

# MAR 19590001: METISKOW LAKE

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19590001

REPORT  
ON THE  
METISKOW LAKE SODIUM SULPHATE DEPOSIT

WESTERN MINERALS LTD.

J. G. Matthews  
R. T. Marshall

Calgary, Alberta.  
September 21, 1959.

## REPORT ON THE METISKOW LAKE SODIUM SULPHATE DEPOSIT

### INTRODUCTION

During the winter seasons of 1957 and 1958, Western Minerals Ltd. , undertook exploratory work on the Metiskow Lake sodium sulphate deposit. The work was designed to determine the quantity and quality of mineral salts present in the deposit and to assess the possibilities for commercial development. The results of this work are described herein.

### LOCATION AND ACCESSIBILITY

By referring to map #1, it will be seen that the Metiskow sodium sulphate deposit is located in east central Alberta, approximately 50 miles southwest of the city of Lloydminster on the Alberta-Saskatchewan boundary.

The nearest point of access is the village of Czar approximately 10 miles by road northwest of the deposit. Czar is located on the main trans-continental line of the Canadian National Railways and also on gravel highway #13. The secondary road from Czar to the deposit is passable in most kinds of weather. Map #2 shows the highways, main secondary road, railways, gas fields and pipelines in the immediate area.

### DESCRIPTION OF PROPERTY

The Metiskow deposit occupies a large poorly-drained depression in a hilly area. Circulating ground waters have leached the soluble sodium salts from the unconsolidated drift material, mainly, but possibly also from bedrock materials, and the solution

has drained into the large depression. Subsequent and periodic evaporation has led to the concentration and deposition of these salts in crystal beds interbedded and intermixed with mud.

During the years 1921 and 1924, Mr. L.H. Cole of the Mines Branch, Ottawa, carried out a drilling programme on the deposit. Eleven holes were drilled, seven at the north end of the deposit and four at the south end. This work showed that the deposit consisted of alternate beds of pure crystal and of mud and crystal mixed to a depth of 20 to 30 ft. in the north part of the lake and up to 57 ft. at the south end. Cole's work showed total reserves of over five million tons of hydrous sodium sulphate.

During the winter seasons of 1957 and 1958, Western Minerals Ltd, carried on some exploratory drilling to confirm the earlier work done by Cole. One hole was drilled at the north end and six holes at the south end of the deposit. In a general way the results of this drilling checked with those of the earlier work.

Most of the work was concentrated at the south end of the lake as this portion of the deposit was known to extend to a greater depth. In addition, it was more suitable for dam construction if drainage of the lake proved to be necessary.

Drilling was carried on from the ice using a packsack diamond drill for five holes (M1-M5) and a 6" auger for the remaining two holes (PE 1 and 2).

The diamond drill, designed to recover a 7/8" core, was most unsatisfactory. Sample recovery while drilling through the crystal beds was very poor and in the soft zones of intermixed mud and crystal, there was virtually no sample recovered whatsoever. As a result of this, logging of the diamond drill holes was largely a matter of guess work using the speed of drilling as an indicator and observing the character of the return water. None of the diamond drill logs could be correlated. This drilling, however, did show interbedded and intermixed mud and crystal in the thickest intersection

to a maximum depth of 42 ft. at which point circulation was lost (see cross sections of drill holes in appendix).

### GRADE AND RESERVE ESTIMATES

Chemical analyses of the auger samples indicate that the total section penetrated averages about 50% sodium sulphate and 4% sodium carbonate and bicarbonate.

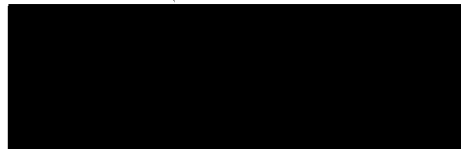
Only an approximation can be made of the reserves of sodium sulphate from the information available at this time. Conservatively, it seems reasonable to give the deposit at the south end of the lake an average thickness of 20 ft. Using an estimated area of 66.8 acres, reserve calculations are as follows:

Volume of crystal-mud mixture	58,159,860 cu. ft.
Tons of crystal-mud mixture	2,620,000
Tons of hydrous sodium sulphate (assumed 50% of total)	1,310,000
Tons of anhydrous sodium sulphate $44/100 \times 1,310,000$	577,000
Tons of sodium carbonate and sodium bicarbonate (assumed 4% of total)	52,400

These reserves of sodium sulphate would be sufficient to supply an 100-ton per day anhydrous sodium sulphate plant for 16.5 years. No estimates are considered for the north end of the lake at this time where the deposit has a much greater area but a lesser thickness.

It is of interest to note the fact that most of the sodium carbonate and bicarbonate is present in the beds that are predominantly mud rather than those that are mainly crystal.

The only solid crystal bed near the surface is the intermittent crystal bed lying beneath the brine. It has a thickness varying from an inch or two near the shore to about one foot in the centre of the lake. A simple calculation will show that this crystal bed contains approximately 28,850 tons of anhydrous sodium sulphate. Therefore, a brining operation at the south end of the lake would last for less than one year. Further brining operations would be impossible because of the large amount of mud.



*P. Fry*

APPENDIX

MAPS AND CROSS SECTIONS

- |           |   |  |
|-----------|---|--|
| Map No. 1 | - | Index map of area                              |
| Map No. 2 | - | Map showing roads, pipelines<br>and gas fields |
| Map No. 3 | - | Plan of drill holes                            |

# ALBERTA



## METISKOW LAKE SODIUM SULPHATE DEPOSIT

K.C.K.

MAP No. 1



# METISKOW LAKE AREA

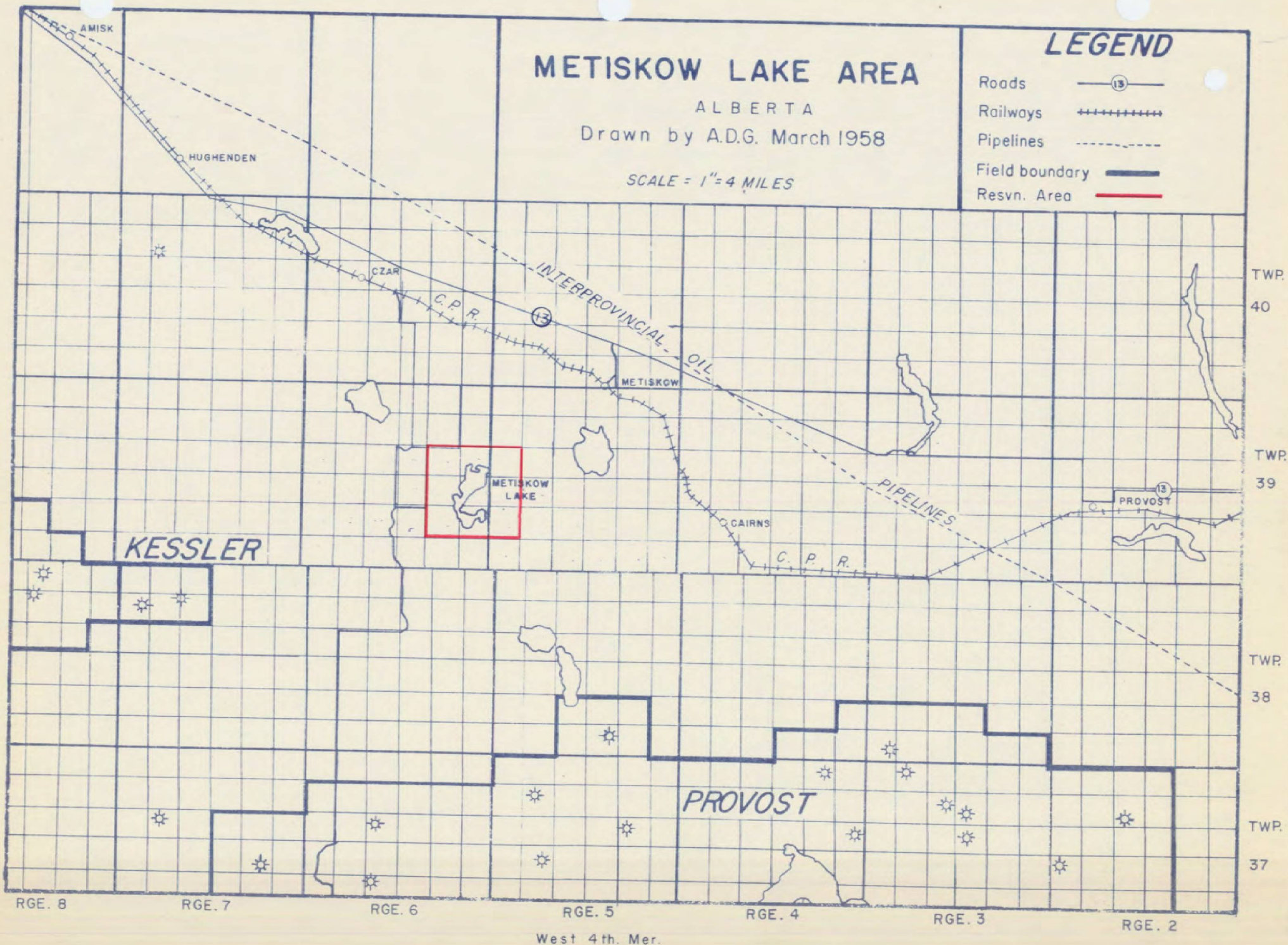
ALBERTA

Drawn by A.D.G. March 1958

SCALE = 1" = 4 MILES

## LEGEND

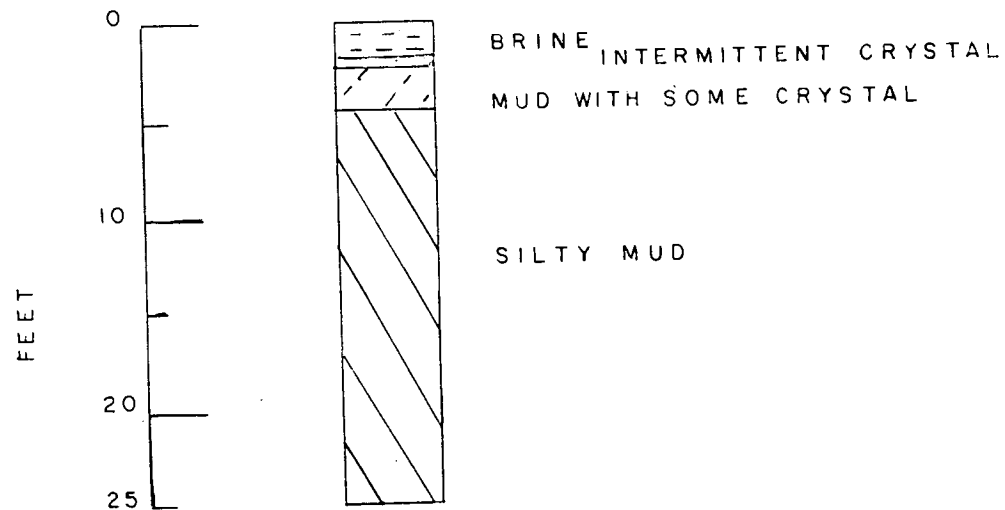
- Roads — (13) —
- Railways — + + + + +
- Pipelines — - - - - -
- Field boundary — — — — —
- Resvn. Area — — — — —



MAP No. 2

West 4th. Mer.

METISKOW LAKE SODIUM SULPHATE  
CROSS SECTION of HOLE NO. M"1.

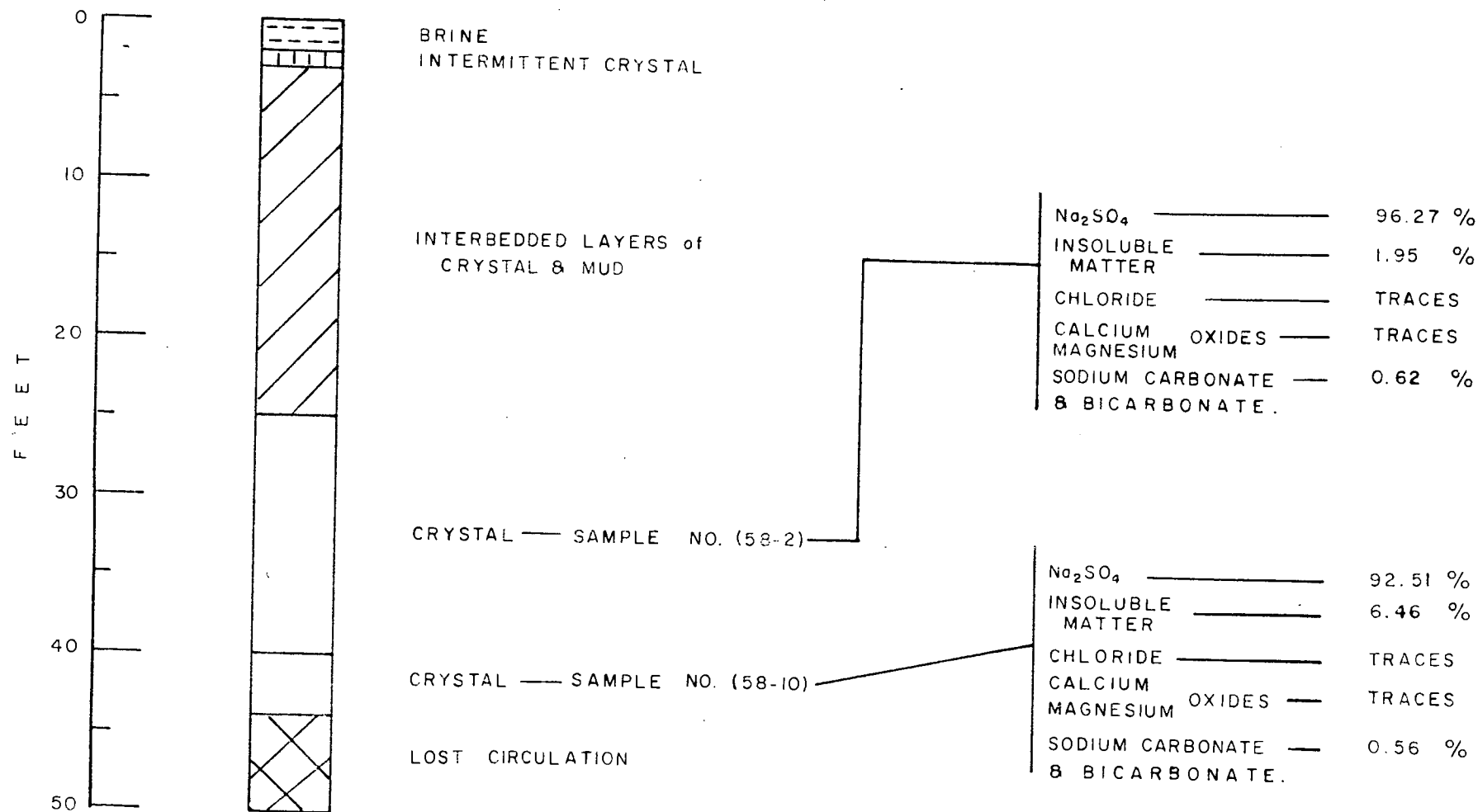


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Sept. 4. 58. C.T.J.

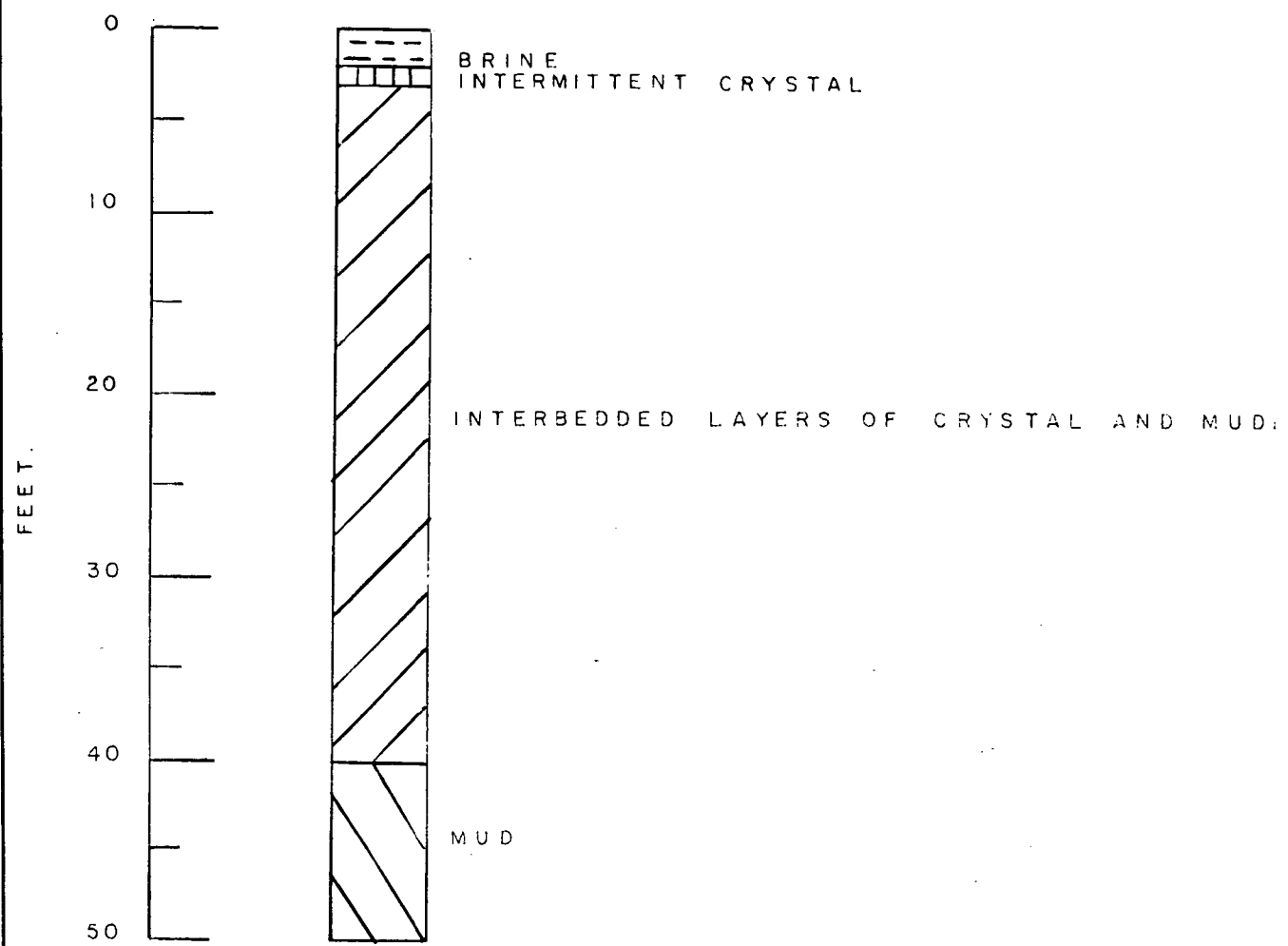
# METISKOW LAKE SODIUM SULPHATE

## CROSS SECTION of HOLE NO. M-2



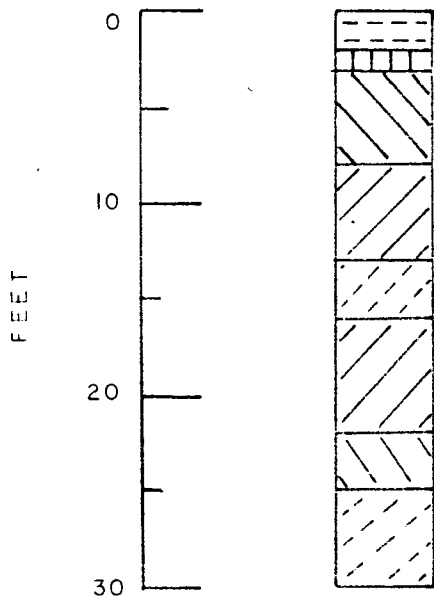
METISKOW LAKE SODIUM SULPHATE

CROSS SECTION of HOLE NO.M-3



# METISKOW LAKE SODIUM SULPHATE

## CROSS SECTION of HOLE NO. M-4



BRINE  
INTERMITTENT CRYSTAL

MUD

INTERBEDDED CRYSTAL & MUD SAMPLE NO.(58-3)

MUD with some CRYSTAL

INTERBEDDED CRYSTAL & MUD SAMPLE NO.(38-5)

MUD

mostly MUD slight CRYSTAL SAMPLE NO.(58-4)

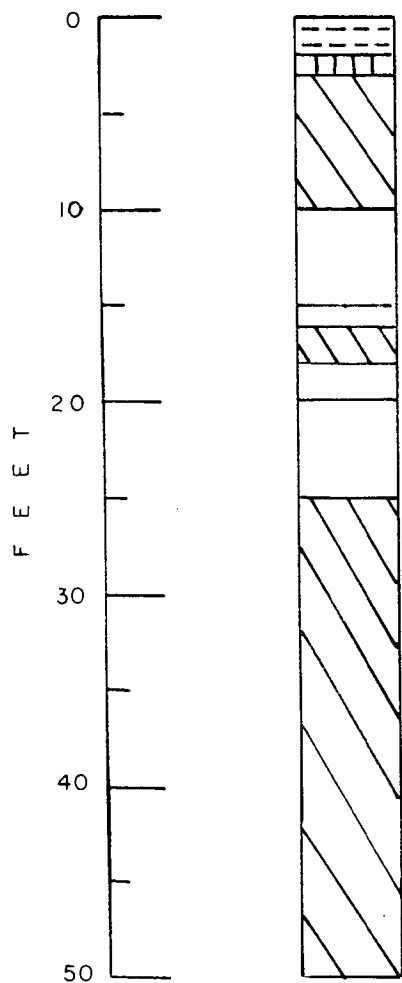
Na <sub>2</sub> SO <sub>4</sub>	15.52 %
INSOLUBLE MATTER	73.71 %
CHLORIDE	1.83 %
CALCIUM OXIDES MAGNESIUM	TRACES
SODIUM CARBONATE & BICARBONATE.	3.73 %

Na <sub>2</sub> SO <sub>4</sub>	92.02 %
INSOLUBLE MATTER	8.00 %
CHLORIDE	TRACES
CALCIUM OXIDES MAGNESIUM	TRACES
SODIUM CARBONATE & BICARBONATE.	0.84 %

Na <sub>2</sub> SO <sub>4</sub>	95.03 %
INSOLUBLE MATTER	1.11 %
CHLORIDE	1.20 %
CALCIUM OXIDES MAGNESIUM	TRACES
SODIUM CARBONATE & BICARBONATE.	0.16 %

# METISKOW LAKE - SODIUM SULPHATE

## CROSS SECTION of HOLE NO. M-5



BRINE  
INTERMITTENT CRYSTAL - SAMPLE NO.(58-6)

MUD

CRYSTAL - SAMPLE NO.(58-7)

CRYSTAL - SAMPLE NO.(58-8)

MUD

CRYSTAL

MUD

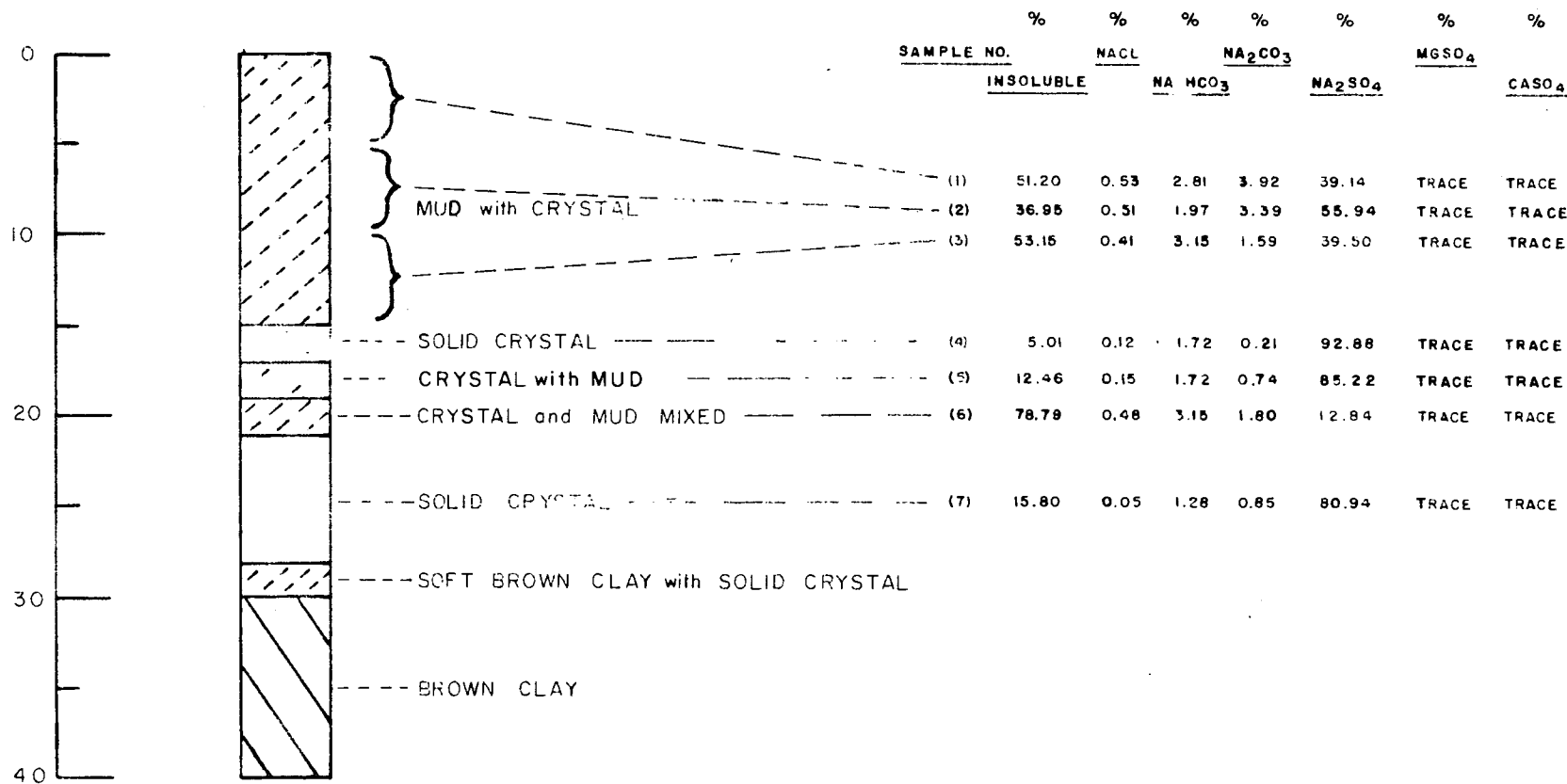
Na <sub>2</sub> SO <sub>4</sub>	89.75 %
INSOLUBLE MATTER	7.58 %
CHLORIDE	TRACES
CALCIUM OXIDES	TRACES
MAGNESIUM	
SODIUM CARBONATE	4.24 %
<b>&amp; BICARBONATE.</b>	

Na <sub>2</sub> SO <sub>4</sub>	98.56 %
INSOLUBLE MATTER	0.73 %
CHLORIDE	TRACES
CALCIUM OXIDES	TRACES
MAGNESIUM	
SODIUM CARBONATE	0.97 %
<b>• BICARBONATE.</b>	

Na <sub>2</sub> SO <sub>4</sub>	99.45 %
INSOLUBLE MATTER	0.50 %
CALCIUM OXIDES	TRACES
MAGNESIUM	
CHLORIDE	TRACES
SODIUM CARBONATE	0.42 %
<b>• BICARBONATE.</b>	

# METISKOW LAKE - SODIUM SULPHATE

POOLE ENGINEERING HOLE NO. PE.-2



Map of  
**METISKOW LAKE**  
 Sodium Sulphate Property  
 Showing  
 Portion of Twp.39, Rge.6, W4thM

LOG M4

- 0 - 2'0" — Brine
- 2'0" - 3'0" — Interbedded Crystal and Mud
- 3'0" - 8'0" — Mud
- 8'0" - 13'0" — Interbedded Crystal and Mud
- 13'0" - 16'0" — Mud with some Crystal
- 16'0" - 22'0" — Interbedded Crystal and Mud
- 22'0" - 25'0" — Mud
- 25'0" - 30'0" — Mostly Mud - Slight Crystal

ANALYSES

	Insoluble	NaCl	NaHCO <sub>3</sub>	Na <sub>2</sub> CO <sub>3</sub>	Na <sub>2</sub> SO <sub>4</sub>	MgSO <sub>4</sub>	CaSO <sub>4</sub>
8'0"-13'0"	8.00%	—	0.47%	0.37%	92.02%	—	—
16'0"-22'0"	1.11%	1.20%	0.14%	0.02%	95.03%	—	—
25'0"-30'0"	73.71%	1.83%	2.40%	1.33%	15.92%	—	—

LOG M5

- 0 - 2'0" — Brine
- 2'0" - 3'0" — Intermittent Crystal
- 3'0" - 10'0" — Mud
- 10'0" - 15'0" — Crystal
- 15'0" - 16'0" — Crystal
- 16'0" - 18'0" — Mud
- 18'0" - 20'0" — Crystal
- 20'0" - 30'0" — Mud

ANALYSES

	Insoluble	NaCl	NaHCO <sub>3</sub>	Na <sub>2</sub> CO <sub>3</sub>	Na <sub>2</sub> SO <sub>4</sub>	MgSO <sub>4</sub>	CaSO <sub>4</sub>
2'0" - 3'0"	7.98%	—	1.64%	2.60%	89.75%	—	—
10'0" - 15'0"	0.73%	—	0.81%	0.16%	98.56%	—	—
15'0" - 16'0"	0.50%	—	0.34%	0.08%	99.45%	—	—

LOG PE1

- 0 - 15'0" — Gray Mud with few Crystal

LOG M1

- 0 - 2'0" — Brine
- 2'0" - 22'0" — Intermittent Crystal
- 22'0" - 40'0" — Mud with some Crystal
- 40'0" - 250'0" — Silty Mud

LOG M2

- 0 - 2'0" — Brine
- 2'0" - 3'0" — Intermittent Crystal
- 3'0" - 25'0" — Interbedded Layers of Crystal and Mud
- 25'0" - 40'0" — Crystal
- 40'0" - 44'0" — Crystal

ANALYSES

	Insoluble	NaCl	NaHCO <sub>3</sub>	Na <sub>2</sub> CO <sub>3</sub>	Na <sub>2</sub> SO <sub>4</sub>	MgSO <sub>4</sub>	CaSO <sub>4</sub>
25'0"-40'0"	1.95%	—	0.51%	0.11%	96.27%	—	—
40'0"-44'0"	6.46%	—	0.45%	0.13%	92.51%	—	—

LOG PE2

- 0 - 15'0" — Mud with Crystal
- 15'0" - 17'0" — Solid Crystal
- 17'0" - 19'0" — Crystal with Mud
- 19'0" - 21'0" — Crystal and Mud mixed
- 21'0" - 28'0" — Solid Crystal
- 28'0" - 30'0" — Soft Brown Clay with Solid Crystal
- 30'0" - 40'0" — Brown Clay

ANALYSES

	Insoluble	NaCl	NaHCO <sub>3</sub>	Na <sub>2</sub> CO <sub>3</sub>	Na <sub>2</sub> SO <sub>4</sub>	MgSO <sub>4</sub>	CaSO <sub>4</sub>
0 - 5'0"	51.20%	0.53%	2.81%	3.92%	39.14%	—	—
5'0" - 10'0"	36.99%	0.51%	1.97%	3.39%	55.94%	—	—
10'0" - 15'0"	53.15%	0.4%	3.15%	1.99%	39.50%	—	—
15'0" - 17'0"	5.01%	0.12%	1.72%	0.21%	92.88%	—	—
17'0" - 19'0"	12.46%	0.15%	1.72%	0.24%	85.22%	—	—
19'0" - 21'0"	78.79%	0.46%	3.15%	1.80%	12.84%	—	—
21'0" - 28'0"	15.80%	0.05%	1.28%	0.85%	80.99%	—	—

LOG M3

- 0 - 2'0" — Brine
- 2'0" - 3'0" — Intermittent Crystal
- 3'0" - 40'0" — Interbedded Layers of Crystal and Mud
- 40'0" - 50'0" — Mud

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Scale	Date	Drawn By	Checked By
15" = 1 mile	Sept. 17, 1959	K.C.K.	R.A.M.

LEGEND

- Drill Holes
- ⊕ Springs — Fresh water
- Boundary of Permanent Crystal Bed

PROJECT NO. 1-1