MAR 19780007: NORTHEASTERN ALBERTA

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ELDORADO NUCLEAR LIMITED Exploration Division

19780001

PROJECT 508 Northeastern Alberta

REPORT ON SUMMER FIELD PROGRAMME, 1978

File: 508-09

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Gerry Mitchell, Geophysicist

and

Peter A. Fortuna, Exploration Geologist

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LOCATION AND ACCESS

Project 508 is located in N.E. Alberta, within the S.W. edge of the Precambrian Shield. The permits lie 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.



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PROPERTY, TENURE & FEES

* *

The present Project 508 area consists of six Quartz Mineral Exploration Permits. All will expire early in 1979, after their third term. After the expiry date leases can be applied for @ a rate of \$0.25/acre/year for the first 5 years, and thereafter @ a rate of \$1.00/acre/year for the remainder of 21 year term*.

Permit #	Date Issued	Present acreage	Final (expiring) Date	Remarks
207	Jan.28/76	18,560	Jan.28/79	optioned from Ram-Vipond**
214	Feb. 2/76	39,680	Feb. 2/79	
215	an an An Anna Anna Anna Anna Anna Anna Anna	39,680	11 11 11	
216	H	47,360	1997 - 1997 -	
217	U	20,000	Ħ	
218	11	9,920		
 Total	acreage:	175,200 a	cres (= 273.75 sq.	mi. = 709.6 km^2)

* N.B. The rates and mining regulations may be soon subject to change by Alberta Government. (See present Regulation #377/67).

Re Ram-Vipond option agreement - Permit 207: Original acreage (optioned by E.N.L. on June 22, 1977): 49,920 acres, reduced upon third term renewal by E.N.L. to 18,560 acres. Transfer to E.N.L. was registered by the Minister of Alberta Energy & Natural Resources on November 2, 1977. Option terms call for E.N.L. to carry out an exploration program costing at least \$20,000 on Permit 207 over a period of not less than 18 months from the date of transfer (= "effective date").

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 search area is along the geologically favourable SW edge of the Athabasca Formation sandstone (Fig. 2). 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 farther 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

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

Aside from the above, the three past summers (1975, 1976 and 1977) were spent doing 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.

Complete reports concerning previous work in the area are on file (see references).

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DISCUSSION OF SUMMER PROGRAMME, 1978

Ground geophysics dominated the work done on Project 508 during the past summer. Two grids were cut on the property, as well as a long line parallel to the assumed edge of the Athabasca Formation. Resistivity (dipole-dipole), horizontal loop EM (Max. Min II) and magnetometer surveys were done. (See Figure 2.)

The following table summarizes work completed during the 1978 summer field programme.

Type of Survey	Permit Work Area	207	214	215	216	217	218	Total (km)
Resistivity	Sst. Edge Grid "C" Grid "D"		9.40 2.80	15.90	5.80	15.40		$25.30 \\ 2.80 \\ \underline{21.20} \\ 49.30 $
Horizontal Loop	Grid "C"		29.05					29.05
Magneto- meter	Grid "D"		+ FAU 117.2		11.30	23.90		35.20
Line- cutting	Sst. Edge Grid "C" Grid "D"		8.00 39.28 +FALC 190.6	14.10	10.0	18.40		22.10 39.28 <u>28.40</u> 89.78
			00.53	30	27.1	57.7		

192.3

6

TURAM

714,46

GRID C

Ground follow-up and drilling of anomalies detected by an airborne Input EM and magnetometer survey located a graphite zone just south of the Richardson River, due south of Muddy Lake (110°20', 57°50') in March 1978. This area was found to be off the edge of the Athabasca basin, stratigraphically beneath the unconformity, and therefore, was not considered to be likely to host a uranium deposit.

The Input EM survey indicates several conductors scattered over an area to the north-east of the graphite zone, Figure 3. These conductors have characteristics which suggest that they may be surficial features and thus were not checked in the initial ground follow-up program. Due to their location at the edge of the Athabasca sandstone, a horizontal loop survey was planned for the 1978 summer program to investigate them.

GRID D

A deep alteration was encountered in the 1976 drilling at a location just south of the Richardson River ($110^{\circ}40'$, $57^{\circ}55'$). A small stringer of pitchblende was intersected in this zone. Further drilling in March 1978 indicated that the alteration zone has significant width. This zone lies on a prominent E-W trending magnetic low interpreted to be a fault zone.

A resistivity and a magnetometer survey over this zone were planned for the 1978 summer program. It was hoped that the alteration zone would appear as a prominent resistivity low, and that definition of the extent and trend of the zone with a resistivity survey could be used to direct future drilling. The magnetometer survey was planned so that the resistivity survey could be correlated with the magnetic low.

Line parallel to the sandstone edge

The drilling in the winter and spring of 1978 defined the approximate location of the edge of the Athabasca Sandstone on permits 214 and 215. Fault zones intersecting this edge are considered to be exploration targets for uranium.

A resistivity survey parallel to the edge of the sandstone, just inside the basin, was planned for the 1978 summer program. The survey was designed to detect zones of low resistivity, at depth, corresponding to faults in the basement beneath the sandstone.

Discussion and Interpretations

Grid C Horizontal Loop EM

Twenty-nine (29) km of Horizontal Loop EM surveying was carried out on grid C. A Max-Min II Horizontal Loop EM system was used. The coil separation was 200m. Measurements at frequencies of 1777 Hz and 888 Hz were taken at 20 meter intervals. This data appears in Figures 4 and 5. Some measurements were made at 222 Hz but in all cases, these low frequency measurements failed to show any variation from the background and therefore, were not plotted. No conductors were located by this survey.

Line 10E was run with dipole-dipole resistivity. The resistivities along this line were very low, between 200 and 400 Ω - Metres. It appears that most of the line is underlain by the low resistivity Devonian rocks. (See Figure 6.)

Grid D

A grid 2.1 km by 1.2 km was centered on the drill holes which encountered the alteration zone. The aeromagnetic low trends through this grid. Thirty-five (35) km of ground magnetic surveying were carried out on this grid, confirming the location of the magnetic low. The data appears in Figures 7 and 8.

A dipole-dipole resistivity survey with a dipole separation of 50m was carried out on the grid on N.S. lines 200 meters apart and E-W lines 300 meters apart. Some fill-in lines were run in the N-S direction. The resistivity pseudosections appear in Figures 9 to 18. Figures 19 and 20 are contours of the resistivity values at N=1 and N=4 respectively.

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There is a pronounced <u>resistivity low</u> in the south-west corner of this grid. The zone has some expression at the N=1 separation, but is much more well defined by the map of the N=4 separation. There is a nearly coincident topographic feature, the edge of a hill, which makes the interpretation difficult.

The magnetic survey confirms the broad magnetic low crossing the grid. There is also a more subtle low of 10 to 20 gammas which is roughly coincident with the resistivity low. The coincidence of the magnetic and resistivity lows suggests the possible existence of a fault related alteration zone.

Line parallel to the sandstone edge

A 22 km line parallel to the edge of the Athabasca sandstone, as defined by the 1978 winter drilling was run with a dipole-dipole resistivity survey with a dipole separation of 50m. The resistivity pseudo sections appear in Figures 21 to 27.

The most obvious feature of this data is the appearance of a low resistivity, horizontal layer underlying much of the line. This is interpreted to be the Devonian sediments. The line passes close to a drill hole at station 28E. There are 10 meters of Devonian sediments overlying the Athabasca sandstone at this location. This low resistivity Devonian cover may mask low resistivity zones in the basement rocks, the targets of the survey.

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An interpretation of the resistivity line appears in Figure 28 . There is one resistivity low on the line, at station 81W, that is most probably a basement feature. The other zones indicated as possible resistivity lows at depth are more poorly defined.

ZONE 1

This is a zone of 200 meters width in an area interpreted as having Devonian cover. The resistivity contrast between this zone and the adjacent sections of the line is small. On the follow-up line 100 meters NE the zone becomes broader and appears to have its lowest resistivity at the separation N=3, suggesting a feature of limited depth extent. It may nonetheless be related to a basement resistivity low.

ZONE 2

This zone is 250m wide. As for Zone 1, this area is interpreted to be overlain by Devonian sediments. The minimum resistivity is at the N=3 separation. Compared to the section of the line immediately to the east, this zone has higher resistivities at the N=2 separation and lower resistivities at N=3 and N=4. As the Devonian sediments are apparently less resistive than the overburden, this phenomena can be explained either by a thickening of the overburden or a resistivity low at depth.

ZONE 3

This zone is similar to Zone 1, and appears more probably to be a shallow feature than a resistivity low in the basement.

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ZONE 4 31W

This zone is in an area interpreted to have no Devonian cover. It is a narrow feature, most probably a basement resistivity low. This is interpreted to be a fault in the basement rocks.

ZONE 5

This resistivity low is probably related to the Devonian sediments.

ZONE 6

This zone and Zone 7 occur on the section of the line with the highest surficial resistivities. These high surficial resistivities are related to a topographical high and probably represent an increased depth to the water table. This increases the apparent resistivities at the N=2, 3 and 4 separations, making it unclear if the area is underlain by Devonian sediments. The lowest apparent resistivity in this zone is at a separation of N=3. This suggests that the low may be caused by a shallow feature.

ZONE 7

This zone is similar to Zone 6, with a slightly stronger suggestion that it may be related to a basement feature.

COST SUMMARY

PROJECT 508

1978 SUMMER FIELD PROGRAMME

Salaries (Planning, supervision, reporting)	\$10,000
Resistivity - contractor	\$27,100
Linecutting - contractor	\$15,000 7 47,600
Horizontal Loop Survey	\$ 4,000
Magnetometer Survey	\$ 1,500
Helicopter	\$16,500
Fixed Wing Aircraft	\$ 2,900
Camp Supplies, fuels, communications	\$ 3,000

TOTAL

\$80,000

N.B. Estimated budget only.







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A CONTRACTOR

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FIGURE 21 ELDORADO NUCLEAR LIMITED PROJECT 508 NORTHEASTERN ALBERTA DIPOLE - DIPOLE RESISTIVITY SURVEY LINE 100+00N 75+00E TO 32+80E FREQUENCY 5.0 Hz SCALE : 2 cm = 50 mJULY 1978



AUGUST 1978





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1447// 388 365 500/ 43 337 363 286 248/ 367 / 59 / 718 769 715 537 608 470 504 502 504 400 400 642 481 376 538 483 479 464 484 484 500 865 1474 1582 1297 1198 914 1241 1052 750 182 167 1994 114 194 31 312 516 510





ELDORADO NUCLEAR LIMITED PROJECT 508 NORTHEASTERN ALBERTA

FIGURE 11

SPREAD: 50 m

(106)

DIPOLE - DIPOLE RESISTIVITY SURVEY

LINES 106+00E & 107+00E (GRID "D")

FREQUENCY 5.0 Hz SCALE : 2 cm = 50 m

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 $\frac{44}{32} - \frac{53}{31} - \frac{53}{31} + \frac{53}{32} + \frac{53}{31} + \frac{53$ ELDORADO NUCLEAR LIMITED PROJECT 508 31 424 532 471 550 443 546 519 700 500 692 642 443 388 447 388 219/ 879 43 561 604 590 594 0-5 NORTHEASTERN ALBERTA DIPOLE - DIPOLE RESISTIVITY SURVEY LINE 100+00N 8+50W TO 52+00W FREQUENCY 5.0 Hz SCALE : 2 cm = 50 m**JULY 1978**







445 471 421 452 375 312/ 222 195 355 145/ 347 323/ 225 384 11-1



Land Watson 6200 hitson 6000 borson bond Station som serson rand strand 714 765 412 724 608 145 373 431 547 654 653 650 705 727 788 1264 850 851 745 551 682 541 1483 511 610 693 556 / 383 / 352 455 677 624 401 342 / 228 212 203 196 190 188 total K Muskey _____ 453 393 468 658 618 542 154 46 644 727 698 637 542 111 407 401 583 441 482 653 701 630 (802 797 782 918 867. 755 776 575 567 364 347 (638 546) 411 358 307 (195 180) (545) 678 (498 341 358 344 425 563 447 328 358 Jac 170 277 371 367 378 578 611 748 616 760 852 762 728 714 185 105 And a 130 561 687 793 729 587 670 665





TOP OF

933 574 721 682 574 532 713 722 612 35 478 532 713 722 612 35 478 532 576 697 562 525 476 453 562 576 697 576 697 576 6

K-Muskan -> 1275//144 / 376 1801 182//187 507 171 50/ 373 306 271/ 303 253 355 231 / 181 231 205 324 288 353 307 474 336 30 30 30 30 1 1 241 440 502 369 537 1804 2461 1615 534 738 95 655 503 (48) 511 430 414 384 424 389 301 324 365 170 161 163 180 172 164 201 212 215 236 248 278



A Miskey _____1 Dry 45E 45450E 46E 46450E 47E 47450E 48E 48450E 49E 49450E 50E 50450E 51E 52450E 53E K-Musken + 52157E 54E 54450 F 55E 55+50E 56E SUSUE STE STHEDE SEE SHEDE 235 223 220/ 181 227 327 269 592 12030/ 345 / 156/ 186/ 270 353 / 287 226 242 214/ 194/ 376 301 (177 153 167 178 163 196) 317 343 242 (314 479 273 359 332 / 355 177 145 156 131) 200 349 249 1.214 233 193 187 173 150 161 227 260 222 259 250 350 205 276 220 164 (144 129 142 169 144 256 208 236 245 214) 183 177 215 206 183 225 220 260 384 152 200 180 181 157 Juy 183 166 226 177

Resistivity ohm - meters



sensoul ein suttom sun sanson san sanson san suttom san suttom san suttom san suttom san suttom sanson sans - Muskeg HEREON HEAV HEREON HERE HEREON 48755W 41W 47750W 47W 731 345 238 380 195 304 199 200 309 458 309 458 373 387 387 . 823 340 222 157 161 349 144 142 178 164 198 208 194 210 205 200 100 206 306 549 348 226 202 154 153 152 137 157 181 205 147 203 162 214 3 1-1 0=2 Resistivity 223 1+9 377 246 271 218 216 171 167 153 167 149 230 219 183 204 220 274 247 n=4 72+500 7245 71+50W 71W 70450W 70W 57+50W 67W 67H50W 68H50W 519 586 578 581 613 607 17-1 612 473 429 431 455 494 516 619 627 504 491 462 381 374 332 467 486 533 Resistiv 4 12 11-3 Ohn - man 362 393 351 347 343 316 368 388 1.4



UNE LAtas 710 / 569 582 50 19 622 502 607 EB2 199 573 549 1532// 561 Seb 720 766 18 / 704 711 397 503 548 655 724 / 1070 12 635/ 1685 1809 173/ 1833 n=1 102 691 592 695 700 605 631 629 25 656 670 756 668 616 791 812 898 833 890 100 950 756 869 741 / 108 1031 193 1031 1958 1140 +2 Ca 11-3 skar-mate N=4 March Low DI LINE 63 + MAN 285 272/ 326 300 311 318 319 387 / 512 607 763 745 876 724 449 358 304 349/ 198 379 3481 3819 352 3720/ 1820 2353 2493 2460 nol 421 408 412 415 401 429 418 444 657 TRI 818 986 1204 1190 181 159 180 1948 1159 180 2142 2346 2265 2344 2738 1488 1132 1832 1833 1645

570 539 543 544 546 568 540 Tax 107 101 142 140 109 141 142 100 109 141 142 100 109 144 115 165 163 1409 1415 165 163 1409 1415 165 163 1409 1415 706 659 622 162 671 675 1823 827 / 1601 1077 1520 / 153 / 1230 / 171 / 1558 143 1096 1299 1469 1076 1520 (1530 / 1520 / 15



nea

MAF

Ca

H=3 Ships meters

ELDORADO NUCLEAR LIMITED PROJECT 508 NORTHEASTERN ALBERTA DIPOLE - DIPOLE RESISTIVITY SURVEY LINES 63+00N & 69+00N (GRID"D") FREQUENCY 5.0 Hz SCALE : 2 cm = 50m AUGUST 1978 SPREAD : 50 m

DEFRESSON DEPRESSION 1129 4035 2506 / 1275 1764 1196 1456 1624 1241 1467 Har 26602/1907 / 661 / (234/ 345 \280 105 1248/ 1504/1/313 706 1398 1339 1845 \$244/ 549/1/1984/ 84 1602/ 752 1833 The TRI 141 TRI STR FOT 855 756 (876) 958 628 (474 402 350 821 278 453 343 381 430 511 453 1052 3341 //12/24 550 492 491 646 1058 The san The (30° 553 Tot) The (586 Tot (480 Tot (480 Tot (480 Tot (480 Tot (480 Tot (480 100) (400 600 542 . 681 Tot) 780 154 783 810 /12/8) /147) 841. 521 644/ 872 784 863 780 833 644 671 649) 455 537 286 471 438 477 536 597 515 536 595 692 781 698



FIGURE 17

SPREAD: 50 m

ELDORADO NUCLEAR LIMITED PROJECT 508 NORTHEASTERN ALBERTA

DIPOLE - DIPOLE RESISTIVITY SURVEY

LINE 57+00 N (GRID "D")

FREQUENCY 5.0 Hz SCALE : 2 cm = 50 m

DEPKESSION ToP of MAL DENCESSION! . 1 68950H 676/ 44 (2312/1/ 560 82 1333 \ 2212 2194 2066 905 579 1/620 (887 816 763 1192 1272 901 1563 1053 935 635 11+3 1257 1070 1067 1122 1084 820

- side

A PERSONAL COMPANY

ROLING WILLS WAY WYSON 65% LSHOW 168 LLHOW KM GMEN LEA 649500	6944	LINE 1231000	
2005 3107 2148 3149 2033 3057 2499 2862 1900 763 1584 1940 1808 174 1527 1497 1977 3011 100 1159 1945 1458 1886 1194 1523 1833 100 1159 1945 1458 1886 1194 253 1833 181 1252 1865 1739 1631 1452 2041	n=1 N=2 N=3 N=4	Ca char-arters	
			ELDORA
			RES LI
			AUGUST 1978



FIGURE 16

200

SPREAD: 50 m

CID

NE 123+00E (GRID "D")

FREQUENCY 5.0 Hz SCALE : 2 cm = 50 m

100

