

REPORT ON COAL TEST
DRILLING PROGRAM
ALEXANDER I.R. #134
NORTH CENTRAL ALBERTA

Oct. 31/73

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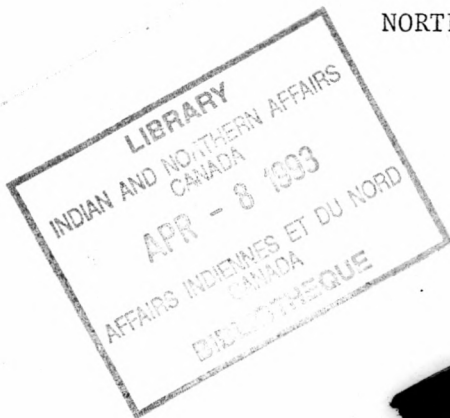
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NORTH CENTRAL ALBERTA



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Indian Minerals Section (West)
Department of Indian Affairs
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Calgary, Alberta
October 31, 1973.

REPORT ON
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NORTH CENTRAL ALBERTA

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August 28, 1973.

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I L L U S T R A T I O N S

DRILL SITE LOCATION MAP & CROSS-SECTIONS	in pocket
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CONCLUSIONS:

Analysis of all the geotechnical data obtained from the shallow coal test drilling and sampling program on Alexander Indian Reserve #134 has led to the following conclusions:

1. Test drilling on the reserve to a maximum depth of 250 feet, encountered only sparse intersections of coal, generally at depths greater than 100 feet.
2. The coal occurs in thin irregular seams or lenses, usually less than two feet in thickness.
3. Cross-sections (in pocket) indicate there is very poor continuity of coal horizons on the reserve. The lack of any apparent distinct seams or zones of coal within the areas drilled indicates that neither the "Big Island Seam" nor the "Weaver Seam" underlie the reserve within 250 feet of the surface as specified in the report on the Mineral Potential of Alexander Indian Reserve #134 by the Research Council of Alberta.
4. Thin clay partings commonly contaminate the thicker coal seams.
5. Visual inspection under 40X magnification indicates the coal varies from lignite to subbituminous in rank.

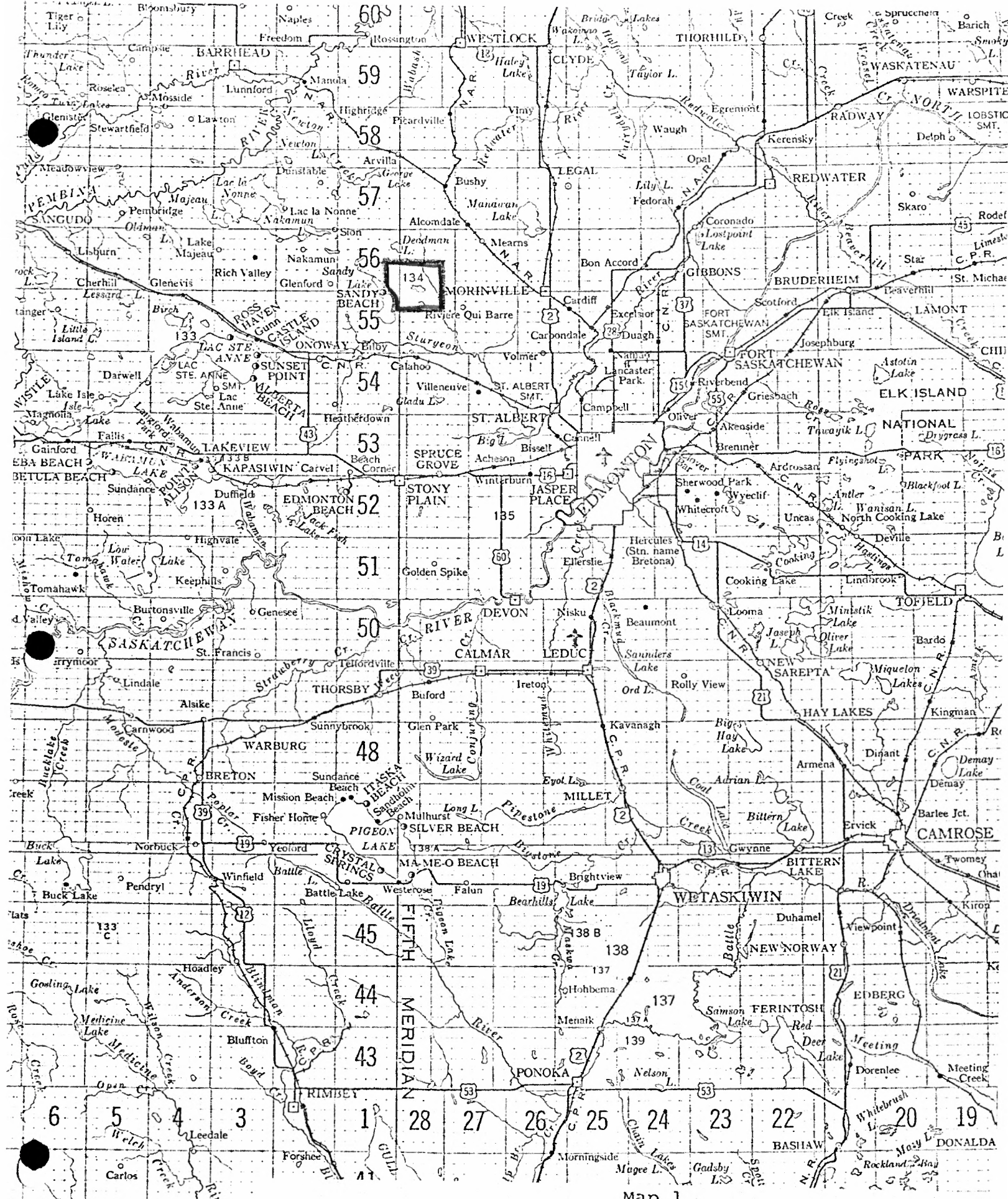
6. No bentonite was observed in any of the samples.
7. In the areas of the reserve which were drilled, there is little or no potential for an economically viable coal mining operation within 250 feet of the surface because:
 - a) There is insufficient tonnage for a coal mining operation due to the thinness of the coal seams, the irregularity of the coal seams and the lack of continuity of the coal seams over any substantial area.
 - b) The overburden thickness is much too great for a viable strip mining operation. Underground mining would not be feasible because of the thinness of the coal seams.

RECOMMENDATIONS:

It is recommended that no further expenditures be made for strip coal or bentonite exploration on Alexander Indian Reserve #134 at the present time.

INTRODUCTION:

Location and access: Alexander Indian Reserve #134 is located about 20 miles northwest of Edmonton, Alberta, and due west of the village of Morinville (Map 1). It comprises an area of approximately 17,000 acres including portions of Townships 55



Map 1

Location Alexander I.R. #134

SCALE: 12 MILES TO 1 INCH

ROYAL CANADIAN MOUNTAIN
 DEPARTMENT OF THE INTERIOR
 GEOLOGICAL SURVEY

and 56, Range 27, West of the fourth Meridian and portions of Townships 55 and 56, Range 1, West of the fifth Meridian.

Access is via paved Highway #2 north from Edmonton, then west along a gravel grid road from Morinville.

Purpose of investigation: Coal has been mined on a small scale for domestic use in north-central Alberta for many years. More recently a large strip mine has been operating at Wabamun Lake approximately 25 miles southwest of Alexander Indian Reserve #134. The subbituminous coal from this deposit is used as fuel in Calgary Power's thermal-electric plant at Lake Wabamun.

The "Report on the Mineral Resource Potential of Alberta Indian Reserves" by the Research Council of Alberta, 1972, indicated that two seams of subbituminous coal possibly underlie Alexander Indian Reserve #134. In the report, N.W. Hamilton and I.J. McLaws state,

"The shallowest seam on the reserve, possibly to be found directly beneath the surficial cover, is the No. 9 or 'Big Island seam', which has been worked considerably at the localities of Rabbit Hill and Big Island about 25 miles southeast along strike from the reserve. However, this seam may be absent from the reserve along with the successive strata owing to erosion, in which case the next shallowest significant seam is the No. 7 of 'Weaver seam' at a depth of 200 to 250 feet."

A shallow test drilling program was recommended to evaluate the potential for strip-mineable coal and bentonite on the reserve.

Previous work: No previous work has been carried out on the Alexander Indian Reserve #134 specifically to evaluate its coal potential. A total of eleven oil and gas exploratory wells have been drilled on the reserve. Seven of these wells, all located in the northeast portion of the reserve, are either producing or temporarily suspended from producing natural gas. The information obtained from the drilling results of these wells was of no use in evaluating the coal potential within 600 feet of the surface as none of the logging was carried out above this depth. One of the well logs located in Lsd. 10, Section 36, Township 55, Range 1, West of the fifth Meridian, did indicate two lignitic coal intersections of approximately 5 feet in thickness but they were of little significance since they occurred at a depth greater than 3,000 feet below the surface.

A number of domestic water wells drilled in the east portion of the reserve revealed noteworthy intersections of coal.

(See map in pocket.)

PHYSIOGRAPHIC SETTING:

Alexander Indian Reserve #134 is situated in the plains region of central Alberta. The terrain is gently undulating with a mean elevation of approximately 2,250 feet above sea level except in the southwest portion of the reserve where hummocky uplands attain a maximum elevation of 2,400 feet above sea level. Many areas of swampy lowlands occur on the reserve. There are several lakes in the area, the largest of which is Sandy Lake bordering the reserve on the southwest. The Riviere Qui Barre meanders in a southerly direction through the eastern portion of the reserve. Bedrock exposure is poor as most of the surface is overlain by a cover of Pleistocene glacial till and lake sediments ranging from 5 to 40 feet in thickness.

GEOLOGIC SETTING:

A geological compilation by the Alberta Research Council (Map 35, 1972, 1 inch = 20 miles), indicates that Alexander Indian Reserve #134 is underlain by the Upper Cretaceous Wapiti formation which is non-marine in origin. However, the abundance of calcareous mudstone and clay found in the cutting samples from the boreholes suggests at least a partially marine environment of deposition. It therefore seems likely that the reserve is underlain by the Upper Cretaceous Horseshoe Canyon formation

which comprises grey, feldspathic, clayey sandstone, grey bentonitic mudstone and carbonaceous shale, concretionary ironstone beds, scattered coal and bentonite beds of variable thickness and minor limestone beds. These sediments apparently extend northwest of Edmonton in a continuation of the trend from the south side of the North Saskatchewan River as shown on Alberta Research Council Map #35 (1972).

It is likely that the coal underlying the reserve was deposited in a deltaic marine environment where vegetation accumulated in bogs and swamps which were intermittently covered by silt and clay sedimentation.

1973 COAL TEST DRILLING PROGRAM

Prior to the start of the test drilling, a detailed examination was made of all the available data from water wells drilled in the area which is on file at the Groundwater Division, Alberta Research Council, Edmonton, Alberta. Fairly detailed lithological descriptions were obtained for several dozen domestic water wells located on/or in the vicinity of Alexander Indian Reserve #134. Nine of the well logs indicated intersections of coal seams within 200 feet of the surface. A detailed airphoto analysis of the physiography of the reserve was also carried out. These studies led to the selection of 21 drilling sites in the

eastern portion of the reserve which would provide the maximum amount of information about possible underlying coal seams in those areas of the reserve which had the best potential for coal occurrences.

Contracts were awarded to three separate companies to carry out the complete program.

a) drilling & sampling - McAuley Drilling Co.Ltd., P.O. Box 4400, Edmonton, Alberta	charges	\$ 4,406.00
b) geophysical logging - Roke Oil Enterprises Ltd., (Gamma Ray,) 2716 - 32 Ave. S.W., (Resistance, SP,) Calgary, Alberta (Sidewall Densilog)	charges	4,770.20
c) supervision - Abcon Engineering (Alberta) Ltd., 1532 Centre A St. N.E., Calgary, Alta.	charges	<u>4,998.58</u>
	Total cost of program	<u><u>\$14,174.78</u></u>

Work commenced on February 21, 1973, and was completed on March 6, 1973. A conventional rotary water well drilling rig utilizing a 4-3/4-inch diameter bit was used. Water was used as drilling mud. Nineteen holes were drilled to depths from 120 to 250 feet for a total accumulated footage of 4,120 feet. Drill cutting samples were taken at 5-foot intervals and at 1-foot intervals where coal was encountered.

A drillers log was supplied for each hole drilled. The following geophysical logs were also run on each hole: Gamma Ray, Resistivity, Self Potential and Sidewall Density. The geophysical logs provided additional information on the boundaries of coal seams and aided in attempting to correlate seams in different holes. Nineteen boreholes were drilled (see map in pocket), mainly in the east half of the reserve with special emphasis in the southeast portion where encouraging results were obtained at the beginning of the program.

Upon completion of the field work the samples were sent to the Indian Minerals Section (West) office in Calgary where they were analysed by geological technician, R. Kaminawaish, under the supervision of the writer. A detailed lithological log was produced for each hole. Comparisons were made with the geophysical logs as a check on the sampling. The density logs provided the best resolution of the coal seam boundaries. The resistivity and gamma ray logs were useful in distinguishing between coal seams and zones which were low in density because of washing out or the presence of a porous sandy zone. The self potential logs were found to be of little use.

In general, the samples and geophysical logs were found to be very satisfactory for the purpose intended.

RESULTS:

Results of the coal test drilling program on Alexander Indian Reserve #134 indicate there is insufficient tonnage of coal underlying the reserve to consider a viable strip-coal mining operation under present economic conditions. Low-grade subbituminous coal was intersected in almost every hole drilled but in the majority of cases the seams were less than one foot in thickness, often interbedded with stringers of clay and usually at a considerable depth below the surface. No continuity could be established between the various seams intersected.

The best coal intersection was in borehole #7301 (see map in pocket) in the northeast quarter of Lsd. 11, Section 26, Township 55, Range 27, west of the fourth Meridian. This borehole intersected coal seams from 86 to 93 feet interbedded with several thin stringers of non-calcareous clay. This hole also intersected thin coal stringers from 143 - 144 feet, 164 - 165 feet, 210 - 211 feet, and 238 - 240 feet. The encouraging results of this test hole led to the drilling of 4 additional test holes to the east and west and south of hole #7301.

Borehole #7316, located 1/2 mile west of #7301 had no intersections of coal.

Borehole #7319, located 1/2 mile east of #7301 intersected coal from 82 - 83 feet, 93 - 95 feet, 102 - 103 feet, 104 - 106 feet and two thin stringers at 113 feet and 133 feet.

Borehole #7317, located 1/2 mile south of #7316, intersected coal from 118 - 120 feet and 121 - 123 feet.

Borehole #7318, 1/2 mile south of #7319 intersected coal from 107 - 109 feet and from 112 - 114 feet.

The results of the step-out drilling around borehole #7301 conclusively show that there is little or no continuity between the various coal seams intersected. The holes drilled in this area of the reserve showed the best results in terms of the amount of coal found. It is apparent from the irregular nature of the coal seam intersections that the coal occurs as lenses which pinch and swell erratically over short distances. The irregular continuity of the coal seams, the general thinness of the seams and the substantial depth of overburden all contribute to the conclusion that the potential for an economically viable strip-coal mining operation is very poor for Alexander Indian Reserve #134.

DRILLING DATA

DRILLING CONTRACTOR: McAuley Drilling Co. Ltd.,
Edmonton, Alberta.

RIG: Conventional rotary water well
drilling data

FLUID SYSTEM: Water

HOLE SIZE: 4-3/4 inches

CASING: None

GEOPHYSICAL LOGS: Gamma ray; resistivity, self potential;
sidewall density.

STARTING DATE: February 21, 1973.

COMPLETION DATE: March 6, 1973.

HOLES SPOTTED BY: N.R. Carlson, W.J. Blackstock

SAMPLES LOGGED BY: R. Kaminawaish

LOG INTERPRETATION: N.R. Carlson

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7301

DEPTH:	DESCRIPTION
0-40'	- Clay; Dark grey, alternating from non-calcareous to calcareous.
40-58'	- Clay; Light to medium grey, silty, slightly calcareous; some carbonaceous material.
58-62'	- Sand; Medium-grained, calcareous, angular quartz and feldspar grains, 1/4 to 1/2 mm.
62-63'	- Clay; Dark grey, non-calcareous, contains thin (<1 foot) stringer of subbituminous coal.
63-78'	- Sand; Fine, slightly calcareous with some carbonaceous material.
78-83'	- Clay; Dark grey and non-calcareous.
83-86'	- Clay; Medium to dark grey, carbonaceous with some lignitic coal.
86-93'	- <u>Coal</u> ; Grading from soft lignite to moderately hard subbituminous with several thin stringers of non-calcareous clay.
93-105'	- Clay; Grey to dark grey, non-calcareous.
105-124'	- Clay; Dark grey, non-calcareous with minor stringers of coal.
124-143'	- Clay; Slightly calcareous, grey with fine sand stringers. Grains in sand are mostly quartz with some feldspars (~1/4 mm.).
143-144'	- <u>Coal</u> ; Thin seam of moderately hard subbituminous coal.

- 144-164' - Clay; Dark grey, non-calcareous with some slightly calcareous silty clay stringers.
- 164-165' - Coal; Thin seam of moderately hard subbituminous coal.
- 165-210' - Clay; Silty, grey, calcareous.
- 210-211' - Coal; Thin seam of subbituminous coal.
- 211-238' - Clay; Dark grey, non-calcareous.
- 238-240' - Coal; With non-calcareous clay stringer. Coal is lignitic to subbituminous.
- 240-250' - Clay; Medium to dark grey, non-calcareous.
- 250' - Total depth

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7302

DEPTH:	DESCRIPTION
0-6'	- Clay; Medium grey and non-calcareous.
6-14'	- Clay; Dark grey, non-calcareous interbedded with light grey highly calcareous silt. Some calcareous pebbles are present.
14-23'	- Clay; Grey, non-calcareous, with intermittent silt stringers. Occasional carbonaceous material.
23-34'	- Clay; Light buff coloured, silty with grey, non-calcareous clay stringers. Grains of quartz are present.
34-43'	- Clay; Medium grey, non-calcareous.
43-51'	- Clay; Coarse, carbonaceous. Small wood and root fragments in this layer.
51-54'	- Clay; Non-calcareous, light grey.
54-59'	- Clay; Coarse, non-calcareous with thin stringers of soft lignitic coal.
59-87'	- Clay; Light to medium grey, non-calcareous.
87-90'	- <u>Coal</u> ; Grading from soft lignitic to moderately hard subbituminous.
90-102'	- Clay; Non-calcareous, medium to dark grey.
102-103'	- <u>Coal</u> ; Subbituminous.
102-111'	- Clay; Dark grey, non-calcareous with minor stringers of light grey, slightly calcareous silty clay.
111-112'	- <u>Coal</u> ; Moderately hard, subbituminous.

- 112-118' - Clay; Light grey and non-calcareous.
- 118-120' - Coal; Thin seam of soft, dull black, lignitic coal in light grey, slightly calcareous silt.
- 120-143' - Clay; Dark carbonaceous, with thin stringers of light grey, slightly calcareous silt. Finely disseminated carbonaceous material in silt.
- 143-144' - Coal; Soft lignitic coal.
- 144-203' - Clay; Grey, very slightly calcareous, thin coal stringer at 161 feet.
- 203-250' - Clay; Dark grey, non-calcareous interbedded with slightly calcareous silt, one thin coal seam at 233-234 feet.
- 250' - Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7303

DEPTH:	DESCRIPTION
0-12'	- Till; Fine, buff coloured, highly calcareous containing angular rock fragments to 2 mm. in diameter.
12-20'	- Clay; Brownish to dark grey, non-calcareous. Angular rock fragments.
20-45'	- Sand; Angular rock fragments (up to 2 cm.), well sorted. Possible water aquifer.
45-140'	- Clay; Light grey, slightly calcareous silty clay interbedded with dull black, carbonaceous, non-calcareous clay.
140-142'	- <u>Coal</u> ; Seam of moderately hard, subbituminous coal.
142-180'	- Clay; Grey, non-calcareous with finely disseminated carbonaceous material throughout.
180-181'	- <u>Coal</u> ; Minor stringer of soft coal in dark, carbonaceous clay.
181-215'	- Clay; Dark grey, non-calcareous with intermittent stringers of grey, calcareous silt.
215-216'	- <u>Coal</u> ; Thin seam in grey, non-calcareous clay.
216-239'	- Clay; Medium to dark grey, non-calcareous with thin stringer of soft, dull, black coal at 226 feet.
239-241'	- <u>Coal</u> ; Moderately hard, subbituminous.
241-250'	- Clay; Dark grey, non-calcareous.
250'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7305

DEPTH:	DESCRIPTION
0-10'	- Till; Very slightly calcareous with intermittent thin bands of black carbonaceous clay. Angular calcareous rock fragments (~2 cm.).
10-32'	- Till; Medium to dark grey, slightly calcareous with some dark, carbonaceous clay stringers. Rock fragments are present (~2 cm.).
32-42'	- Silt; Light grey and highly calcareous with some finely disseminated flakes of coal and rock fragments (1-2 cm).
42-131'	- Clay; Interbedded dark grey, carbonaceous clay and grey calcareous silt.
131-132'	- <u>Coal</u> ; Stringer of soft, dull black lignitic coal in grey, non-calcareous clay.
132-141'	- Clay; Slightly calcareous, grey.
141-142'	- <u>Coal</u> ; Very soft, dull, black, lignitic coal stringers in grey, non-calcareous clay.
142-211'	- Clay; Dark grey, slightly calcareous, interbedded with grey non-calcareous silts.
211-212'	- <u>Coal</u> ; Thin seam of soft lignitic coal.
212-250'	- Clay; Medium to dark grey and very slightly calcareous.
250'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7306

DEPTH:	DESCRIPTION
0-10'	- Silty clay; Light brown, slightly calcareous. A few fragments of calcareous rocks.
10-75'	- Clay; Intermittent banding of grey to dark grey, non-calcareous clay with silty clay and some carbonaceous clay stringers. Occasional grains of quartz imbedded in clay. Some sub-rounded calcareous pebbles.
75-77'	- <u>Coal</u> ; Extremely soft, dull black lignitic coal interbedded with non-calcareous clay. No definite seams.
77-98'	- Clay; Medium to dark grey, non-calcareous.
98-100'	- <u>Coal</u> ; Low-grade coal ranging from soft black lignitic to moderately hard, black, subbituminous.
100-127'	- Clay; Dark grey, and carbonaceous with intermittent stringers of calcareous silt. Grains in silt are predominantly feldspar and quartz.
127-128'	- <u>Coal</u> ; Thin seam of soft, flaky coal.
128-252'	- Clay; Intermittent banding of medium grey, non-calcareous clay with carbonaceous clay and a few stringers of calcareous silt. Occasional thin stringers of coal.
252'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7307

DEPTH:	DESCRIPTION
0-17'	- Clay; Silty, slightly calcareous, light brown, oxidized. Angular, calcareous rock fragments and quartz grains throughout.
17-85'	- Clay; Interbedded light-dark grey, non-calcareous fine clay with grey, calcareous silt. Angular to sub-rounded sandstone.
85-114'	- Clay; Medium to dark grey. Very slightly calcareous with thin stringer of soft, dull black, flaky coal occurring at 86 feet.
114-117'	- Clay; Grey to dark grey and non-calcareous, interbedded with two thin coal seams.
117-137'	- Clay; Medium to dark grey, carbonaceous.
137-138'	- <u>Coal</u> ; Narrow seam of moderately hard subbituminous coal.
138-148'	- Clay; Grey to dark grey, slightly calcareous.
148-149'	- <u>Coal</u> ; Thin seam of moderately hard subbituminous coal.
149-240'	- Clay; Medium to dark grey, non-calcareous with occasional light grey stringers of silty calcareous clays containing finely disseminated carbonaceous material and occasional coal stringers.
240'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7308

DEPTH:	DESCRIPTION
0-23'	- Till; Light brown coloured, calcareous, containing angular to sub-rounded quartz and feldspar pebbles.
23-52'	- Clay; Medium to dark grey, non-calcareous, with stringers of flaky lignitic coal at 37 feet.
52-85'	- Clay; Grey, slightly calcareous, with grains of sub-rounded quartz and feldspar (~1 cm.). Finely disseminated carbonaceous material throughout. Thin seam of extremely soft lignitic coal at 52 feet.
85-134'	- Clay; Grey, slightly calcareous with occasional soft coal. Minor stringer of soft lignitic coal at 90 feet.
134-136'	- <u>Coal</u> ; Seam of lignitic to subbituminous coal.
136-238'	- Clay; Interbedded dark grey non-calcareous clay with light grey, calcareous silt. Grains of quartz and feldspar present (1-2 cm.).
238-239'	- <u>Coal</u> ; Thin seam of soft lignitic coal.
239-244'	- Clay; Dark grey, slightly calcareous.
244-245'	- <u>Coal</u> ; Seam of coal ranging from soft lignitic to moderately hard subbituminous.
245-250'	- Clay; Dark grey, non-calcareous.
250'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7309

DEPTH:	DESCRIPTION
0-16'	- Till; Brown, calcareous, with angular to sub-rounded rock fragments of quartz and some feldspar present (to 1 cm.).
16-82'	- Clay; Brown, silty and calcareous clay with finely disseminated carbonaceous material, interbedded with grey, slightly calcareous clay. Grains of quartz and feldspar present. Minor stringer of soft coal at 65 feet.
82-83'	- <u>Coal</u> ; Soft, dull black lignitic to moderately hard sub-bituminous.
83-105'	- Clay; Medium-dark grey, slightly calcareous.
105-110'	- Clay; Grey, slightly calcareous clay interbedded with two thin seams of soft lignitic coal at 106 and 109 feet.
110-126'	- Clay; Dark grey, non-calcareous, interbedded with light grey, calcareous, silty clay with finely disseminated carbonaceous flakes.
126-127'	- <u>Coal</u> ; Thin seam of hard subbituminous coal. Lignitic on top and bottom.
127-250'	- Clay; Interbedded grey, non-calcareous clay with light grey, slightly calcareous silty clay. Silty clay contains grains of quartz. Minor stringers of subbituminous coal at 145, 154, 176 and 187 feet.
250'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7310

DEPTH:	DESCRIPTION
0-24'	- Till; Calcareous, light brown. Finely disseminated carbonaceous material imbedded throughout with angular to sub-rounded pebbles (to 1 cm.) composed mostly of quartz and feldspar.
24-153'	- Clay; Predominantly grey, very slightly calcareous. Some grains of quartz, feldspar (to 1 cm.) and carbonaceous material visible. Finely disseminated carbonaceous material imbedded in the silty layers.
153-154'	- <u>Coal</u> ; Seam of moderately hard, subbituminous coal.
154-220'	- Clay; Dark, non-calcareous, with thin stringers of soft, flaky coal occurring at 185 feet.
220-250'	- Clay; Dark grey, non-calcareous, interbedded with light grey calcareous silty clay. Two thin stringers of soft lignitic coal at 224 and 228 feet.
250'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7311

DEPTH:	DESCRIPTION
0-5'	- Till; Predominantly grey, slightly calcareous. Some grains of quartz and feldspar (to 1 cm.).
5-12'	- Sand; Light brown and calcareous. Grains comprised of quartz and feldspar. Angular to sub-rounded rock fragments (to 1 cm.).
12-51'	- Clay; Interbedded, dark, non-calcareous clay with slightly calcareous silty clay.
51-138'	- Clay; Greenish grey, very slightly calcareous with interbedded stringers of carbonaceous clays.
138-141'	- Silt; Highly calcareous, containing finely disseminated flakes of carbonaceous material.
141-146'	- Clay; Dark, non-calcareous.
146-148'	- <u>Coal</u> ; Soft, lignitic to moderately hard subbituminous coal.
148-174'	- Clay; Dark grey, non-calcareous.
174-184'	- Silt; Highly calcareous, light coloured.
184-250'	- Clay; Grey, non-calcareous with intermittent layers of highly calcareous silt. Thin seam of subbituminous coal 233-234 feet.
250'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7312

DEPTH:	DESCRIPTION
0-23'	- Till; Light grey, slightly calcareous. Occasional angular, sub-rounded pebbles composed of quartz and feldspar are visible.
23-34'	- Clay; Silty, predominantly grey and slightly calcareous with a few grains of feldspars and some quartz along with flakes of carbonaceous material.
34-127'	- Clay; Dark grey, non-calcareous with intermittent layers of silty, calcareous clay.
127-129'	- <u>Coal</u> ; Seam of soft lignitic to subbituminous coal with light grey, non-calcareous clay parting.
129-160'	- Clay; Dark grey, non-calcareous, slightly carbonaceous interbedded with light grey, slightly calcareous and silty clay.
160-162'	- <u>Coal</u> ; Seam of coal grading from soft lignitic to moderately hard subbituminous.
162-251'	- Clay; Medium to dark grey, non-calcareous with intermittent stringers of slightly calcareous silty clay.
251'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7314

DEPTH:	DESCRIPTION
0-13'	- Till; Predominantly brown, non-calcareous pebbly rock fragments present.
13-23'	- Clay; Non-calcareous brown grey.
23-96'	- Clay; Slightly calcareous, grey, interbedded with greenish grey non-calcareous clay and a few thin stringers of soft lignitic coal.
96-108'	- Clay; Dark brown, non-calcareous, with some thin stringers of slightly calcareous silt.
108-112'	- <u>Coal</u> ; Seam of soft, flaky lignitic coal with numerous clay partings.
112-133'	- Clay; Grey, slightly calcareous, silty.
133-137'	- Silt; Slightly calcareous, light, grey, with minor stringers of non-calcareous clay.
137-251'	- Clay; Medium to dark grey, non-calcareous clay, with intermittent layers of slightly calcareous silt.
251'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7315

DEPTH:	DESCRIPTION
0-18'	- Till; Calcareous, predominantly grey clay. Some angular to sub-rounded pebbles of quartz and feldspar.
18-46'	- Clay; Brownish grey, non-calcareous with minor stringers of brown, calcareous silt.
46-82'	- Clay; Light to dark grey, non-calcareous, carbonaceous.
82-97'	- Silt; Grey, slightly calcareous, a few sand grains of quartz and feldspar.
97-184'	- Clay; Non-calcareous, dark grey with intermittent thin stringers of slightly calcareous silt.
184-187'	- <u>Coal</u> ; Soft, brown lignitic to moderately hard subbituminous.
187-251'	- Clay; Non-calcareous with minor stringers of dark carbonaceous clays and slightly calcareous silt. Thin seam of soft, lignitic coal at 222 to 224 feet.
251'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7316

DEPTH:	DESCRIPTION
0-17'	- Till; Highly calcareous, silty, (light brown). Angular to sub-rounded pebbles present.
17-25'	- Clay; Light brown with numerous silt stringers. Silt is light grey, calcareous and is imbedded with carbonaceous material.
25-42'	- Sand; Brown to greenish grey, slightly calcareous grains of quartz and feldspars. Some angular to sub-rounded pebbles.
42-133'	- Clay; Medium to dark grey, non-calcareous, interbedded with slightly calcareous silt. Some carbonaceous clay layers.
133'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGICAL BOREHOLE #7317

DEPTH:	DESCRIPTION
0-7'	- Till; Grey, calcareous, pebbly, some grains of feldspar (to 1/2 cm.).
7-31'	- Till; Brown, calcareous with minor stringers of light grey, slightly calcareous clay. Some sub-rounded pebbles of quartz.
31-33'	- Clay; Silty, slightly calcareous, some rounded quartz grains and finely disseminated carbonaceous material.
33-118'	- Clay; Dark grey, carbonaceous, non-calcareous, interbedded with grey, slightly calcareous silt.
118-120'	- <u>Coal</u> ; Seam of soft to moderately hard, subbituminous.
120-121'	- Clay; Grey, non-calcareous.
121-123'	- <u>Coal</u> ; Seam of soft to moderately hard, subbituminous.
123-131'	- Clay; Grey, non-calcareous clay.
131'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGICAL BOREHOLE #7318

DEPTH:	DESCRIPTION
0-9'	- Clay; Light brown to light grey, slightly calcareous.
9-23'	- Clay; Light brown, silty, slightly calcareous.
23-45'	- Clay; Grey, slightly calcareous, silty. Sub-rounded grains of quartz and feldspars. Some minor stringers of light brown fine sand.
45-49'	- Sand; Light brown, fine, slightly calcareous.
49-72'	- Silt; Grey, calcareous. Some small sandstone fragments (to 1 cm.).
72-107'	- Clay; Dark grey, non-calcareous. Some stringers of grey, slightly calcareous silt.
107-109'	- <u>Coal</u> ; Seam of moderately hard subbituminous coal.
109-112'	- Clay; Dark grey, non-calcareous.
112-114'	- <u>Coal</u> ; Moderately hard, subbituminous.
114-131'	- No samples.
131'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7319

DEPTH:	DESCRIPTION
0-9'	- Clay; Predominantly grey, non-calcareous.
9-25'	- Silty clay; Light brown, calcareous.
25-27'	- Gravel; Angular, sub-rounded pebbles (to 2 cm.).
27-74'	- Silty clay; Grey, slightly calcareous. Small rounded rock fragments present. Minor stringers of non-calcareous clay.
74-93'	- Clay & Silt; Interbedded calcareous silt and non-calcareous clay. Thin stringer of subbituminous coal at 82 feet.
93-95'	- <u>Coal</u> ; Subbituminous coal seam.
95-102'	- Clay; Dark grey, non-calcareous clay.
102-103'	- <u>Coal</u> ; Seam of coal grading from soft, flaky lignite to moderately hard subbituminous.
103-104'	- Clay; Non-calcareous clay.
104-106'	- <u>Coal</u> ; Moderately hard subbituminous.
106-147'	- Clay; Grey, non-calcareous with intermittent minor stringers of slightly calcareous silt. Extremely thin intersections of subbituminous coal occurring at 113 feet and 133 feet.
147'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7320

DEPTH:	DESCRIPTION
0-51'	- Clay; Medium grey, non-calcareous. A few small angular to sub-rounded quartz pebbles (to 1 cm.).
51-52'	- <u>Coal</u> ; Thin intersection of dull, black powdery coal.
52-62'	- Clay; Medium grey, non-calcareous.
62-83	- Clay; Interbedded layers of grey, non-calcareous clay and fine, slightly calcareous silt. Angular pebbles (to 1 cm.). Thin seam of lignitic coal at 75 feet.
83-95'	- Clay; Dark grey, non-calcareous.
95-107'	- Clay; Interbedded layers of dark grey, non-calcareous clay and fine, light grey, slightly calcareous silt.
107-112'	- Clay; Medium grey, slightly calcareous, silty. Finely disseminated carbonaceous material throughout.
112-117'	- Clay; Dark grey, non-calcareous with minor stringers of slightly calcareous silt.
117'	- Total depth.

ALEXANDER INDIAN RESERVE #134

LITHOLOGY OF BOREHOLE #7321

DEPTH:	DESCRIPTION
0-5'	- Silty clay; Very slightly calcareous, light brown in colour. Grains of quartz (to 1 cm.).
5-23'	- Clay; Predominantly light grey, non-calcareous. Sub-rounded pebbles and grains of quartz (to 1 mm.).
23-64'	- Clay; Very slightly calcareous, ranges in colour from greenish grey to a dark grey. A few quartz grains imbedded.
64-72'	- Silt; Light grey, calcareous.
72-86'	- Clay; Dark grey, non-calcareous with stringer of soft brownish lignitic coal at 75 feet.
86-89'	- Clay; Dark carbonaceous clay.
89-93'	- Clay; Grey, non-calcareous.
93-119'	- Clay & Silt; Interbedded, non-calcareous, dark clay with slightly calcareous, light grey silt.
119-147'	- Silt; Light grey, calcareous. Few stringers of non-calcareous clay.
147'	- Total depth.

ALEXANDER INDIAN RESERVE #134

WATER WELL LOGS

RESEARCH COUNCIL OF ALBERTA

#1. Lsd.2, Sec.3, Twp.56,
Rge.27, W4M

0-40 clay
40-55 gravel & sand
55-60 clay
60-65 coal
65-80 clay
80-110 shale
110-112 sandstone
112-115 coal
115-160 shale

#2. Lsd.12, Sec.2, Twp.56,
Rge.27, W4M

0-84 clay
84-86 coal
86-96 shale
96-165 shale

#3. Lsd.8, Sec.16, Twp.56,
Rge.27, W4M

0-20 brown clay & stones
20-30 grey clay & gravel seams
30-58 grey clay, sand, coal
seams
58-60 grey clay, sandy shale
60-80 grey clay
80-83 brown shale
83-84 coal
84-100 brown shale & coal seams
100-110 brown shale & limestone
110-120 grey sandy shale & sand
120-146 grey sandy shale
146-151 grey rock
151-170 sandy grey shale

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No. -7317
ELEV. 2200'

118'-120'
121'-123'
131'

No. -7318
2200'

107'-109'
112'-114'
131'

Alexander I.R. 134
COAL SEAMS

CROSS - SECTION AA'

SCALE: VERTICAL - 1" = 40 Ft.
HORIZONTAL - 1" = 1320 Ft.

DATE: JULY 20, 1973

No. - 7306

ELEV. 2275'

75'-77'

98'-100'

127'-128'

252'

No. - 7307

ELEV. 2285'

86'-87'

137'-138'

148'-149'

240'

No. - 7305

ELEV. 2285'

131'-132'

141'-142'

211'-212'

250'

Alexander I.R. 134
COAL SEAMS

CROSS - SECTION EE'

SCALE: VERTICAL - 1" = 40 Ft.
HORIZONTAL - 1" = 1320 Ft.

DATE: JULY 20, 1973

ELEV. 2260'

146'-148'

250'

ELEV. - 2250'

82'-83'

126'-127'

250'

ELEV. 2225'

87'-90'

102'-103'

111'-112'

118'-120'

143'-144'

250'

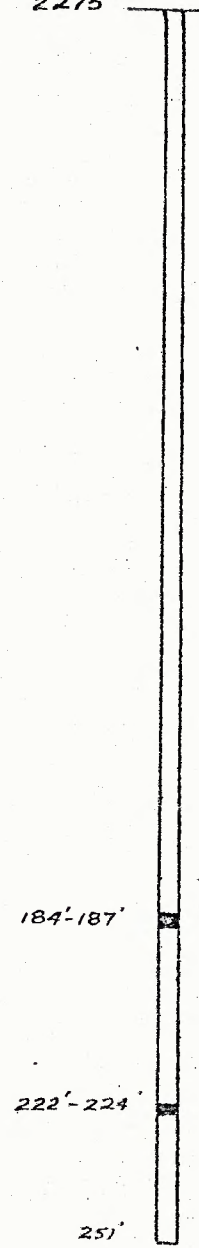
Alexander I.R. 134
COAL SEAMS

CROSS-SECTION C C'

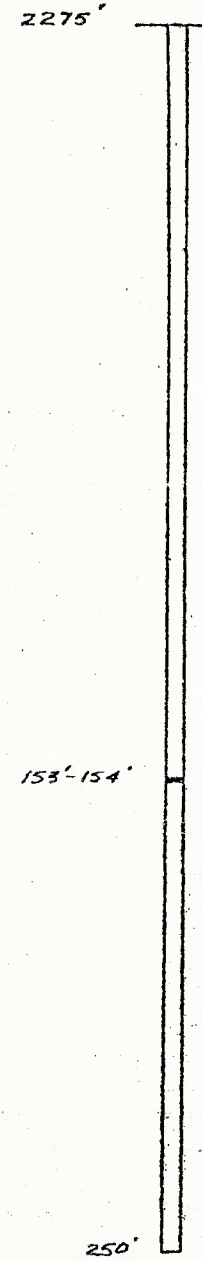
SCALE: VERTICAL - 1" = 40 Ft.
HORIZONTAL - 1" = 1320 Ft.

DATE: JULY 20, 1973

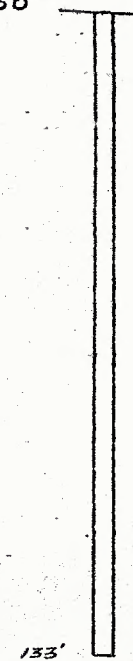
7315
ELEV. 2275'



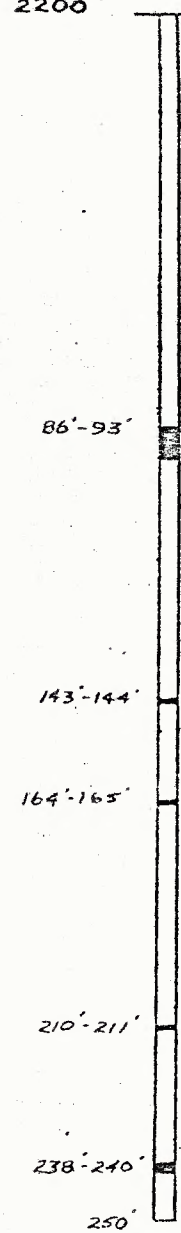
7310
ELEV. 2275'



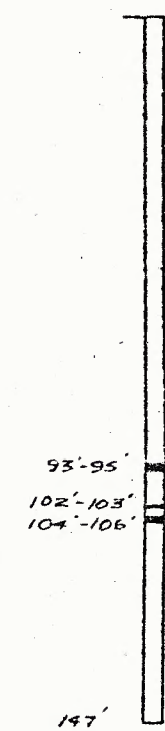
7316
ELEV. 2250'



7301
ELEV. 2200'



7319



Alexander I.R. 134
COAL SEAMS

CROSS - SECTION B B'

SCALE: VERTICAL - 1" = 40 FT.
HORIZONTAL - 1" = 1320 FT.

DATE: JULY 20, 1973

No - 7314

ELEV.
2275'

108'-112'

251'

No - 7312

ELEV. 2275'

127'-129'

160'-162'

251'

No - 7308

ELEV. 2250'

134'-136'

238'-239'
244'-245'
250'

No - 7303

ELEV. 2260'

140'-142'

180'-181'

215'-216'

239'-241'

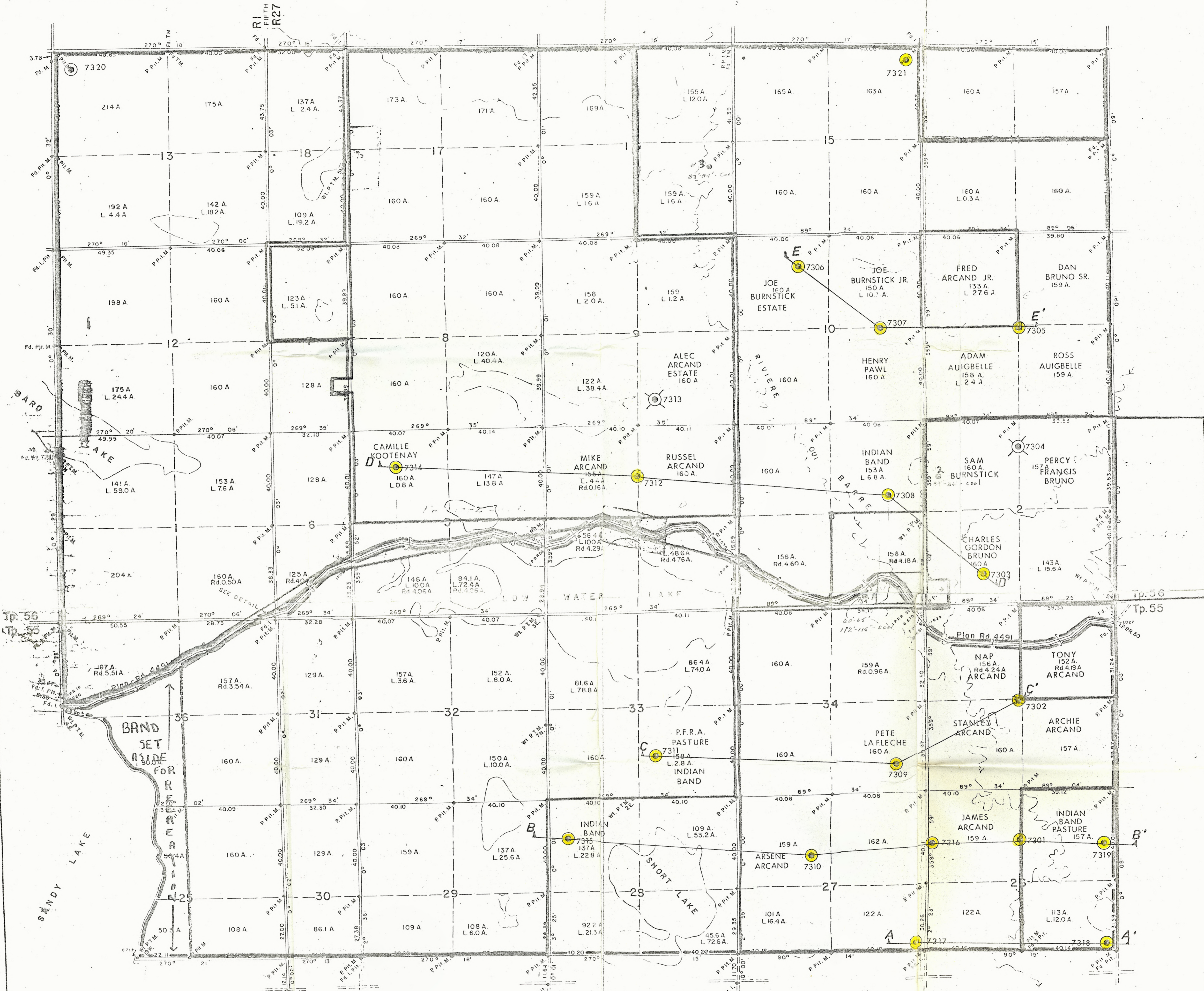
250'




Alexander I.R. 134
COAL SEAMS

CROSS - SECTION DD'

SCALE: VERTICAL - 1" = 40 FT.
HORIZONTAL - 1" = 1320 FT.

DATE: JULY 20, 1973



-  BORE HOLES IN 1973 PROGRAM
-  HOLES NOT DRILLED
-  WATER WELLS INTERSECTING COAL HORIZONS

ABCON ENGINEERING (ALBERTA) LTD.

MAP SHOWING
 CROSS-SECTION OF
 DRILLED TEST HOLES
 ALEXANDER INDIAN RESERVE #134

Drawn by: Central Drafting Services Ltd.	Project Area:
Checked by:	
Approved by:	Scale: 1" = 1/4 MILE
Date: FEB. 16, 1973	Dwg. No. AIR CP 7301

DRILLING LOCATION MAP

&

CROSS SECTIONS

