

# MAR 19790003: RICHARDSON RIVER

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ELDORADO NUCLEAR LIMITED

Exploration Division

19190003

PROJECT 508

SUMMARY REPORT - PERMIT 216

February 2, 1967 to February 2, 1979

U-AF 144(1)  
U-AF 142(2)

Peter A. Fortuna  
Exploration Geologist

## INTRODUCTION

Eldorado Nuclear Limited has been actively involved in uranium exploration in the Richardson River area, N.E. Alberta, since May 1975. Quartz Mineral Exploration Permits Numbers 214, 215, 216, 217 and 218 were issued on February 2, 1976. The permits expire on February 2, 1979 and must be taken to lease.

The work on Eldorado's Project 508 has been reported on previously. The following reports, dealing with the exploration programmes on the above permits, have been forwarded to the Earth Sciences Branch, Alberta Energy and Natural Resources.

- 1) Eldorado Nuclear Limited, Project 508: Progress Report on results of work done during summer 1976 and winter 1976-77; Hugo Laanela, Project Geologist.
- 2) Eldorado Nuclear Limited, Project 508; Progress Report on results of work done during spring and summer 1977; Hugo Laanela, Project Geologist.
- 3) Eldorado Nuclear Limited, Project 508; Progress Report on results of work done during winter, 1978; Hugo Laanela, Project Geologist.
- 4) Summer Field Programme, 1978; Gerry Mitchell, Geophysicist and Peter A. Fortuna, Exploration Geologist.

This report summarizes the work performed on Permit 216 to date. It should be stated that due to the nature of exploration, the entire project area is treated as a unit. Dealing with each permit individually is possible, but with the degree of overlap that is necessary from one permit to the next, particularly in interpretations and recommendations, the project area must still be evaluated as one.

Maps, drill logs, details, etc., of the previous work are not included in this report. All of this information has been previously provided with the reports indicated above. This report will summarize the work done to date, review the conclusions of this work, and discuss the reasons for continuing exploration in the area.



ELDORADO NUCLEAR LIMITED

Project 508

SUMMARY REPORT - PERMIT 216

February 2, 1976 to February 2, 1979

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ELDORADO NUCLEAR LIMITED

Project 508

Summary Report - Permit 216

February 2, 1976 to February 2, 1979

LOCATION AND ACCESS

Permit 216 is part of Eldorado's Project 508, located in N.E. Alberta, within the S.W. edge of the Precambrian Shield. The property lies along the edge of the geologically favourable Athabasca formation (Fig.1).

Access to the project area is restricted to fixed wing or rotary aircraft. A winter road passes the Richardson airstrip, about 20 km W.S.W. of the base camp. Uranium City (225 km north) and Fort McMurray (145 km south) serve as supply depots.

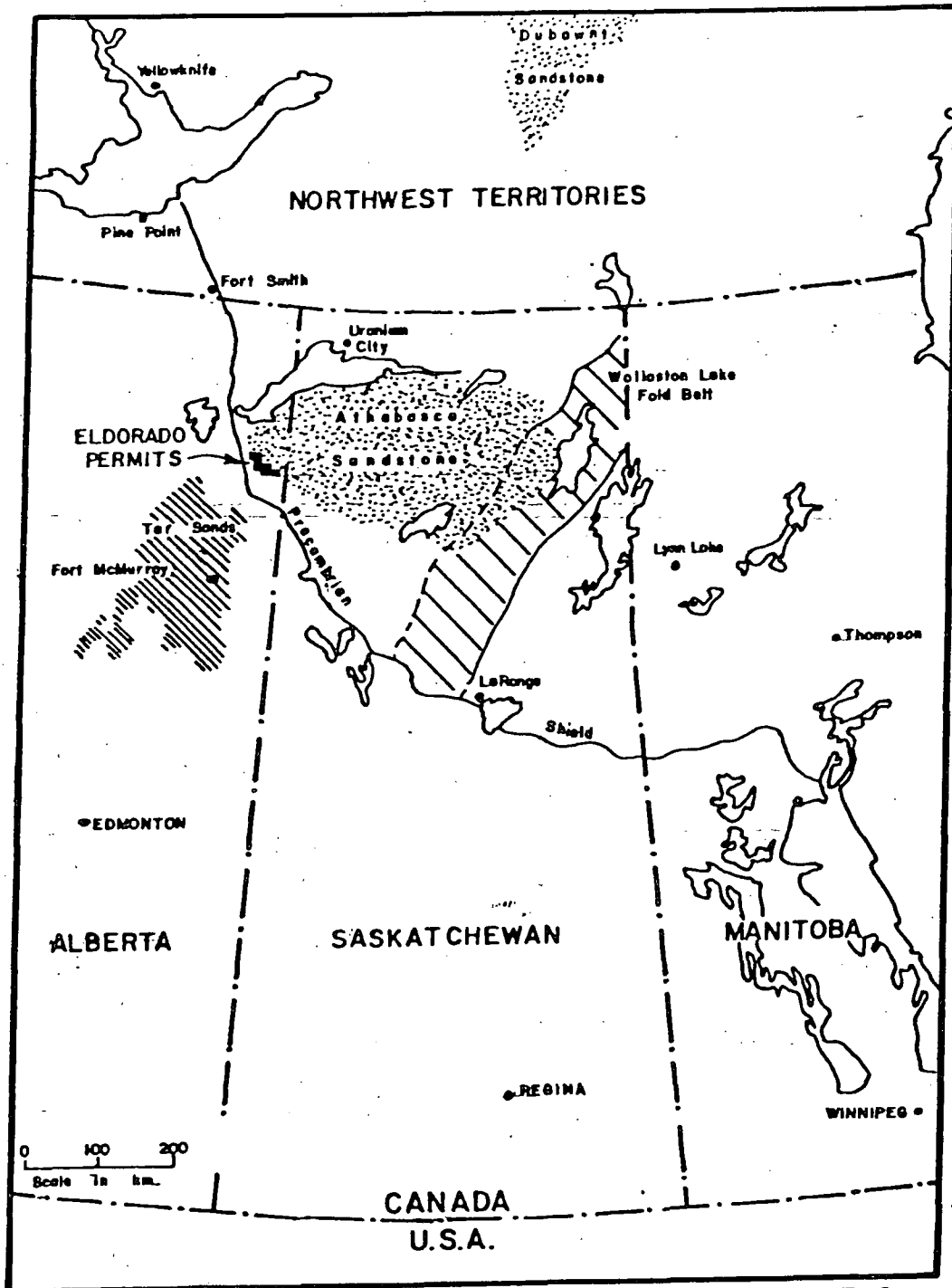


FIGURE 1

PROJECT 508  
LOCATION MAP

## REVIEW OF PREVIOUS WORK (1975-1978)

Eldorado Nuclear Limited has been engaged in uranium exploration in the Project 508 area since May, 1975. Discoveries at Rabbit Lake, Cluff Lake, Key Lake and Maurice Bay have proven the unconformity between the Athabasca Formation and underlying basement rocks to be a favourable target for uranium exploration.

Originally, the project consisted of three permits (185, 186 and 187). These were dropped in 1976 and an additional five permits (214 to 218) were granted. Permit 207 was obtained from Ram Petroleum Limited/Vipond Oil and Gas International Limited in 1977. The option on Permit 207 was not exercised and the permit returned to Ram/Vipond in 1978.

The search area is along the geologically favourable SW edge of the Athabasca Formation sandstone. Except for some granitic outcrops in and near the SW part of the Project area, there are no other outcrops in the area. The glacial overburden is thick, often in excess of 30 meters. Uncertainty regarding the actual location of the edge of the Athabasca Formation has been a major problem since the inception of the exploration program. In 1974 it was thought that this edge, which marks the unconformity between the Athabasca sandstone and Precambrian basement, lies along the NE boundary of Permit 185.

Field work during 1975 indicated that this edge is much further toward the SW, between Maybelle and Richardson Rivers. Subsequently, five additional permits (No's 214 to 218) were obtained in the Richardson River area and the 1976 and 1977 work was done mostly here. The Winter Drilling Programs, 1976-1977, and 1978 were carried out to test this assumption, and the results indicate that the edge of the Athabasca Formation is within the Permits 214, 215 and 216, between the above two rivers. The exact shape and location of the edge is by no means yet certain, and can only be determined by further

work. The former Permits 185, 186 and 187 were found to be underlain entirely by thick (125 m  $\pm$ ) Athabasca Formation sandstone, which, in turn, is partly overlain by remnants of calcareous Devonian mud- and sandstone.

Aside from the above, summer exploration has included various regional surveys. These included regional sediment, water and muskeg geochemistry, semi-detailed soil sampling, radiometric prospecting, outcrop geology and boulder mapping. The 1975 work was done on the Permits 185, 186 and 187, and in the adjacent areas. The 1976 and 1977 work was done on the Permits 214 to 218, and in the areas adjacent to these; this work was more productive since it outlined several water and sediment geochemical anomalies by the end of summer, 1976. A geochemical muskeg sampling program was started in late 1976 and continued in 1977.

Several grids have been cut on the property. Soil sampling and ground geophysical surveys have accounted for the bulk of the work in the area. Mapping of granitic outcrop in the southern portion of the permits was completed in 1976.

An airborne INPUT-EM and magnetometer survey in 1977 indicated a number of bedrock EM conductors in the area. Ground geophysics (Turam, horizontal loop, magnetometer and EM-16) and diamond drilling in winter, 1978 followed up these anomalies. Drilling intersected some graphitic zones. The edge of the Athabasca Formation and a deep alteration zone encountered during the 1976-1977 drilling were also tested.

The 1978 summer programme involved further follow-up of the airborne conductors. In addition, resistivity surveys were carried out to detect any

major basement structures below the sandstone and to define an alteration zone that was intersected in DDH 2.

Table 1 breaks down the work done to date on Permit 216.

Note: The above review deals with the exploration history of the entire project area.

ELDORADO NUCLEAR LIMITED  
Exploration Division

Distribution of Work

Project 508

Permit 216

ACTIVITY	1976	1977	1978	TOTAL
Diamond Drilling - meters	126.17	68.28	432.80	627.25
Horizontal Loop Survey - line km.	—	—	43.90	43.90
Resistivity Survey - line km.	5.95	—	5.80	11.75
Turam Survey - line km.	—	—	8.80	8.80
EM-16 Survey - line km.	—	140.00	21.90	161.90
Magnetometer Survey - line km.	—	150.00	11.30	161.30
A-B Input EM & Mag - line km.	—	1270.00	—	1270.00
Soil Sampling - # samples	448	3238	—	3686
Muskeg Sampling - # samples	53	37	—	90
Lake/Stream Sediments - # samples	267	—	—	267
Line cutting - line km.	24.00	188.80	10.00	222.80

Table 1

- 6 -

.../7

19790003

## RESULTS OF WORK DONE

### Diamond Drilling

From drilling, it has been determined that most of Permit 216 lies south of the edge of the Athabasca formation. The trace of the unconformity crosses the north-east corner of the permit. Basement rock types encountered include Precambrian granitic gneisses, and quartz diorite (north-west portion only).

Drilling to test airborne conductors that had been followed up by ground geophysics, verified a graphitic zone. Weak uranium mineralization (less than .001%) was encountered in these drill holes.

### Horizontal Loop Survey

Ground follow-up of an airborne INPUT-EM conductor (Questor Zone 3) by horizontal loop was successful in further defining this zone. Drilling intersected a graphitic horizon.

### Resistivity Survey

No resistivity lows that might reflect basement structures were indicated by this survey.

### Turam Survey

A small amount of Turam was run over Questor Zone 3, but the conductor indicated by the airborne INPUT-EM was not detected. (Later verification by horizontal loop showed that the Turam lines had been run parallel to this conductor, which is why the survey was unsuccessful).

### EM-16 Survey

Most crossovers detected by this survey are coincident with swamp edges or lake, and interpreted to be due to surficial rather than bedrock phenomena. Questor Zone 3 was successfully detected by this method.



#### Magnetometer Survey

Spacing on this survey is considered too wide to permit contouring of data. Where fill-in lines were run (Questor Zone 3), some small magnetic "highs" were indicated.

#### A/B INPUT-EM and Magnetometer Survey

One conductive zone (Questor Zone 3) was indicated by the airborne INPUT-EM Survey. This was verified by ground follow-up geophysics and diamond drilling.

The magnetics did not suggest any significant structures.

#### Soil Sampling

The results of this programme are discouraging, laboratory results being low. When considering the glaciofluvial conditions in the area (excessive thickness of far-travelled material), the reliability of this method is in doubt.

#### Muskeg Sampling

The results of this survey reflect background values only.

#### Lake/Stream Waters and Sediments

Generally, samples analysed reflect background values only.

In addition to the above surveys, reconnaissance geological traverses covered the permit area. Outcrops were mapped; all are granitic in nature. No radioactive boulders were detected by the prospecting.

#### CONCLUSIONS

1. The Athabasca formation covers the northeast corner of Permit 215.
2. The airborne INPUT-EM system is useful in detecting buried graphitic zones. Ground follow-up (horizontal loop) better define these conductors for diamond drilling.
3. Standard geochemical methods in this area are questionable. Due to the nature of the far-travelled glacial material, the reliability of geochemical anomalies as a guide to ore deposits in this area is very low.
4. The EM-16 does not appear to penetrate excessive overburden thicknesses and reflects only surficial features.

#### RECOMMENDATIONS

1. Soil geochemistry should not be applied in this area unless areas of locally derived till can be defined.

2. Because the overburden is thick, any geophysical methods applied should have deep penetrating power in order to reflect bedrock conditions.

3. Since a portion of the permit is overlain by Athabasca sandstone, this land is in a favourable environment for uranium mineralization. More work should be done to further test the contact between the Athabasca formation and the Precambrian basement.

4. The graphitic zone intersected in Questor's Zone 3 is not considered to be significant as this area is well south of the edge of the Athabasca sandstone.

#### SUMMARY

The northeast portion of Permit 216, overlain by Athabasca sandstone, should be taken to lease to allow Eldorado to continue exploration for uranium in this area.

STATEMENT OF COSTS

PROJECT 508

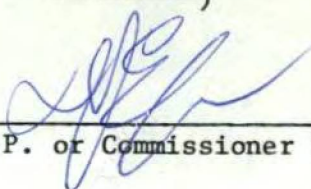
Permit 216

	<u>1976</u>	<u>1977</u>	<u>1978</u>
Drafting, clerical	\$ 1,200	\$ 707	\$ 477
Reporting	2,041	2,830	1,673
Geological - mapping, prospecting, etc.	6,053	—	1,545
Diamond Drilling	28,109	—	40,984
Borehole Survey	—	—	1,319
Ground Geophysics	5,710	27,523	11,798
Airborne Geophysics	—	32,331	—
Geochemistry - soil, muskeg, etc.	12,000	10,990	—
Supervision, planning	3,500	35,627	3,148
Logistic support	12,100	53,440	10,925
Line cutting	10,950	47,217	1,619
Disposition Maintenance	35	4,736	7,104
SUB-TOTALS	81,698	215,401	80,592
TOTAL			\$377,691

I, Peter Anthony Fortuna of the City of Ottawa Province of Ontario do solemnly declare that to the best of my knowledge, the following work expenditures were conducted on Quartz Mineral Exploration Permit 216, N.E. Alberta in the Permit Years 1976, 1977 and 1978.

And, I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

Declared before me at the City  
of Ottawa in the Province  
of Ontario, this 13th  
day of December, A.D. 19 78

  
\_\_\_\_\_  
J.P. or Commissioner for Oaths



# REFERENCE

- DDH 3\* Diamond Drill Hole, site and number, (\* refers to abandoned)  
Winter Programs 1976-77 and 1978.
- Line Grid: cut and chained to end of April, 1978 (all grid coordinates in kilometres, picketed at each 100 metres)
- + Corner reference of Alberta township-range grid (approximate)

ELDORADO NUCLEAR LIMITED— OTTAWA  
**PROJECT-508**  
 QUARTZ MINERAL EXPLORATION PERMITS  
 Nos. 207, 214, 215, 216, 217 and 218  
 NORTH EASTERN ALBERTA  
 LOCATION MAP OF  
**DIAMOND DRILL HOLES**  
 NO'S 508-1 to 29  
 AND  
**LINE GRIDS**  
 (1976-1978)

Scale 1:50,000 (1 cm = 500m or 1/27 1/2 mile)

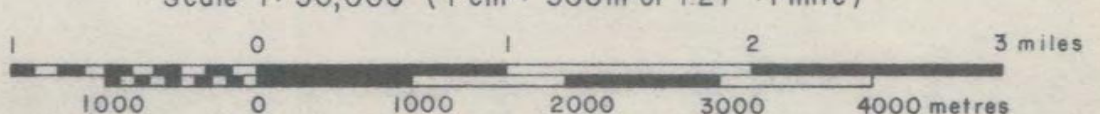
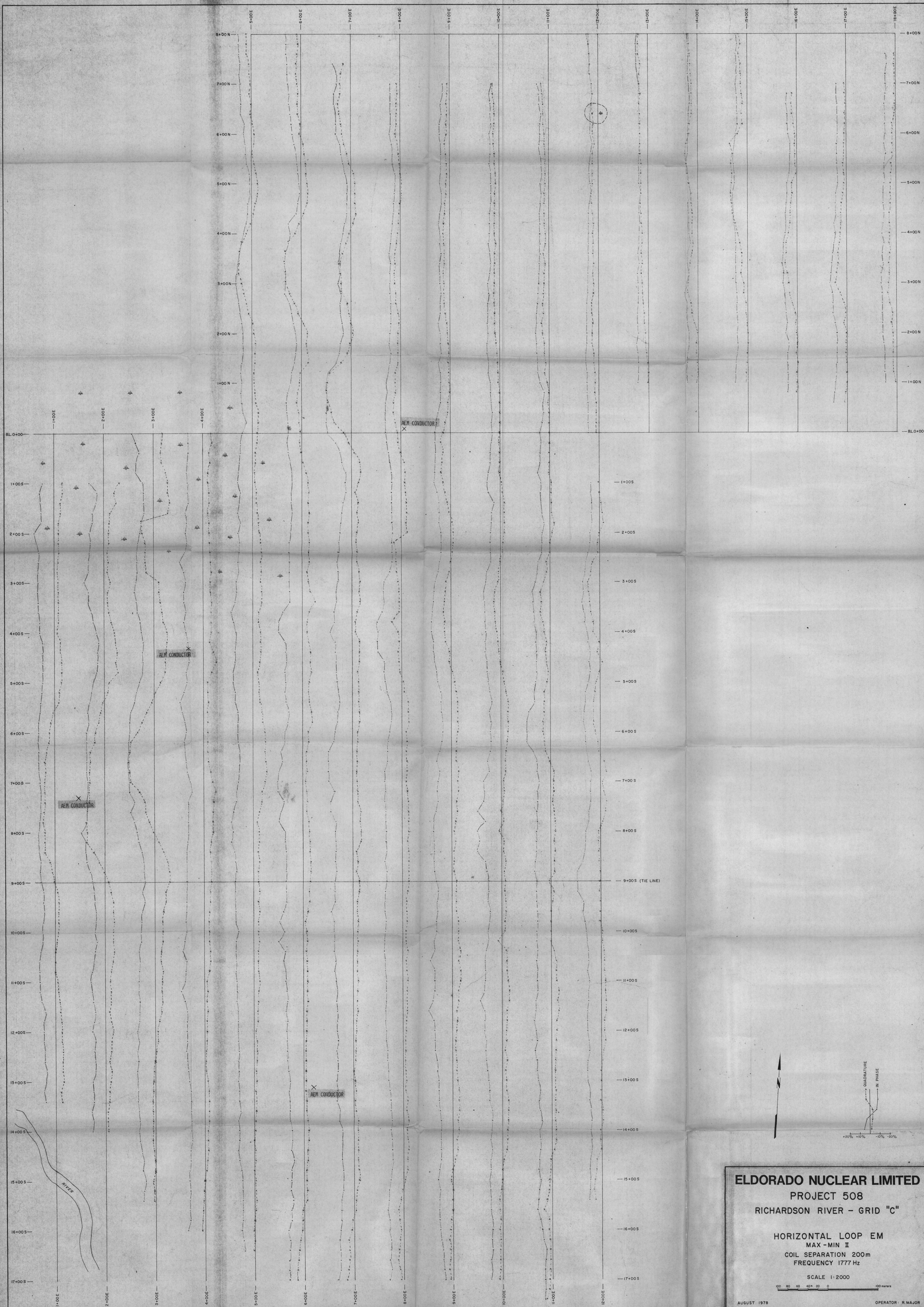


FIGURE 2

Base map drawn by S.R., Feb. 1976/Updated Sept. 1977, Updated May 1978  
 After: Alberta 1:100,000 scale forestry maps

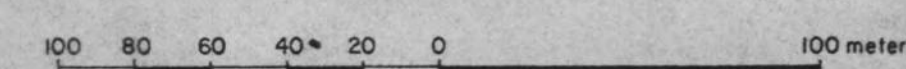




**ELDORADO NUCLEAR LIMITED**  
**PROJECT 508**  
**RICHARDSON RIVER - GRID "C"**

**HORIZONTAL LOOP EM**  
**MAX - MIN II**  
**COIL SEPARATION 200m**  
**FREQUENCY 1777 Hz**

SCALE 1:2000

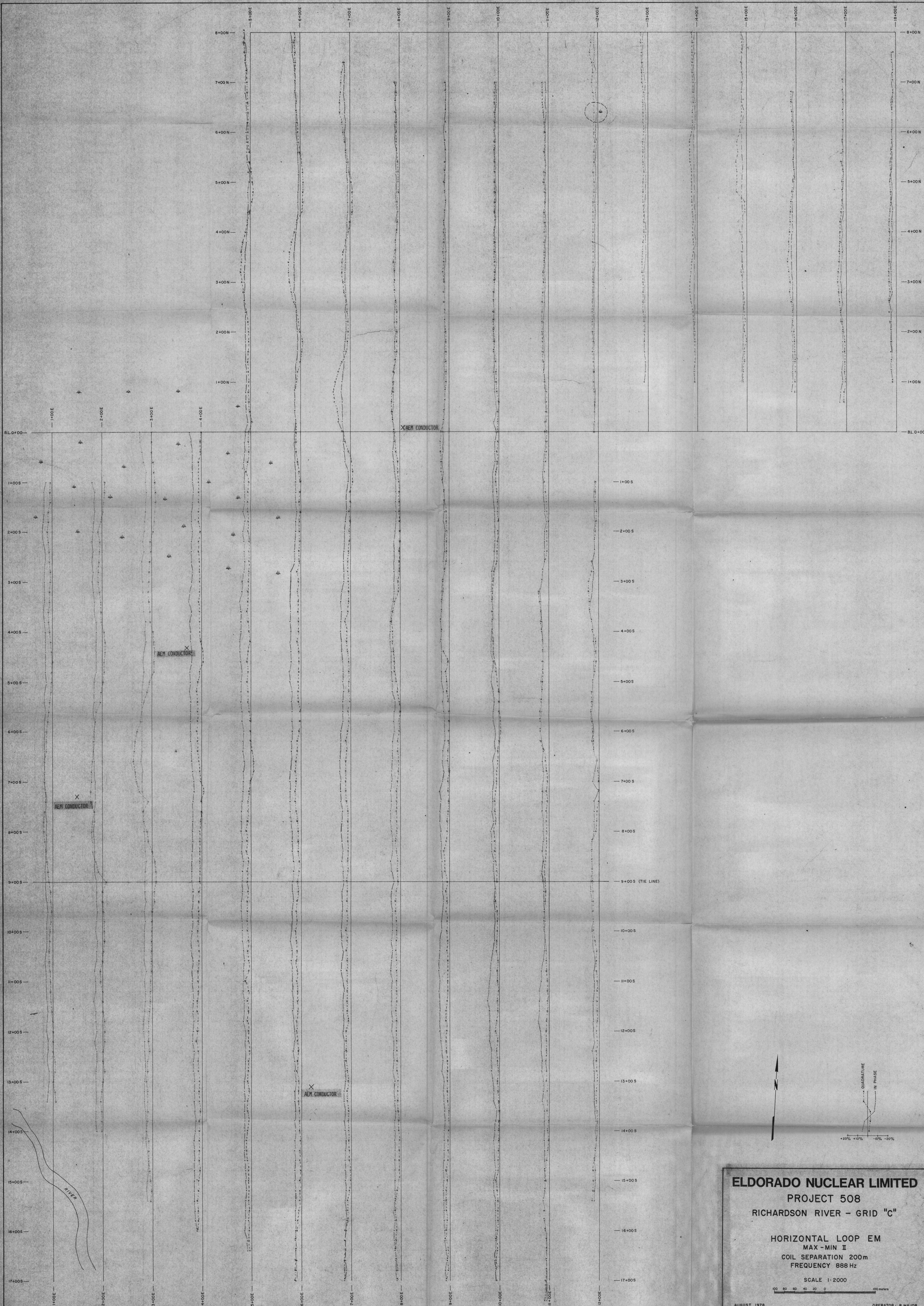


AUGUST 1978

OPERATOR: R. MAJOR

FIGURE 4





**ELDORADO NUCLEAR LIMITED**  
**PROJECT 508**  
**RICHARDSON RIVER - GRID "C"**

**HORIZONTAL LOOP EM**  
**MAX - MIN II**  
**COIL SEPARATION 200m**  
**FREQUENCY 888 Hz**

**SCALE 1:2000**

**AUGUST 1978** **OPERATOR: R. MAJOR**



ELDORADO NUCLEAR LIMITED

Exploration Division

PROJECT 508

19990003

SUMMARY REPORT - PERMIT 214

February 2, 1976 to February 2, 1979

U-AF-142 (2)  
U-AF-144 (1)

Peter A. Fortuna  
Exploration Geologist



## INTRODUCTION

Eldorado Nuclear Limited has been actively involved in uranium exploration in the Richardson River area, N.E. Alberta, since May 1975. Quartz Mineral Exploration Permits Numbers 214, 215, 216, 217 and 218 were issued on February 2, 1976. The permits expire on February 2, 1979 and must be taken to lease.

The work on Eldorado's Project 508 has been reported on previously. The following reports, dealing with the exploration programmes on the above permits, have been forwarded to the Earth Sciences Branch, Alberta Energy and Natural Resources.

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- 3) Eldorado Nuclear Limited, Project 508; Progress Report on results of work done during winter, 1978; Hugo Laanela, Project Geologist.
- 4) Summer Field Programme, 1978; Gerry Mitchell, Geophysicist and Peter A. Fortuna, Exploration Geologist.
- 5) Project 508, Northeastern Alberta; Report on Fall Geophysics, 1978; Peter A. Fortuna, Exploration Geologist.

This report summarizes the work performed on Permit 214 to date. It should be stated that due to the nature of the exploration, the entire project area is treated as a unit. Dealing with each permit individually is possible, but with the degree of overlap that is necessary from one permit to the next, particularly in interpretations and recommendations, the project area must still be evaluated as one.

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ELDORADO NUCLEAR LIMITED

Project 508

SUMMARY REPORT - PERMIT 214

February 2, 1976 to February 2, 1979

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ELDORADO NUCLEAR LIMITED

Project 508

Summary Report - Permit 214

February 2, 1976 to February 2, 1979

LOCATION AND ACCESS

Permit 214 is part of Eldorado's Project 508, located in N.E. Alberta, within the S.W. edge of the Precambrian Shield. The property lies along the edge of the geologically favourable Athabasca formation. (Fig.1).

Access to the project area is restricted to fixed wing or rotary aircraft. A winter road passes the Richardson airstrip, about 20 km W.S.W. of the base camp. Uranium City (225 km north) and Fort McMurray (145 km south) serve as supply depots.



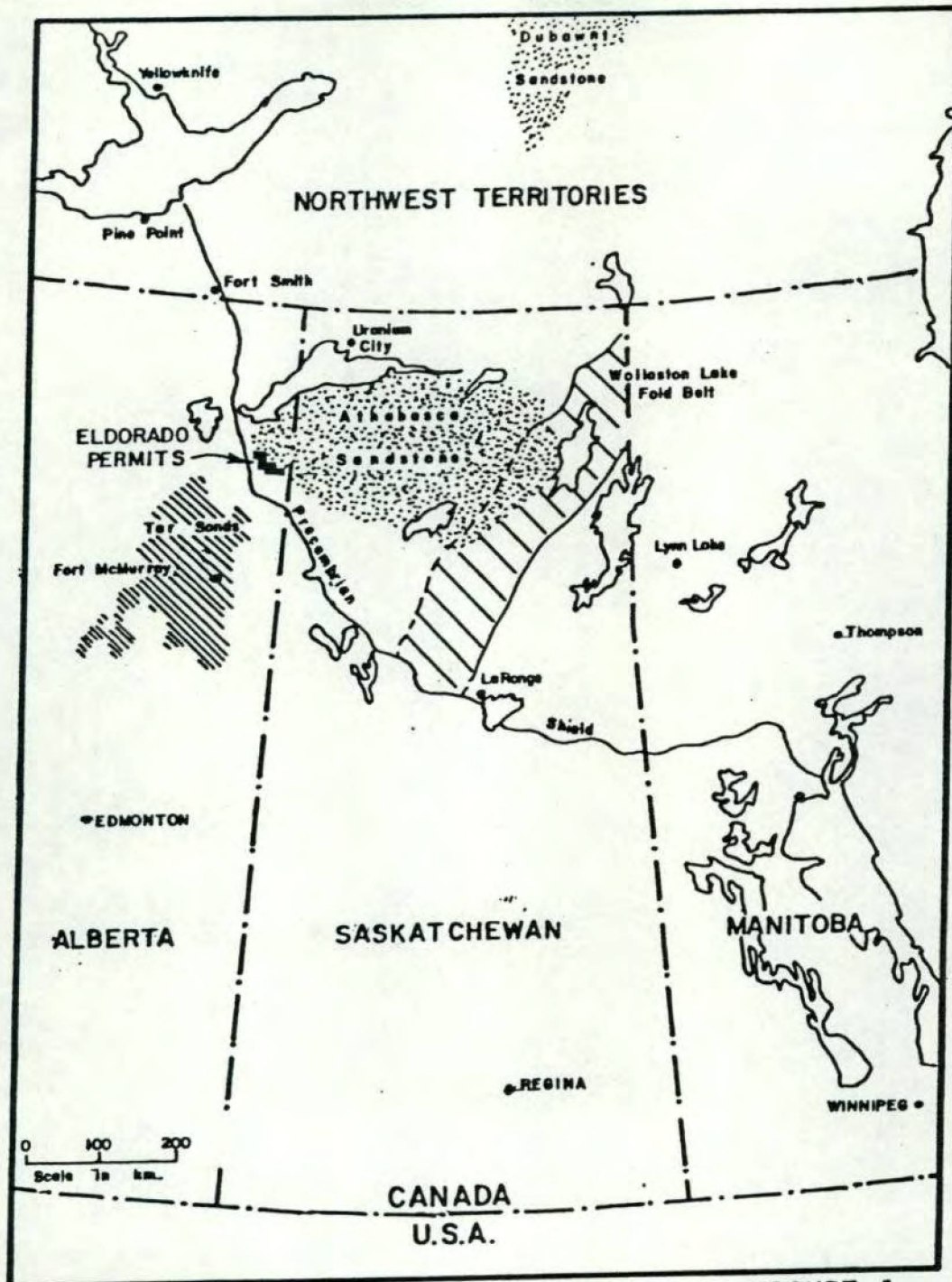


FIGURE 1

PROJECT 508  
LOCATION MAP



## REVIEW OF PREVIOUS WORK (1975-1978)

Eldorado Nuclear Limited has been engaged in uranium exploration in the Project 508 area since May, 1975. Discoveries at Rabbit Lake, Cluff Lake, Key Lake and Maurice Bay have proven the unconformity between the Athabasca Formation and underlying basement rocks to be a favourable target for uranium exploration.

Originally, the project consisted of three permits (185, 186 and 187). These were dropped in 1976 and an additional five permits (214 to 218) were granted. Permit 207 was obtained from Ram Petroleum Limited/Vipond Oil and Gas International Limited in 1977. The option on Permit 207 was not exercised and the permit returned to Ram/Vipond in 1978.

The search area is along the geologically favourable SW edge of the Athabasca Formation sandstone. Except for some granitic outcrops in and near the SW part of the Project area, there are no other outcrops in the area. The glacial overburden is thick, often in excess of 30 meters. Uncertainty regarding the actual location of the edge of the Athabasca Formation has been a major problem since the inception of the exploration program. In 1974 it was thought that this edge, which marks the unconformity between the Athabasca sandstone and Precambrian basement, lies along the NE boundary of Permit 185.

Field work during 1975 indicated that this edge is much further toward the SW, between Maybelle and Richardson Rivers. Subsequently, five additional permits (No's 214 to 218) were obtained in the Richardson River area and the 1976 and 1977 work was done mostly here. The Winter Drilling Programs, 1976-1977, and 1978 were carried out to test this assumption, and the results indicate that the edge of the Athabasca Formation is within the Permits 214, 215 and 216, between the above two rivers. The exact shape and location of the edge is by no means yet certain, and can only be determined by further



work. The former Permits 185, 186 and 187 were found to be underlain entirely by thick (125 m  $\pm$ ) Athabasca Formation sandstone, which, in turn, is partly overlain by remnants of calcareous Devonian mud- and sandstone.

Aside from the above, summer exploration has included various regional surveys. These included regional sediment, water and muskey geochemistry, semi-detailed soil sampling, radiometric prospecting, outcrop geology and boulder mapping. The 1975 work was done on the Permits 185, 186 and 187, and in the adjacent areas. The 1976 and 1977 work was done on the Permits 214 to 218, and in the areas adjacent to these; this work was more productive since it outlined several water and sediment geochemical anomalies by the end of summer, 1976. A geochemical muskeg sampling program was started in late 1976 and continued in 1977.

Several grids have been cut on the property. Soil sampling and ground geophysical surveys have accounted for the bulk of the work in the area. Mapping of granitic outcrop in the southern portion of the permits was completed in 1976.

An airborne INPUT-EM and magnetometer survey in 1977 indicated a number of bedrock EM conductors in the area. Ground geophysics (Turam, horizontal loop, magnetometer and EM-16) and diamond drilling in winter, 1978 followed up these anomalies. Drilling intersected some graphitic zones. The edge of the Athabasca Formation and a deep alteration zone encountered during the 1976-1977 drilling were also tested.

The 1978 summer programme involved further follow-up of the airborne conductors. In addition, resistivity surveys were carried out to detect any

major basement structures below the sandstone and to define an alteration zone that was intersected in DDH 2.

A Turam survey in late fall, 1978 indicates some bedrock conductors on Grid E. The magnetic survey verified the airborne magnetic character.

Table I breaks down the work done to data on Permit 214.

NOTE: The above review deals with the exploration history of the entire project area.



ELDORADO NUCLEAR LIMITED

Exploration Division

Distribution of Work

Project 508

Permit 214

ACTIVITY	1976	1977	1978	TOTAL
Diamond Drilling - meters	--	145.69	627.90	773.59
Horizontal Loop Survey - line km.	--	--	53.65	53.65
Resistivity Survey - line km.	--	--	12.20	12.20
Turam Survey - line km.	--	--	267.20	267.20
EM-16 Survey - line km.	--	--	67.80	67.80
Magnetometer Survey - line km.	--	--	185.0	185.0
A/B INPUT EM & Mag - line km.	--	1082.00	--	1082.00
Soil Sampling - # samples	--	--	--	--
Muskeg Sampling - # samples	--	47	--	47
Lake/Stream Sediments - # samples	101	--	--	101
Linecutting- line km.	--	--	310.10	310.10

TABLE I

## RESULTS OF WORK DONE

### Diamond Drilling

Diamond drilling has helped define the edge of the Athabasca Formation across portions of Permit 214. The location of the edge has been extrapolated to the west using drill hole information from Permit 215.

The stratigraphic sequence on the permit is: Precambrian granites and gneisses, overlain by Athabasca sandstone, overlain by Devonian sediments (mudstone). Overburden is quite thick, 30 m.

Graphitic shear zones were intersected by drill holes testing airborne INPUT-EM anomalies followed up with Turam and horizontal loop surveys.

### Horizontal Loop Survey

Horizontal loop methods (EM-17 and MaxMin II) were used to follow up airborne INPUT-EM anomalies on Grids B and C.

The surveys successfully outlined conductive zones indicated by INPUT-EM; graphitic shears were intersected when these were drilled.

### Resistivity Survey

Several broad resistivity lows were detected in the survey run in summer, 1978; these are interpreted as layering effects due to Devonian sediments overlying the Athabasca formation.

### Turam Survey

Airborne INPUT-EM conductors were successfully detected by this survey on Grid B. Subsequent diamond drilling intersected graphitic shear zones.

Conductors indicated by a recent survey on Grid E have not yet been followed up by diamond drilling.



#### EM-16 Survey

Although the location of the graphitic shear zones on Grid B was verified by this survey method, several other EM-16 crossovers were indicated. These are coincident with swamp or lake edges and interpreted to be caused by surficial rather than bedrock phenomena.

#### Magnetometer Survey

Ground magnetometer surveys were in close agreement with airborne data. No structures were suggested by the magnetic response in the area tested.

#### A/B INPUT-EM and Magnetometer Survey

Several INPUT-EM anomalies were indicated by this survey over Permit 214. These were followed up by ground geophysics (Turam and horizontal loop); those interpreted to be bedrock sources were drilled, and graphitic zones intersected.

#### Muskeg Sampling

The results of analyses on these samples reflect background values only.

#### Lake/Stream Water Sediments

Aside from some high U values along the Richardson River, waters and sediments reflect background values only.

In addition to the above surveys, reconnaissance geological traverses covered the permit area. No outcrop was seen, and no radioactive boulders were detected by the prospecting.

## CONCLUSIONS

1. The Athabasca formation covers part of Permit 214. It is overlain in part by Devonian sediments and underlain by Precambrian granites and gneisses.

2. Graphitic zones were successfully detected by the airborne INPUT-EM survey, and later followed up by Turam and horizontal loop surveys. These zones were verified by diamond drilling.

3. Several broad resistivity lows, attributed to layering effects caused by Devonian sediments overlying the Athabasca sandstone were picked up by this survey.

4. Turam indicates the presence of additional bedrock conductors on Grid E.

5. Standard geochemical methods in this area are questionable. Due to the nature of the far-travelled glacial material, the reliability of geochemical anomalies as a guide to ore deposits is questionable.

6. The EM-16 does not appear to penetrate excessive overburden thicknesses and often reflects only surficial phenomena.



## RECOMMENDATIONS

1. Geochemical methods should not be applied in this area unless areas of local till can be defined.

2. Because the overburden is thick, and with the added complication of Devonian cover, any geophysical methods used should have deep penetrating power in order to reflect bedrock conditions.

3. Since the basement-Athabasca unconformity is present at shallow depths within the permit, this land is in a favourable environment for uranium mineralization. The proximity of this contact to graphite-bearing zones makes this area even more attractive.

4. Diamond drilling should be carried out to follow up the Turam anomalies detected on Grid E in fall, 1978 and resistivity lows located in the summer programme.

SUMMARY

A considerable amount of work is still required to properly evaluate the economic potential of Permit 214. It is recommended that the permit be taken to lease to allow Eldorado to continue exploration for uranium. The southern portion of the permit, well away from the sandstone edge, need not be retained.



STATEMENT OF COSTS

PROJECT 508

Permit 214

	<u>1976</u>	<u>1977</u>	<u>1978</u>
Drafting, clerical	\$ 1200	593	1404
Reporting	2040	2370	4136
Geological-mapping,prospecting etc.	6060	--	1250
Diamond Drilling	20060 ?	--	59459
Borehole Survey	--	--	1914
Ground Geophysics	2750	--	47469
Airborne Geophysics	--	27542	--
Geochemistry - soil, muskeg, etc	6205	3500	--
Supervision, planning	2500	4000	7416
Logistic support	12112	3490	27370
Linecutting	--	--	20441
Disposition maintenance	32	3968	5952
TOTAL	52959	45463	176771

NOTE: 1978 costs represent winter and summer exploration programmes.

An additional estimated \$100,000. was expended in the fall programme.

A statutory declaration of costs will be submitted shortly, as soon as the year end computer print-out is received.