

MAR 19610001: LOYALIST LAKE

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REPORT
ON THE
LOYALIST LAKE SODIUM SULPHATE PROPERTY

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Western Minerals Ltd.
Calgary, Alberta
January 1961

Project No. 1-4

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REPORT ON THE LOYALIST SODIUM SULPHATE

PROPERTY

INTRODUCTION

During the summer of 1958, the Research Council of Alberta carried out a search for sodium sulphate deposits in eastern Alberta. This work uncovered a deposit at Loyalist.

This report describes the results of an evaluation carried out by Western Minerals Ltd. during 1959 and 1960. A total of 16 holes were drilled and 15 chemical analyses obtained. Considerable work was done with respect to separating the salts from the large amount of mud associated with the deposit. Maps and cross-sections may be found in the appendix.

SUMMARY

The Loyalist sodium sulphate deposit has reserves of 3,618,000 tons of material containing 1,710,600 tons of hydrous sodium sulphate, and 284,100 tons of hydrous sodium carbonate and bicarbonate.

HOWARD SMITH
FELIX BOND

LOCATION AND ACCESSIBILITY

By referring to the index map it may be seen that the deposit is located in east-central Alberta about 125 air-miles east of the city of Red Deer. The nearest railpoint is the village of Loyalist 7 1/2 miles south of the deposit. Loyalist is served by the Coronation-Kerrobot branch line of the Canadian Pacific Railway Co. and also by highway No. 12.

RASBURN

MINERAL OWNERSHIP

The right to the sodium sulphate and associated salts are owned by the Crown in the name of the Province of Alberta.

In February 1959, Western Minerals Ltd. was granted a prospecting permit for one year on 5,120 acres. This permit was renewed for 6 months in February 1960, and the area reduced to 1,600 acres. The permit was again renewed for an additional 6 months in August 1960.

DESCRIPTION OF DEPOSIT

Topography

The deposit occupies a poorly-drained basin having an area of approximately 270 acres in a region of hummocky dead-ice moraine. Circulating ground waters have leached the soluble sodium salts from the unconsolidated drift material and possibly also from bedrock in the surrounding area and drained into this depression.

Geology

Geologically the deposit may be divided into four stratigraphic divisions: (1) A thin layer of brine. This layer of brine is of intermittent nature being dependent on weather conditions. (2) An upper permanent crystal bed grading 79.85% sodium sulphate and 3.72% combined sodium carbonates. (3) An underlying black clay-crystal mixture grading 32.85% sodium sulphate and 9.75% sodium carbonate and bicarbonate. (4) A lower permanent crystal bed grading 86.31% sodium sulphate and 2.26% of sodium carbonate and bicarbonate.

At the time of drilling the brine had a maximum thickness of about two feet, during the latter part of 1960 the deposit was completely free of brine.

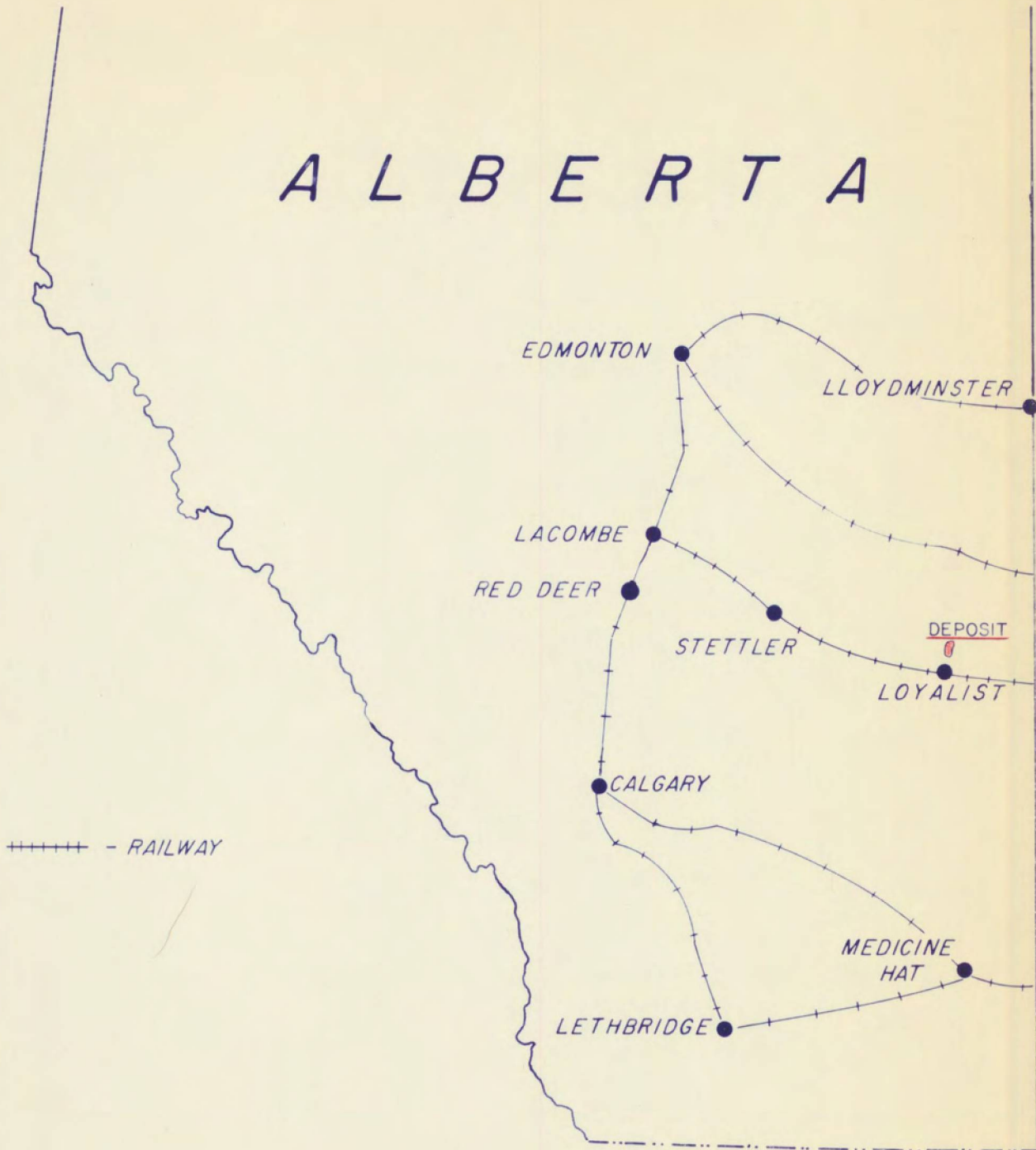
RESERVES OF SALTS

The drilling carried out on the deposit has enabled a fairly accurate estimate of the reserves of salt consisting of 1,710,600 tons of hydrous sodium sulphate and 284,100 tons of hydrous sodium carbonates and bicarbonates, the remainder consisting of insoluble material.

APPENDIX I

INDEX MAP OF AREA

ALBERTA



LOYALIST

SODIUM SULPHATE DEPOSIT

APPENDIX II

PLAN SHOWING LOCATIONS OF DRILL HOLES AND OUTLINE
OF SALT BEDS

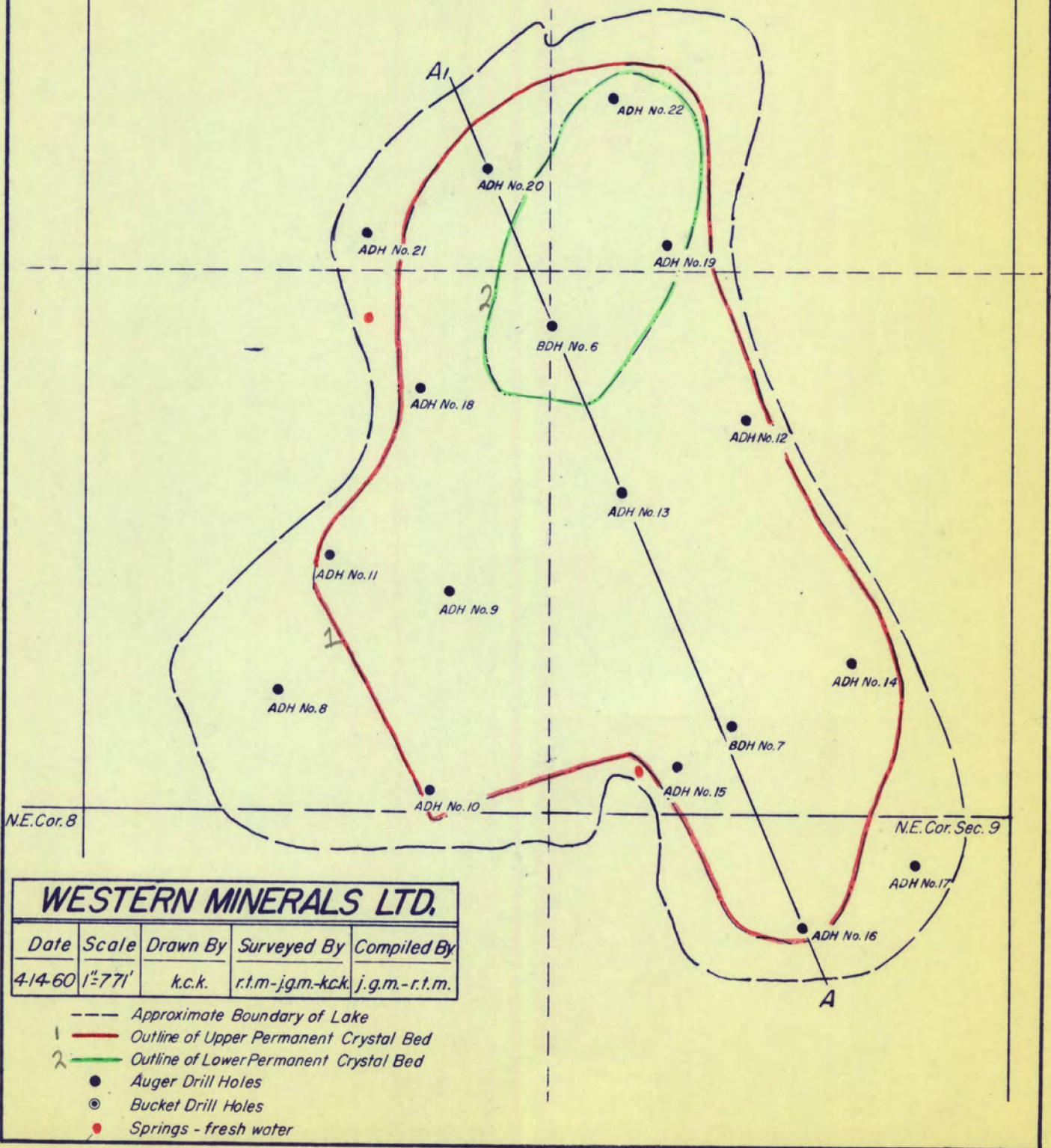
N.E. Cor. 17

N.E. Cor. Sec. 16

PLAN OF LOYALIST SODIUM SULPHATE PROPERTY

Sec. 16 and Portion of Sec. 9, Twp. 36, Rge. 7, W 4th Mer.

ALBERTA



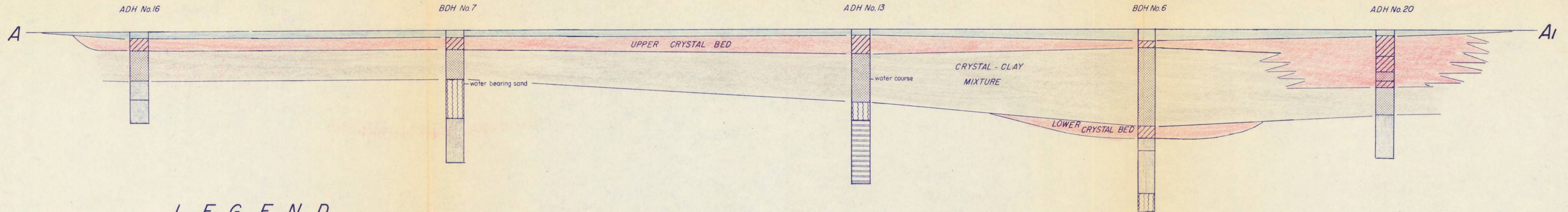
WESTERN MINERALS LTD.

Date	Scale	Drawn By	Surveyed By	Compiled By
4-14-60	1"=77'	k.c.k.	r.t.m.-j.g.m.-k.c.k.	j.g.m.-r.t.m.

- Approximate Boundary of Lake
- 1 — Outline of Upper Permanent Crystal Bed
- 2 — Outline of Lower Permanent Crystal Bed
- Auger Drill Holes
- ⊙ Bucket Drill Holes
- Springs - fresh water

APPENDIX III

CROSS SECTIONS OF DEPOSIT



LEGEND

- Ice
- Predominantly Crystal but Contains some Clay
- Fine Grained Black Clay
- Black Clay - Crystal Mixture
- Fine Grained Brown Clay
- Light Grey Sand - some Crystal
- Light Grey Sand
- No Sample Recovered

ADH No. — Auger Drill Hole No.

BDH No. — Bucket Drill Hole No.

LONGITUDINAL SECTION A-A

SCALE:

Horizontal — 1 inch = 200 feet

Vertical — 1 inch = 10 feet

APPENDIX IV

LOGS OF DRILL HOLES

LOYALIST DEPOSIT

Logs of Auger Holes Drilled

Holes #8

0' - 1' - Ice
1' - 11' - Wet black clay and crystal mixed. Sample #1.
Clay changes to brown color on drying.
11' - 12' - Brown clay with a few scattered crystals (up to
1" in diameter).
12' - 13' - Light grey, water-bearing sand.
13' - 14' - Grey sandy clay.
End of hole.

Hole #9

0' - 1' - Ice
1' - 2' - Light grey crystal.
2' - 9' - Wet black clay and crystal mixed (contains some
large crystals of 2" diameter.) Clay changes to
light brown color on drying.
9' - 9'6" - Crystal.
9'6" - 18' - Wet black clay and crystal mixed. Water course at
12'.
18' - 20' - Brown clay.
20' - 25' - Wet black clay and crystal mixed.
25' - 29' - Light grey sand.
29' - 30' - Light brown clay.
End of hole.

Samples #2 - 1' - 5'
#3 - 5' - 10'
#4 - 10' - 13'
#5 - 13' - 18'
#6 - 20' - 25'

Hole #10

0' - 1' - Ice
1' - 2' - Black clay with fine crystal.
2' - 3' - Light grey crystal with about 50% mud.
3' - 15' - Dark grey clay and fine crystal mixed. From
10' - 15' clay is slightly wet.
15' - 17' - Brown clay.
17' - 19' - Water-bearing grey sand.
End of hole.

Samples #7 - 1' - 5'
#8 - 5' - 10'
#9 - 10' - 15'

Hole #11

0' - 8' - Ice
8" - 14" - Crystal
14" - 9' - Wet sandy black clay mixed with some coarse crystal.
9' - 12' - Wet dark grey, clayey sand.
12' - 14' - Wet grey sand.

Water course at 7'

Sample #10 - 8" - 9'

Bulk Sample - Holes 9, 10, & 11.

Covering complete section of crystal-bearing material.

Hole #12

0' - 1' - Ice
1' - 3 1/2' - Light grey crystal.
3 1/2' - 12' - Dark grey crystal. Black clayey sand mixture.

Water course at 8'.

12' - 14' - Light grey cemented sand.
End of hole.

Samples #11 - 1' - 3 1/2'
#12 - 3 1/2' - 8 1/2'
#13 - 8 1/2' x 12'

Hole #13

0' - 1' - Ice
1' - 4' - Light grey crystal, clean. (clay content greatest from 3' - 4').
4' - 12' - Dark greenish-grey crystal-black clay mixture.
Large amount of water at 8'. Crystal content approx. 60%. 6" of crystal at 5'.
12' - 15' - Light grey sand.
15' - 25' - Samples lost. (Probably wet sand).
End of hole.

Samples #14 - 1' - 4'
#15 - 4' - 8'
#16 - 8' - 12'

Bulk sample taken of Hole #13 to 12' depth.

Hole #14

0' - 1' - Ice
1' - 4' - Grey-green crystal with slight amount of clay.
4' - 10' - Sticky black sandy clay and small amount of crystal mixed.
10' - 12' - Sticky black clay with no visible crystal.
12' - 13' - Dark grey, water-bearing sand.
13' - 13 1/2' - Sticky black clay.
13 1/2' - 16' - Sticky light brown clay.
End of hole.

Samples #17 - 1' - 4'
#18 - 4' - 10'

Hole #15

0' - 1' - Ice
1' - 1 1/2' - Crystal
1 1/2' - 10' - Black clayey sand with fine crystal. Weathers to light brown color.
10' - 12' - Sticky black sandy clay with some scattered coarse crystals.
12' - 14' - Sticky brown sandy clay with traces of coarse crystal.
14' - 21' - Light brown clay with well preserved wood fragments. Also contains shells.

Samples #19 - 1' - 8'
#20 - 8' - 14'
#21 - Special sample of wood fragments, taken at 21'.

Hole #16

0' - 1' - Ice
1' - 3' - Crystal with some clay.
3' - 8' - Black sticky clay with fine crystal mixed. Clay weathers to light brown color.
8' - 10' - Light grey sticky clay - no crystal.
10' - 11' - Black sticky clay - no crystal (weathers to light brown color).
11' - 15' - Lt. brown clay with fine igneous pebbles (1/8") - no crystal.
End of hole.

Samples #22 - 1' - 3'
#23 - 3' - 8'
#24 - 8' - 11'

Hole #17

0' - 6" - Ice
6" - 8' - Sticky black clayey sand with little crystal.
8' - 11' - Sticky black clay - no crystal - clay weathers to brown color.
11' - 15' - Light brown clay with igneous pebbles (1/8")
End of hole.

Water course hit at 15'.

Samples #25 - 6" - 8'
#26 - 8' - 11'

Hole #18

0' - 1' - Ice
1' - 4' - Fine crystal with slight amount of clay.
4' - 9' - Crystal with black clay mixed (clay weathers to light brown color.)
9' - 15' - Sticky black clay with very slight amount of coarse crystal.
15' - 20' - 20' Light grey sand.

Samples #27 - 1'-4'
#28 - 4' - 9'
#29 - 9' - 15'

Bulk sample to depth of 9' also taken.

Hole #19

0' - 1' - Ice
1' - 2' - Crystal with light greyish clay.
2' - 5' - Crystal with sticky black clay (clay weathers to brown color.
5' - 7' - Crystal with wet sticky black clay.
7' - 8' - Sticky black clay with scattered coarse crystal.
8' - 12' - Sticky black clay with much coarse crystal.
12' - 13' - Crystal with black clay.
13' - 14' - Black clay with some crystal.
14' - 19 1/2' - Crystal with some black clay.
19 1/2' - 30' - No sample recovered.

Samples #30 - 1' - 5'
#31 - 5' - 12'
#32 - 12' - 19 1/2'

Hole #20

0' - 1' - Ice
1' - 4 1/2' - Crystal with black clay.
4 1/2' - 7' - Crystal with small amount of grey clay.
7' - 8 1/2' - Sticky black clay with a few coarse crystals.
8 1/2' - 9 1/2' - Light grey crystal.
9 1/2' - 14' - Black sticky clay with a few scattered coarse crystals.
14' - 21' - Light brown sticky very fine-grained clay with wood fragments.

Samples #33 - 1' - 4 1/2'
#34 - 4 1/2' - 7'
#35 - 7' - 14'
#36 - Special sample of wood fragments at 21'.

Hole #21

0' - 1 1/2' - Ice.
1 1/2' - 7' - Dark grey sandy clay with very few scattered crystals at 7'.
7' - 10' - Dark grey clayey sand with very few scattered crystals.
10' - 11 1/2' - Crystal with slight amount of light-grey clay.
11 1/2' - 13' - Dark grey clayey sand.

Hole #22

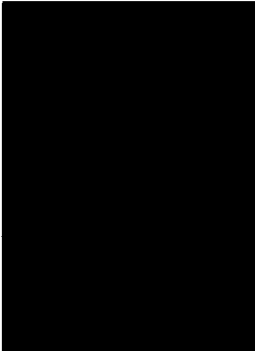
0' - 1' - Ice
1' - 2' - Crystal with slight amount grey clay.
2' - 4 1/2' - Sticky black clay with large amount of coarse crystal.
4 1/2' - 5' - Crystal with slight amount of grey clay.
5' - 5 1/2' - Sticky black clay with large amount of crystal.
5 1/2' - 9' - Crystal with slight amount of black clay.
9' - 12' - Black sticky clay with coarse crystal mixed.
12' - 16' - Crystal.
16' - 18' - Black sticky clay with coarse crystal (1"-1 1/2")
18' - 19' - Crystal.
19' - 21' - Fine-grained brown clay. Water at 20'.

Samples #37 - 1' - 5'
#38 - 5' - 9'
#39 - 9' - 12'
#40 - 12' - 16'
#41 - 16' - 18'
#42 - 18' - 19'

DESCRIPTION

IN TOWNSHIP THIRTY-SIX (36), RANGE SEVEN (7), WEST OF
THE FOURTH (4) MERIDIAN:

Sections Nine (9), Ten (10), Fifteen (15),
Sixteen (16), Seventeen (17), Twenty (20),
Twenty-one (21) and Twenty-two (22);

 containing an area of Five Thousand, One Hundred and
Twenty (5,120) acres, more or less.