SODIUM SULFATE

by

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NOTE: This is a preliminary report and is subject to revision with a more comprehensive study. Information presented herein should not be published without prior approval of the Alberta Research Council.

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ACKNOWLEDGMENTS

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FIGURE

SODIUM SULFATE

INTRODUCTION

The series of reports attempts to review the status of geology-related studies (published and unpublished) which reflect on the evaluation of a specific resource or commodity.

Literature references are incorporated and classified according to the level and type of field exploration detail supplied.

The reports should provide the background and basis from which:

1. an assessment can be made of the level of exploration information currently available;
2. the most relevant literature can be selected through a system of classified references; and,
3. an economic feasibility for locating and/or developing a primary resource or commodity can be assessed from the geological characteristics and conditions as presently understood in Alberta.

Sodium sulfate deposits result from high evaporation rates of ponded or seepage waters that contain dissolved minerals, such as those lakes situated in east-central Alberta (figure 1). Lakes which exhibit a high dissolved salt content are referred to as saline or alkaline lakes. This region of high evaporation is continuous eastward into the central plains of Saskatchewan.

Sodium sulfate crystals are deposited on the margins and bottoms of alkaline lakes that shrink during the high evaporation rates of the summer.

The last significant published summary of sodium sulfate deposits in Alberta was based on a survey by Govett (1958) of the Alberta Research Council. This summary is now almost 30 years old, and unlike

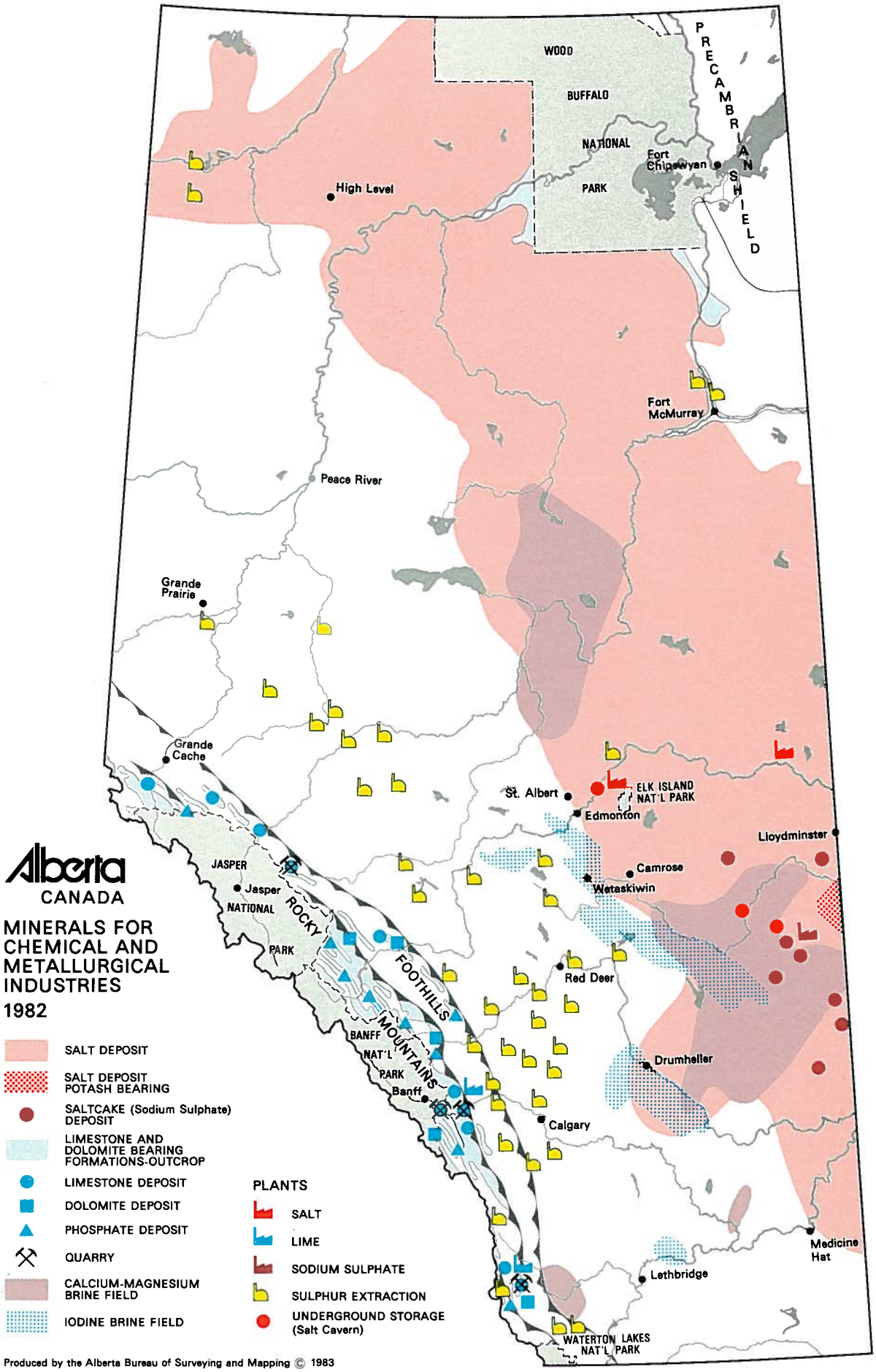
Alberta
CANADA
MINERALS FOR CHEMICAL AND METALLURGICAL INDUSTRIES
1982
SALT DEPOSIT
SALT DEPOSIT POTASH BEARING
SALTCAKE (Sodium Sulphate) DEPOSIT
LIMESTONE AND DOLOMITE BEARING FORMATIONS-OUTCROP
LIMESTONE DEPOSIT
DOLOMITE DEPOSIT
PHOSPHATE DEPOSIT
QUARRY
CALCIUM-MAGNESIUM BRINE FIELD
IODINE BRINE FIELD
PLANTS
SALT
LIME
SODIUM SULPHATE
SULPHUR EXTRACTION
UNDERGROUND STORAGE (Salt Cavern)
Produced by the Alberta Bureau of Surveying and Mapping © 1983
WOOD BUFFALO NATIONAL PARK
PRECAMBRIAN SHIELD
High Level
Fort Chipewyan
Fort McMurray
Peace River
Grande Prairie
Grande Cache
JASPER NATIONAL PARK
Jasper
ROCKY MOUNTAINS
FOOTHILLS
BANFF NAT'L PARK
Banff
St. Albert
ELK ISLAND NAT'L PARK
Edmonton
Lloydminster
Camrose
Wetaskiwin
Red Deer
Drumheller
Calgary
Medicine Hat
Lethbridge
WATERTON LAKES NAT'L PARK

Figure 1.

most other commodities under review, because of its mode of formation, the nature of these deposits may be significantly different in this relatively brief period of time.

The limited amount of exploration and related literature on sodium sulfate occurrences in Alberta, probably reflects several factors:

- the specialized industrial applications;
- limited local uses; and,
- excess production capacity from an established industry in nearby Saskatchewan.

Govett (1958) showed from his survey in southern Alberta that only one deposit in over 250 lakes visited met the requirements for economic development.

OUTLOOK

1. From the purely geological standpoint, Govett's study (1958) indicated that there is at least one sodium sulfate deposit in Alberta that is capable of supporting a commercial operation. There may be others, depending upon the results of more detailed exploration.

2. There is a well established natural sodium sulfate producing industry in Saskatchewan that appears to have excess capacity. Such circumstances may thwart attempts to initiate production in Alberta, assuming that increased consumption in the Alberta marketplace needs to be satisfied.

3. The trend in manufactured sodium sulfate production (i.e. sodium sulfate produced as a byproduct of the industrial chemical industry) should be assessed. Although in 1953, byproduct sodium sulfate accounted for only 0.2 per cent of the total Canadian production of sodium sulfate.

4. The principal industrial use for sodium sulfate is in the manufacture of kraft paper pulp, the source of brown wrapping paper. Other uses are in the manufacture of: plate and sheet glass; chemicals such as sodium carbonate, sodium aluminum sulfate, sodium silicate and sodium sulfide; rayon, wool, and other textile fibres; detergents and pharmaceuticals. The market for sodium sulfate in Alberta appears to be largely geared to the pulp and paper industry, which is not experiencing a particularly strong growth at present.

5. Unless there is a strong economic resurgence in the pulp and paper industry of Alberta, or an entirely new industrial application introduced, the traditional pattern of need and supply appears to be stable and adequate.

RESEARCH PROJECTS

1. In view of the mode of formation of natural sodium sulfate and the 30 year gap since the last geological survey was conducted, it would be appropriate to reassess the current situation. A reconnaissance areal photographic interpretive survey should be undertaken to outline the prospective region. Followup on-the-ground investigations of the more promising sites could be undertaken according to the findings of the areal photographic study in conjunction with Govett's (1958) earlier assessments.

2. Exploration of the extent, grade and tonnage of a deposit cannot be established without subsurface data. These data can best be obtained through use of a drill and sample-collecting program.

3. In the economic interests and potential value of any site-specific detailed exploration, it would be appropriate to initially examine the status of the sodium sulfate industry in Saskatchewan and the current and projected trade patterns.

The outlook for this commodity in Saskatchewan could have a profound influence on any development and production plans for Alberta.

4. Despite the small amount of technical literature on sodium sulfate occurrences in Alberta, a more significant summary could be generated beyond the limitations encompassed within the present study. The constraints placed on this 'overview-type brief' by the existing contract did not necessarily permit extraction, compilation and sythesis of all the pertinent information.

SUMMARY OF DATA GAPS

1. An up-to-date geological survey outlining the potential region of sodium sulfate occurrences, with an on-site detailed examination of the more promising occurrences, is needed to establish the production potential of this commodity for Alberta.

2. Consideration should be given to assessing the economic outlook for sodium sulfate (market potential and production capacity/utilization in Saskatchewan) before proceeding with any extensive exploration for this commodity in Alberta.

OUTLINE FOR REFERENCE CLASSIFICATION: RESOURCE INVENTORY

A. Resource (Commodity) Evaluation References
   1. General Overview
   2. Specific Commodity Overview
   3. Exploration - Reconnaissance Scale
   4. Exploration - Site Specific Scale

B. Supporting References
   1. Concepts and Principles
   2. Indirect Exploration - Reconnaissance Scale
   3. Indirect Exploration - Site Specific Scale

C. Background and Miscellaneous References

REFERENCES

A. RESOURCE (COMMODITY) EVALUATION REFERENCES

1. General Overview

2. Specific Commodity Overview

3. Exploration - Reconnaissance Scale

Cole, L.H. (1926): Sodium sulphate of Western Canada: occurrence, uses and technology; Canada Department of Mines, Mines Branch Report 646, 160 pp.

4. Exploration - Site Specific Scale

Govett, G.J. (1958): Sodium sulfate deposits in Alberta; Earth Science Report 58-5, Alberta Research Council, 34 pp.

B. SUPPORTING REFERENCES

1. Concepts and Principles

2. Indirect Exploration - Reconnaissance Scale

3. Indirect Exploration - Site Specific Scale

C. BACKGROUND AND MISCELLANEOUS REFERENCES

Edmunds, F.H. (1957): Sodium sulphate in Saskatchewan; The Geology of Canadian Industrial Minerals, 6th Commonwealth Mining and Metallurgical Congress, pp. 226-231.

Johnstone, S.J. (1954): Minerals for the chemical and allied industries; Chapman and Hall, London, 691 pp.

Tomkins, R.V. (1954): Natural sodium sulphate in Saskatchewan; Saskatchewan Department of Mineral Resources, Industrial Mineral Resources Branch, Report no. 6, 71 pp.