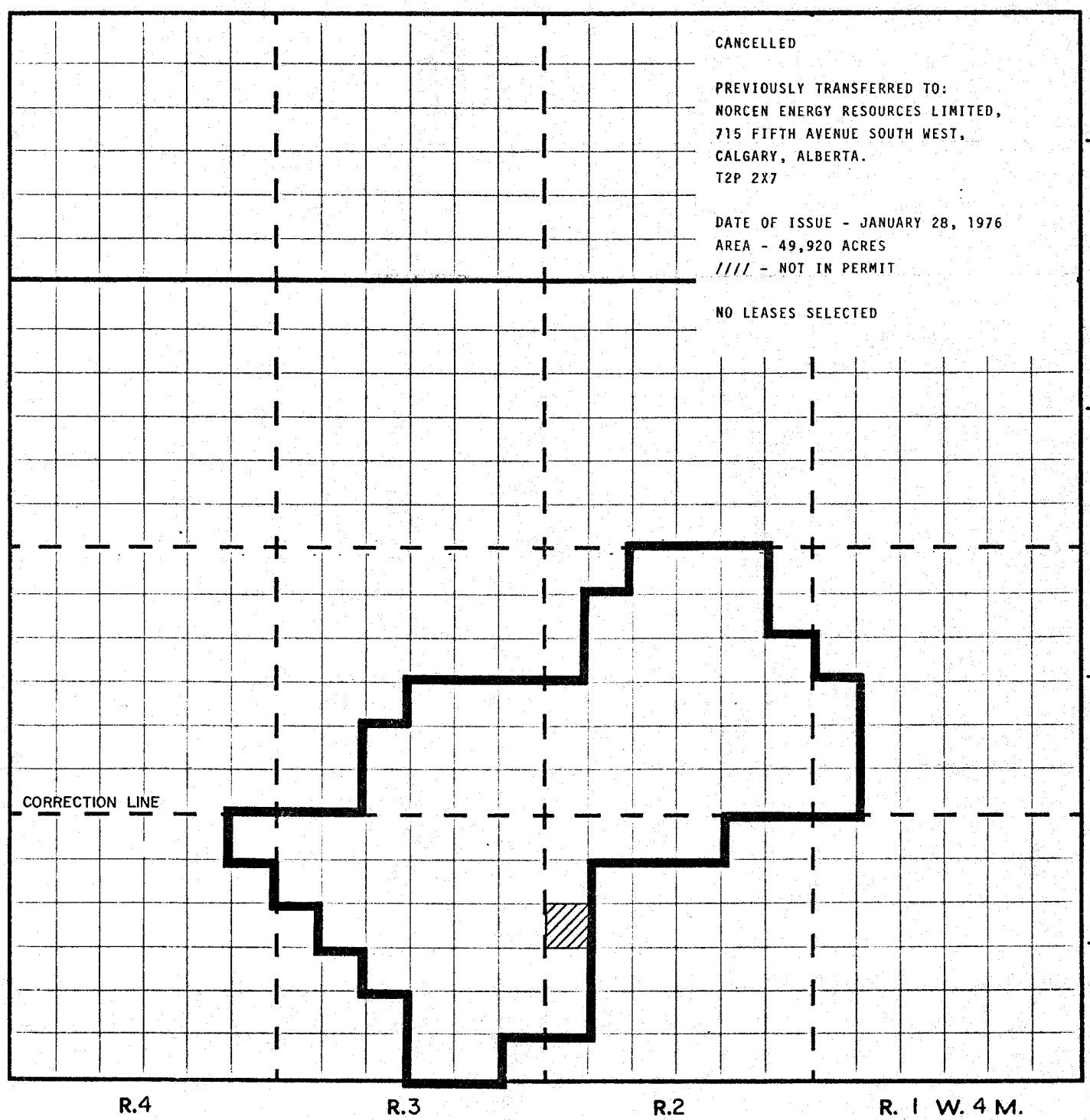
QUARTZ MINERAL EXPLORATION PERMIT No. 208

19770010



QUARTZ MINERAL EXPLORATION PERMIT No. 210

19770010



QUARTZ MINERAL EXPLORATION PERMIT No. 211

1977 0010