17 Sep 2024

Alkali Mineral Dispositions, Saskatchewan

Technical Report

Edison Saskatchewan
Resources Corp, a subsidiary of:

EDISON LITHIUM CORP.

Lynn I. Kelley, P. Geo.
LKgeoscience@gmail

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1. Summary

Edison Saskatchewan Resources, a subsidiary of Edison Lithium Corp., has acquired dispositions on four alkali lakes in Saskatchewan, Canada under the Alkali Regulations, Saskatchewan. Edison management, looking towards a clean-energy future, sees sodium-ion batteries as having a place on the future energy landscape, and believes the sodium sulfate found in the alkali lakes of the Great Plains, as a highly-concentrated and readily-available source of sodium, may be a feasible source for production of some of the various sodium compounds required for battery production.

Na-ion batteries function in a way similar to Li-ion batteries. They are heavier and less energy-dense than Li-ion batteries, but Na is much more abundant than Li, potentially rendering Na-ion batteries cheaper to produce. Na-ion batteries do not require metals that are rare and/or produced in problematic jurisdictions such as cobalt and nickel and do not present the risk of spontaneous fire that has been experienced with Li-ion batteries. Two Chinese concerns have recently begun manufacture of small commuter cars powered by Na-ion batteries.

Sodium sulfate has been produced from the alkali lakes of the Great Plains for approximately 100 years. In the past, several extraction methods have been employed, but as the industry matured, the preferred method became concentration of high-density lake brine through summer evaporation and crystallization of solids with cooling fall temperatures.

One of the Edison properties, Whiteshore Lake, produced continuously from the 1930s through 2003 at a maximum nameplate capacity of 90,000 tonnes per year. Another Edison property at Ceylon Salt Lake, produced briefly in the 1930's. The other two properties, Freefight Lake and Cabri Lake, have not seen production, although Freefight has been the subject of extensive research efforts, including an historic resource estimate.

No exploration has been done on these properties, save some reconnaissance geochemical sampling of lake brine and precipitated salts at Ceylon Salt Lake and Freefight Lake. Historic accounts of Cole (1926) and Tomkins (1954) are the benchmark publications describing the resource, and are referred to extensively herein. Both Cole and Tomkins, along with other authors, have compiled resource estimates which are emphatically not in compliance with the standards of National Instrument 43-101 (NI 43-101). The historic estimates are not in compliance with either the Canadian Institute of Mining and Metallurgy (CIM) Estimation of Mineral Resources & Mineral Reserves Best Practice Guidelines (Best Practice Guidelines) or the CIM Industrial Mineral Leading Practice Guidelines. Nonetheless, the historic estimates are presented herein and the author considers them useful in the context of comparing the various deposits.

The processes leading to the transport and concentration of salts in these lake basins is not fully understood, but in general groundwater discharge, perhaps from multiple aquifers, along with overland runoff, transport dissolved ions into closed-basin lakes (that is lakes with no outlet). With no outflow, the ions are concentrated by evaporation to form dense brine (specific gravities exceeding 1.2). Crystalline material, primarily mirabilite ($Na_2SO_4 \cdot 10H_2O$) precipitates when the brine is saturated, accelerates in autumn with temperature-driven variations in solubility (freeze-out), and accumulates on the lakebed. Lake-bottom crystal beds more than 100 ft (30 m) thick are reported at some deposits. The processes of spring discharge and overland flow supplying dissolved ions and concentration by evaporation and freeze-out continues at virtually all the known alkali lakes across the Great Plains, leading some to speculate that the sodium sulfate deposits are, to some degree, renewable.

Of the four Edison properties, Whiteshore Lake, a large former producer with good access and infrastructure, is the most attractive. Edison management proposes to conduct metallurgical research into production of sodium sulphate from Whiteshore Lake brine and implementing a sampling program that measures concentrations in the lake brine, including spatial and temporal variations. This would be essential data towards establishing resource quantity and quality. Edison also plans to assess whether sodium compounds required for future Na-ion batteries can be produced from brines and/or crystalline precipitates derived from alkali lakes of the Great Plains. Edison management plans to investigate the production of high purity Na-compounds for potential Na-ion battery component products, or other high end technology or agriculture products..

2. Introduction and Terms of Reference

2.1. Introduction

Sodium-ion batteries

Numerous recent studies have highlighted the potential of sodium-ion batteries as a cheaper, safer alternative to lithium-ion batteries. While the energy density of Na-ion batteries is less than that of Li-ion batteries, Na-ion batteries have been found to be less prone to overheating and perform better in cold environments. The primary raw ingredient for Na-ion batteries, sodium hydroxide, is a small fraction of the cost of lithium hydroxide. Na-ion batteries do not require cobalt, a critical metal with production dominated by the Democratic Republic of Congo. Table 1 is a comparison of the characteristics of Na-ion and Li-ion batteries.

CHARACTERISTIC	Na-ion	Li-ion
Energy density	70-160 W h/kg, with potential to go to 200 W h/kg	Ranging from about 150 W h/kg for lithium-iron-phosphate cathodes to 275 W h/kg for nickel-manganese-cobalt cathodes
Manufacturing	Yet to be manufactured at commercial scale	Proven at scale and in high-performance cars
Raw material cost	Sodium hydroxide is $300–$800 per metric ton	Lithium hydroxide is $78,000 per metric ton
Safety	No risk of thermal runaway	Can overheat and catch fire
Cycle life	Some developers have struggled to overcome performance fade	Steady performance over a high number of cycles
Performance at low temperature	Maintains >90% performance at -20 ºC	Drops considerably in cooler temperatures
Recyclability	Simple recovery process	Complex separation of metals may be required

Source: C&EN research.

Table 1--Comparison of characteristics of Na-ion and Li-ion batteries. From (Scott, 2022).

In late 2023, Chinese manufacturers Yiwei, a Volkswagen affiliate, and JMEV each debuted their first EVs powered by sodium-ion batteries (Johnson, 2023) (Electrify News, 2024). Edison sees opportunity for Na-ion batteries to play a significant role in future electric vehicle design and development, providing low-cost options for powering short- to medium- range commuter vehicles. While the emphasis has been on EVs, other authors have pointed to the utility of sodium-ion batteries in stationary applications (Siddiqi, 2024).

Siddiqi (2024) also points out that various battery components and chemistries are being considered and adoption of a single formulation is unlikely. Sodium is abundant and ubiquitous, but the concentrations of sodium in alkali lakes on the Great Plains reach many times the concentrations in seawater, making them intriguing potential sources of sodium battery materials.

Sodium compounds are used in both the cathode and electrolyte solutions of Na-ion batteries. Sodium hydroxide is the primary feedstock required for production of the electrolyte, but other sodium compounds are used by various formulators. It is Edison's intention to test metallurgical processes to assess the feasibility of using naturally occurring sodium sulphate to produce sodium hydroxide and other sodium compounds for sodium-ion battery manufacturing.

Natural sodium sulfate

Sodium sulfate is an industrial mineral traditionally used in the manufacture of detergents, carpet fresheners and deodorizers, glass, paper, and textiles. The past 30 years has seen an increase in the value-added manufacture of potassium sulfate by reacting sodium sulfate with potash. Potassium sulfate is used as a fertilizer for chloride-sensitive crops and in a variety of industrial applications.

Sodium sulfate has been mined in Saskatchewan since 1918. Production has been from evaporite deposits in lake basins that are internally drained and generally spring-fed to some extent. The area of internal drainage that hosts the sodium sulfate deposits occupies much of southwest Saskatchewan and adjoining parts of North Dakota and Alberta (Figure 1).

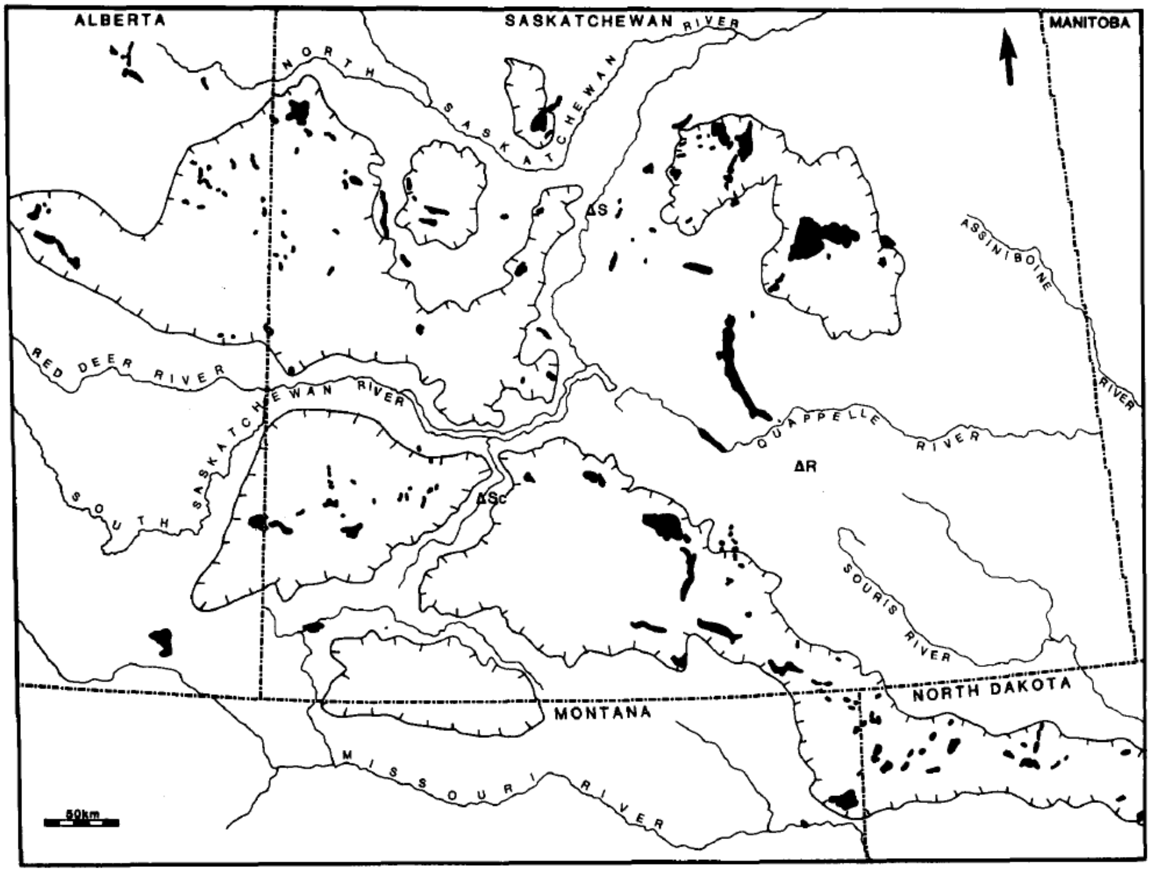


Figure 1--Map of northern Great Plains showing saline lakes (shaded) and areas of internal drainage (hash marks). R = Regina; SC= Swift Current; S = Saskatoon. (Last & Schweyen, 1983)

Some 20 companies have produced sodium sulfate in Saskatchewan (Broughton, 1984). Major deposits are shown on Figure 2. Production peaked in 1982 at some 500,000 tonnes from about a dozen producers (Murphy, 1996). The industry has declined over the past few decades, with the Saskatchewan Mining and Minerals Inc. (SMMI) operation at Chaplin being the only still in production. SMMI has been producing and distributing sodium sulphate from its plant in Chaplin for more than 75 years. Life-of-mine production reached 11 million tonnes in 2018 (SMMI, 2024a) The company recently announced plans to increase production to 70,000 tonnes per year of sodium sulphate in 2025, with operations continuing indefinitely. The company plans for construction of a new facility for the manufacture of potassium sulfate, anticipated to begin production in 2026 and reach a nameplate capacity of 50,000 tpy (SMMI, 2024b).

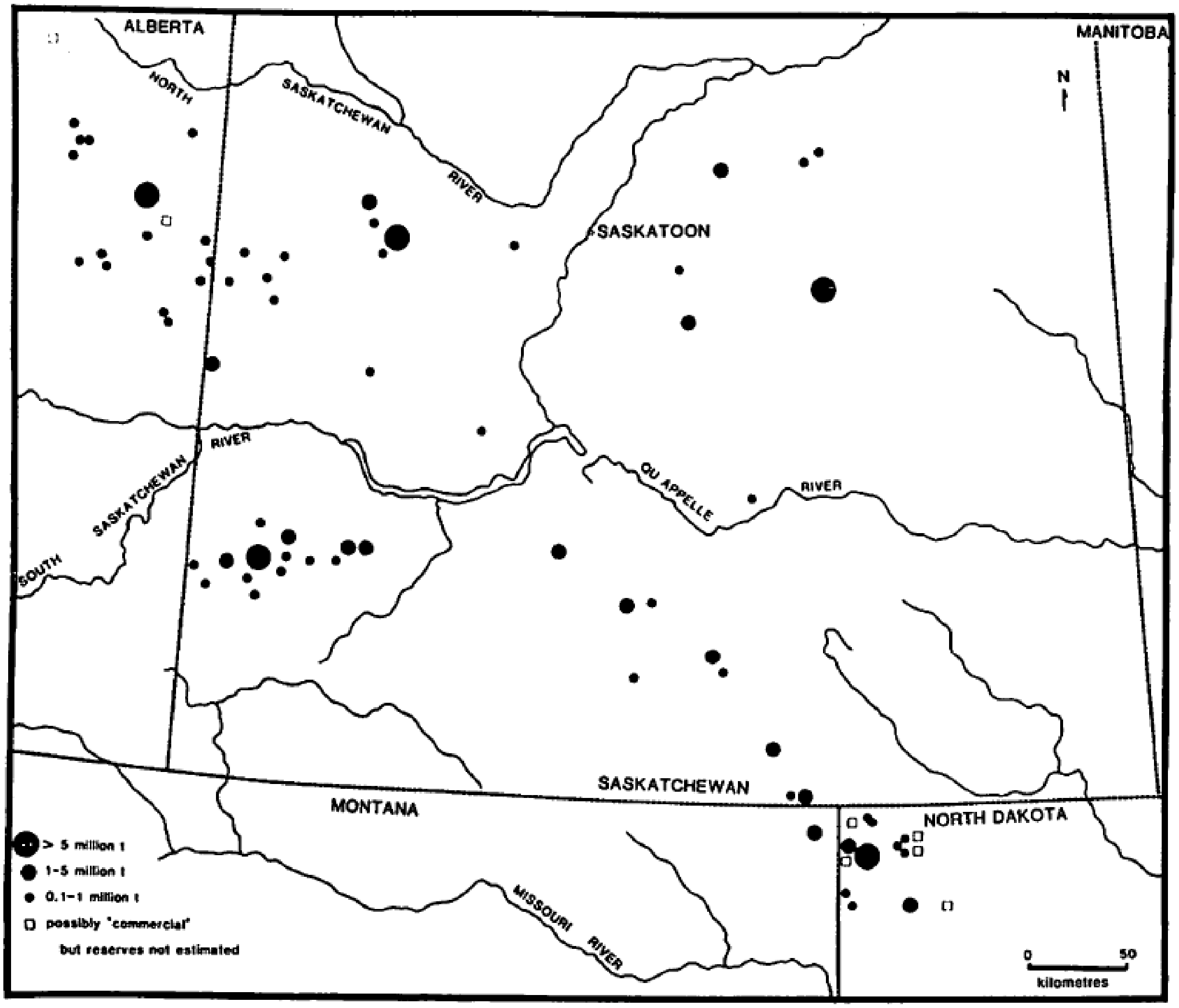


Figure 2--Map showing the distribution and size of sodium sulfate deposits of the northern Great Plains from (Last & Slezak, 1987b). Deposit size estimates are historical and do not comply with NI43-101 reporting standards.

2.2. Terms of Reference

This report summarizes legacy information related to the history of exploration and production, geologic setting and resource potential for sodium sulfate associated with several internally-drained salt lakes in southern Saskatchewan.

This report is primarily a review of published descriptions of the subject properties. This report is intended for the use of Edison Lithium Corp and affiliated entities (collectively referred to as ELC). It is intended to present an independent review of resource potential based primarily on prior scientific literature to inform ELC's decision-making process with regards to further investigation potentially leading to development of sodium sulfate resources in Saskatchewan.

While reference is made to historic resource estimates, none of the historic estimates meet modern standards and in no way should be considered aligned with CIM Best Practice Guidelines nor compliant with National Instrument 43-101.

Lynn I. Kelley, P. Geo. prepared this report and is responsible for its contents. Kelley visited Ceylon Salt Lake, Cabri Lake and Freefight Lake on September 12 and 13, 2023, in the company of Luisa Moreno and Roger Dahn of ELC. Kelley has visited Whiteshore Lake many times during the period 1998-2005. Grab samples of lake brine and crystalline material were collected during the September 2023 field visits, but these are not sufficient to make any inferences regarding volume or grade potential. Any resource estimates referred to are derived from literature and do not meet the standards of CIM Best Practice Guidelines or NI43-101.

2.3. Terminology

Unless otherwise stated all units used in this report are metric, and all coordinates are expressed as Universal Transverse Mercator (UTM) Zone 13, NAD 83 datum. All geological terms used are in standard use within the geological consulting profession in Canada and the US.

Edison Saskatchewan Resources Corp. (ESRC) is the registered owner of the alkali dispositions discussed herein. ESRC is a wholly owned subsidiary of Edison Lithium Corp. (ELC). In the text the author has used ESRC, ELC and Edison interchangeably.

2.4. Sources of Information

The primary sources of information regarding Saskatchewan salt lakes as sources of industrial sodium sulfate are Cole (1926) and Tomkins (1954). More recent literature focuses on various geochemical and hydrogeological aspects of individual salt lakes and their utility in reconstructing past environments. In general these more recent studies have focused on lake systems which have not seen commercial interest.

Sources are cited in the text as appropriate. Reports describing sodium sulfate occurrences of potential economic interest in other Great Plains jurisdictions include Murphy (1996) and Govett (1958). While these reports cite resource estimates for some of the deposits, they are in no way compliant with modern (NI43-101) resource estimation standards, and any resource estimates are presented for historical context only.

3. Reliance on Other Experts

3.1. Technical Data

Lynn I. Kelley, P. Geo., the author of this report, has prepared the report strictly in the role of an independent qualified person. Technical data herein is largely derived from prior work by others supplemented by Kelley's research on sodium sulphate deposits in the period 1998-2005.

3.2. Project management

Luisa Moreno, COO of ELC and Roger Dahn, P. Geo., a director of ELC, accompanied Kelley on field visits to the Ceylon, Freefight and Cabri properties and provided project support and senior review, along with Nathan Rotstein, CEO of ELC.

4. Property Description and Location

4.1. Introduction

Crown minerals have been acquired under the Saskatchewan Alkali Mining Regulations, 1943, for five parcels over four closed-basin lakes as shown in Figure 3 and as described in Table 2.

The dispositions at Ceylon Salt Lake, Cabri Lake North, Cabri Lake South and Freefight Lake were originally executed in the name of Globex Mining Enterprises Inc. on June 8, 2023. ELC acquired 100% interest in the properties, subject to a 2 % gross royalty retained by Globex, by entering into an asset purchase agreement on 11 July, 2023 (Edison Lithium Corp., 2023) . Mineral title for the alkali dispositions was transferred from Globex to Edison Saskatchewan Resources Corp. on 4 June 2024.

Alkali disposition A-4593 at Whiteshore Lake was purchased by Globex from the previous lessee and vended to ELC on April 8, 2024, under terms similar to the other four properties (Edision Lithium Corp., 2024). Mineral title for the Whiteshore disposition was also transferred to Edison Saskatchewan Resources Corp. on 4 June 2024.

The terms of the alkali dispositions are 20 years from the origin date shown in Table 2, with rent of $1 per acre being due each year on the anniversary of the origin date. All rents are current as of 8 June 2024.

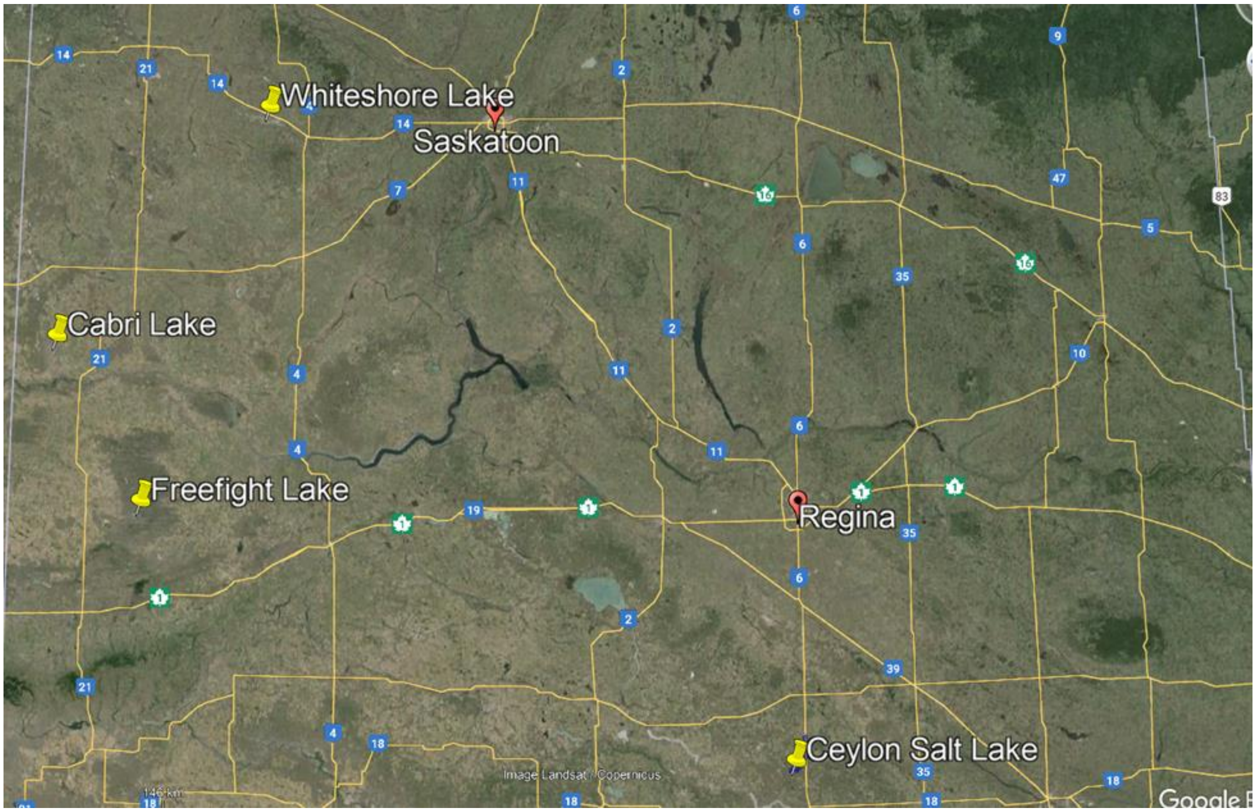


Figure 3---Location map showing four closed basin lakes in southern Saskatchewan

Disposition	Parcel	Holder	Origin Date	Area, acres
A-4613	Cabri North	Edison Sask. Resources Corp 100%	2023-06-08	1200.3611
A-4614	Cabri South	Edison Sask. Resources Corp 100%	2023-06-08	1200.786
A-4615	Ceylon	Edison Sask. Resources Corp 100%	2023-06-08	1279.8505
A-4616	Freefight	Edison Sask. Resources Corp 100%	2023-06-08	883.873
A-4593	Whiteshore W	Edison Sask. Resources Corp 100%	2012-01-31	1487.57

Table 2--Alkali dispositions held by Edison Saskatchewan Resources Corp. through agreements with Globex Mining Enterprise Inc reached on 11 July 2023 and 8 April 2024. Ownership of the dispositions was transferred to Edison Sask. Resources Corp on 4 June 2024.

Whiteshore Lake W

The Whiteshore Lake W disposition, A-4593 is on the west portion of Whiteshore Lake, the site of the historic Palo Mine, operated by Millar-Western Industries from the 1930s to 2003. Whiteshore Lake is about 15 km NE of the community of Biggar (Fig 3). The lake forms part of the boundary between the RM of Rosemount, No. 378 to the north and the RM of Biggar, No. 347 to the south. The disposition is plotted on the Saskatchewan township fabric on Figure 5.

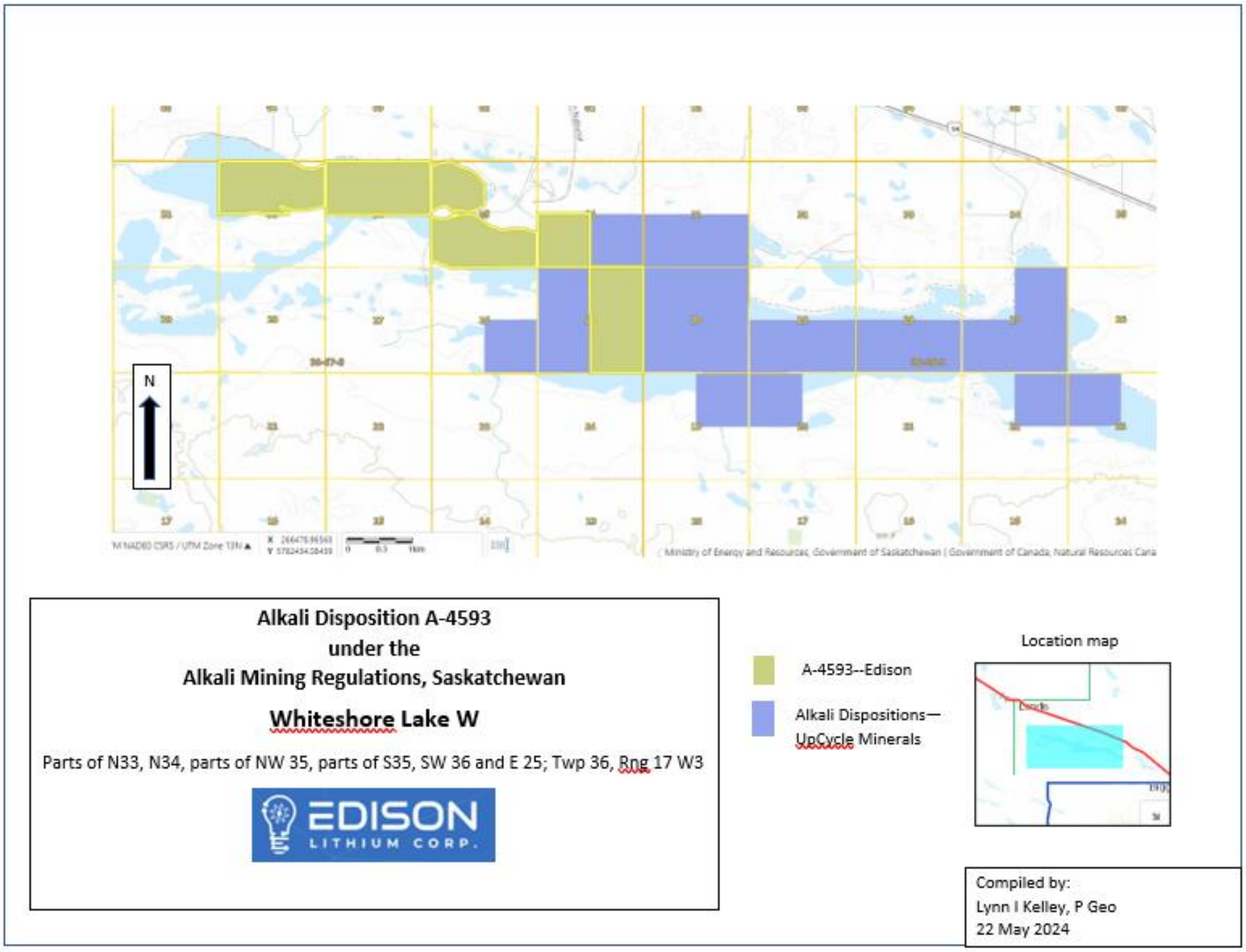


Figure 4-Alkali disposition A-4503-Whiteshore Lake West.

Ceylon Salt Lake

Ceylon Salt Lake is located approximately 130 km south of Regina and 25 km SSE of the village of Ceylon, in the rural municipality (RM) of The Gap, No.39 (Fig 3). The disposition is plotted on the Saskatchewan township fabric in Figure 5.

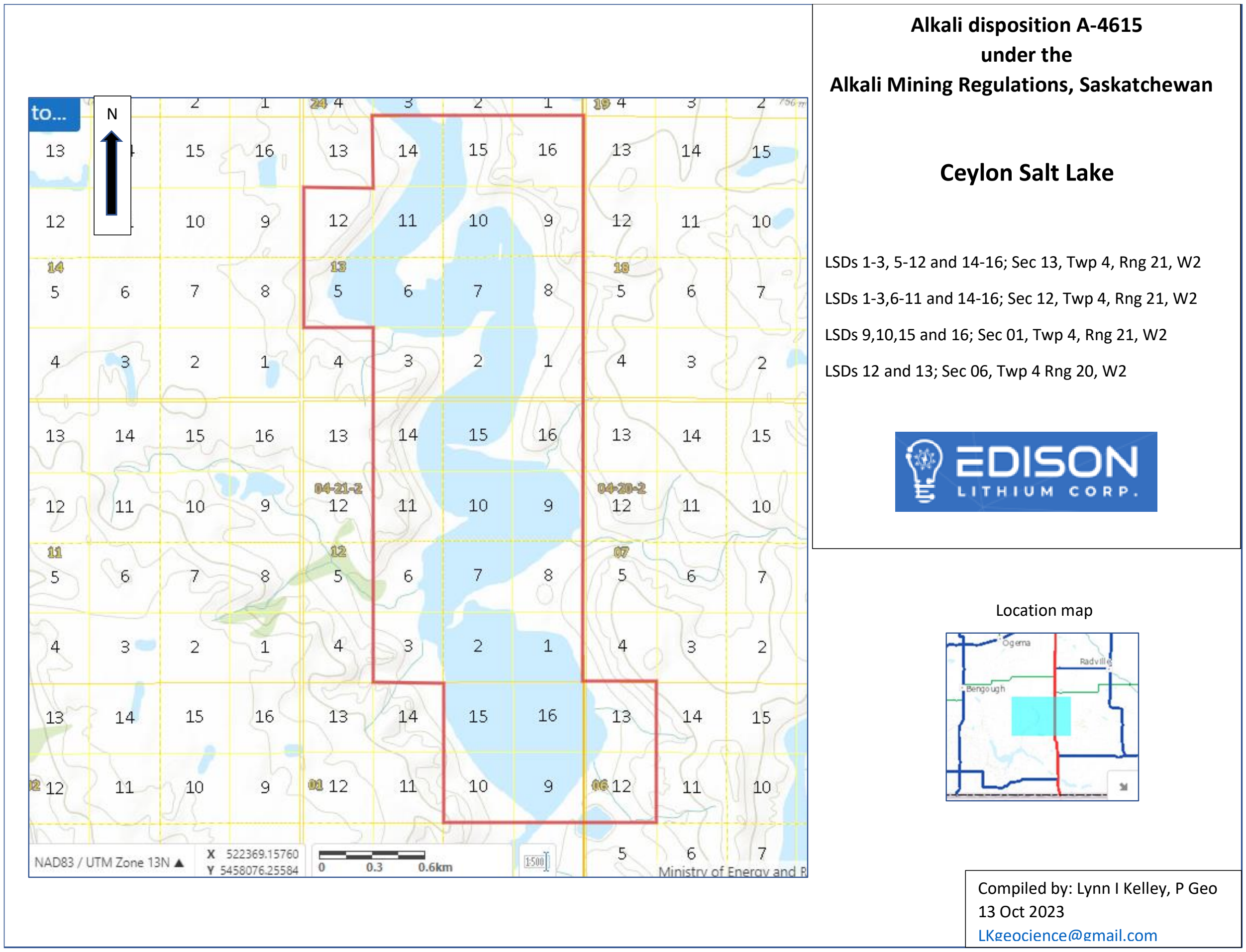


Figure 5--Alkali disposition A-4615, Ceylon Salt Lake

Freefight Lake

Freefight Lake is located approximately 100 km WNW of Swift Current, 25 km ESE of the village of Fox Valley, and approximately 15 km east of the former sodium sulfate producing operation at Ingebrigt Lake (Fig 3). Freefight is located in the rural municipality (RM) of Fox Valley,171. The disposition is plotted on the Saskatchewan township fabric in Figure 6.

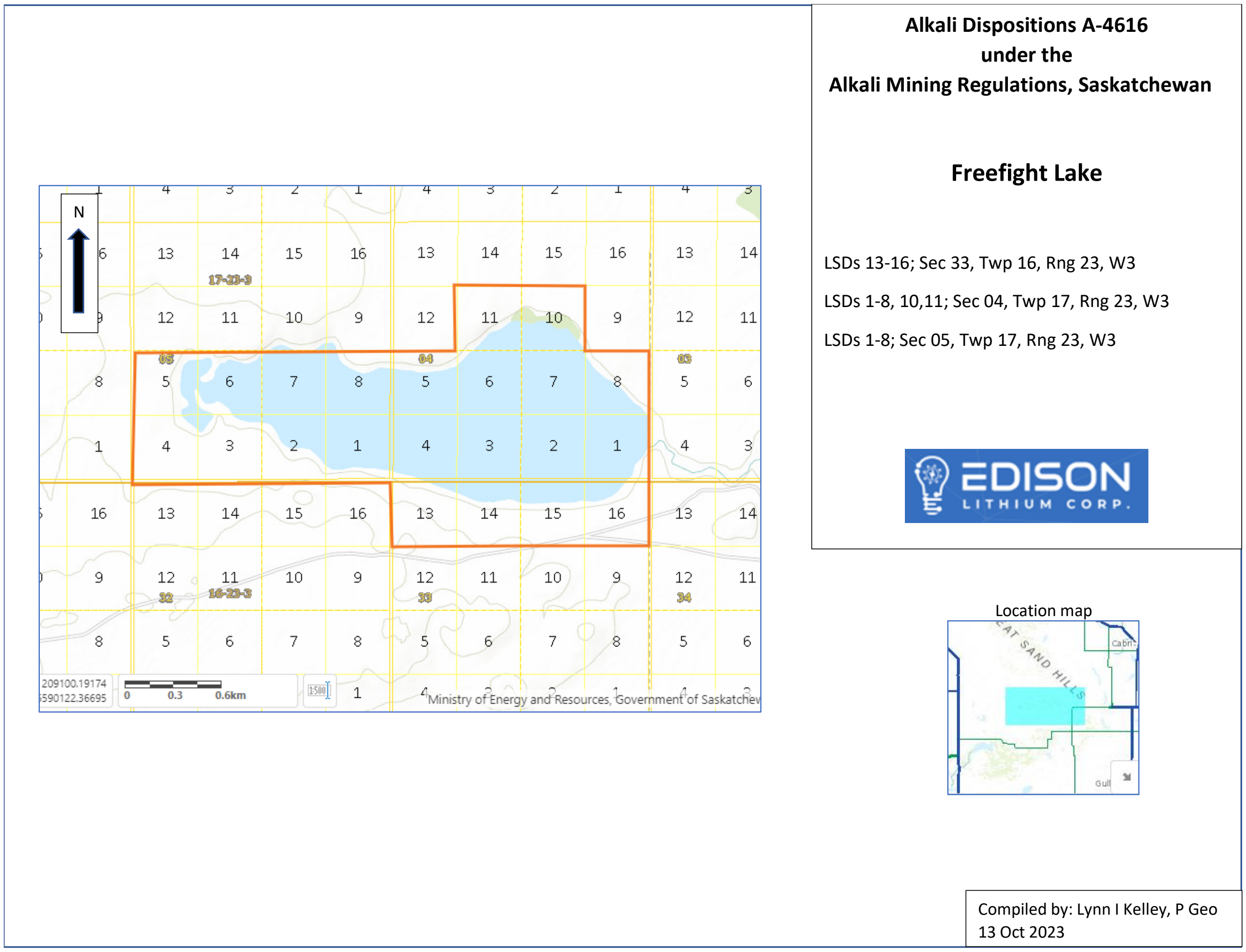
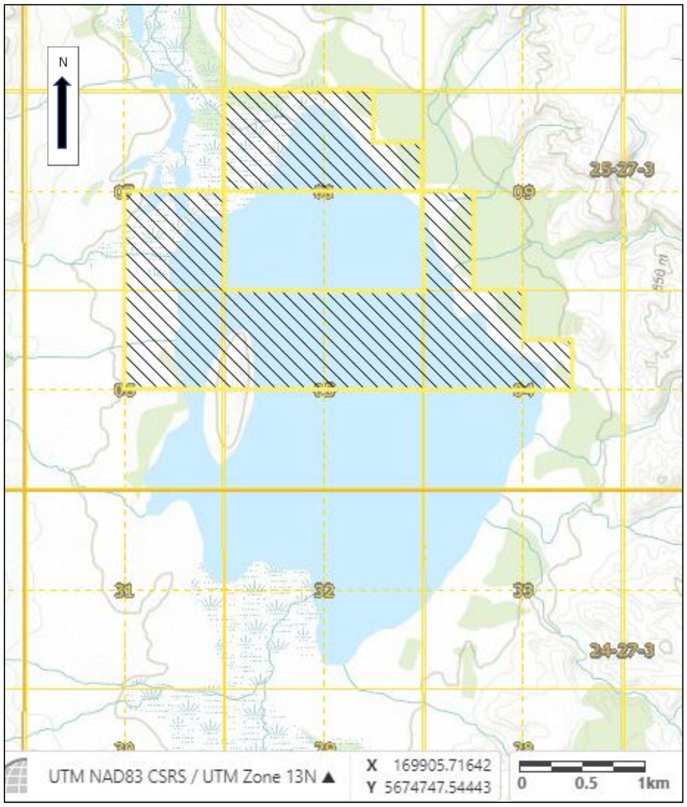


Figure 6--Alkali disposition A-4616, Freefight Lake

Cabri Lake

Cabri Lake is located approximately 30 km NW of the town of Leader, in the RM of Chesterfield, No.261 (Fig 4). The dispositions are plotted on the Saskatchewan township fabric in Figures 7 and 8.

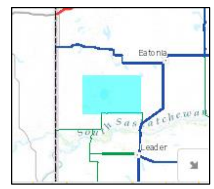


Alkali Disposition A-4613
under the
Alkali Mining Regulations, Saskatchewan

Cabri Lake N

LSDs	Section	TWP	RNG	MER
1,2,7,8	7	25	27	W3
9,10,11,12,13,14,15	8	25	27	W3
9,10,15,16	6	25	27	W3
9,10,11,12,13,14,15,16	5	25	27	W3
4,5	9	25	27	W3
10,11,12,13,14	4	25	27	W3

Location map



Compiled by: Lynn I Kelley, P Geo
13 Oct 2023
LKgeoscience@gmail.com

Figure 7--Alkali disposition A-4613, Cabri Lake north block

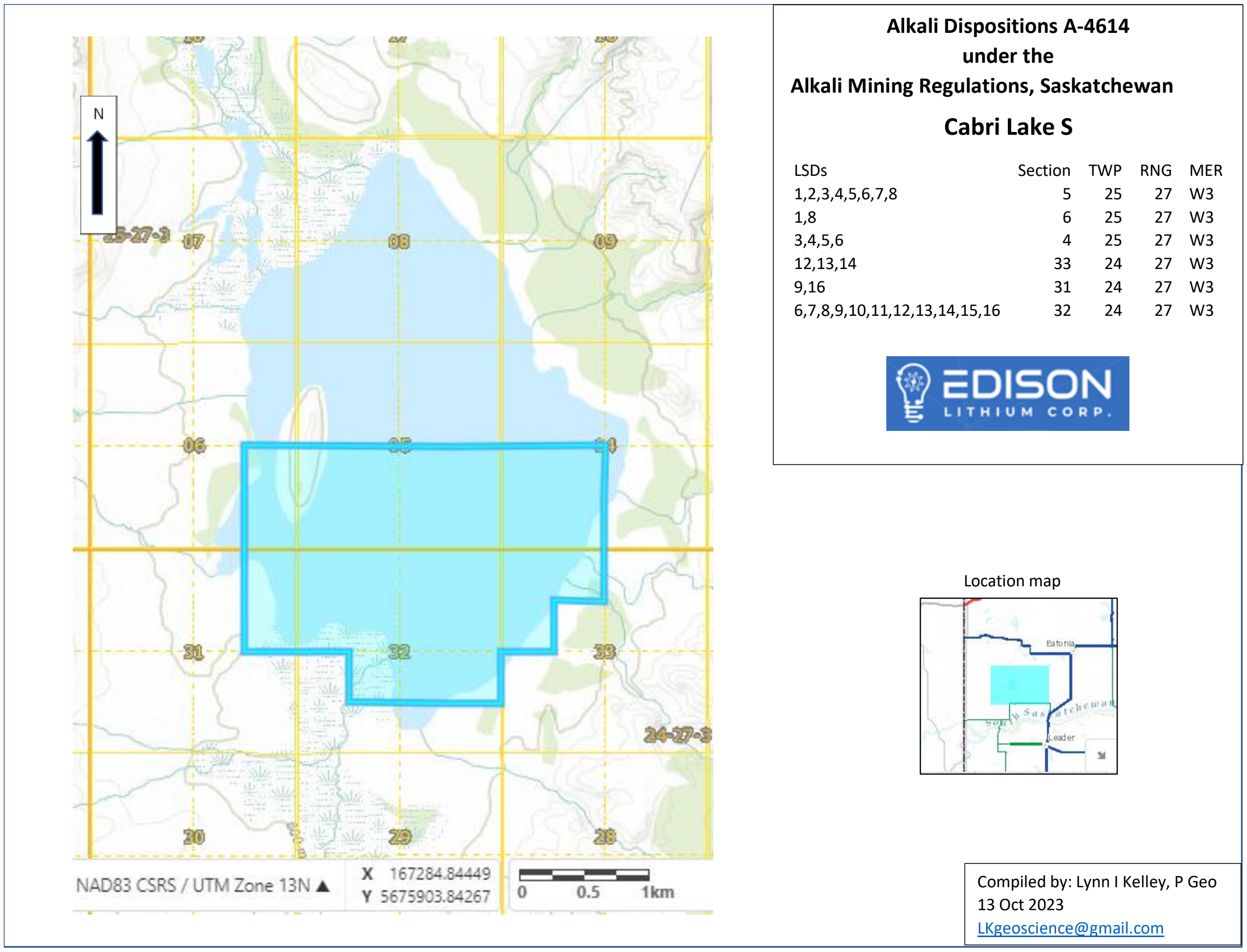


Figure 8--Alkali disposition A-4614, Cabri Lake south block.

4.2. Mineral ownership and burdens

ELC acquired 100% rights to alkali minerals at the Ceylon, Freefight and Cabri properties through the asset purchase agreement executed on 11 July, 2023, subject to a royalty of 2% of gross revenue from commercial production (Edison Lithium Corp., 2023). Alkali disposition A-4593 at Whiteshore Lake was purchased by Globex from the previous lessee and vended to ELC on April 8, 2024, under terms similar to the other four properties (Edision Lithium Corp., 2024).

Under the Alkali Mining Regulations, commercial production is subject to a royalty of 3% payable to the Crown, less royalty credits which include expenditures related to development, including feasibility study, design and engineering, capital costs and transport of capital assets. (Saskatchewan, Gov't of, 1943).

4.3. Surface ownership

The banks and beds of Saskatchewan lakes are owned by the Crown and is considered public (Water Security Agency, n.d.). The land surface surrounding the lakes will need to be accessed to explore and develop resources. Surface ownership around each target lake Is described below:

Whiteshore Lake W

Land ownership in the vicinity of Whiteshore Lake is shown on Figure 9. Cultivated and pasture lands surrounding the lake are held by a multitude of family and corporate owners. The site of the former Millar-Western sodium sulphate plant is marked in blue diagonal hatch. These parcels are now held by Saskatchewan Mining and Minerals Inc.

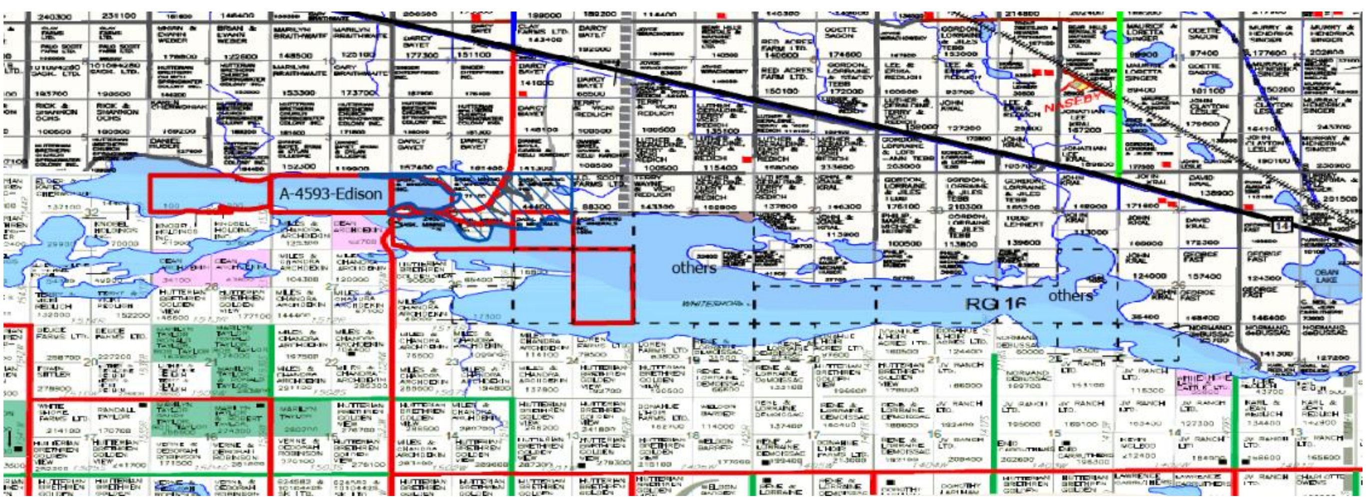


Figure 9--Surface land ownership in the vicinity of Whiteshore Lake. Blue diagonal hatch marks the area of the former Millar-Western plant. After RM maps for RM of Biggar (Rural Municipality of Biggar No. 347, 2023) and RM of Rosemount (Rural Municipality of Rosemount No. 378, 2020).

Ceylon Salt Lake

Land ownership in the vicinity of Ceylon Salt Lake is shown on Figure 10. The lake is located primarily within The Gap Community Pasture. Community pastures provide supplemental grazing for local ranchers. The Gap community pasture is owned by the Saskatchewan government and administered through the Ministry of Agriculture, Lands Branch. The land is managed by a patron board elected by nearby ranchers who send their cattle to graze the pasture in the summer months. The surface title to the northwest portion of the claim block is held by South View Ranch Inc.

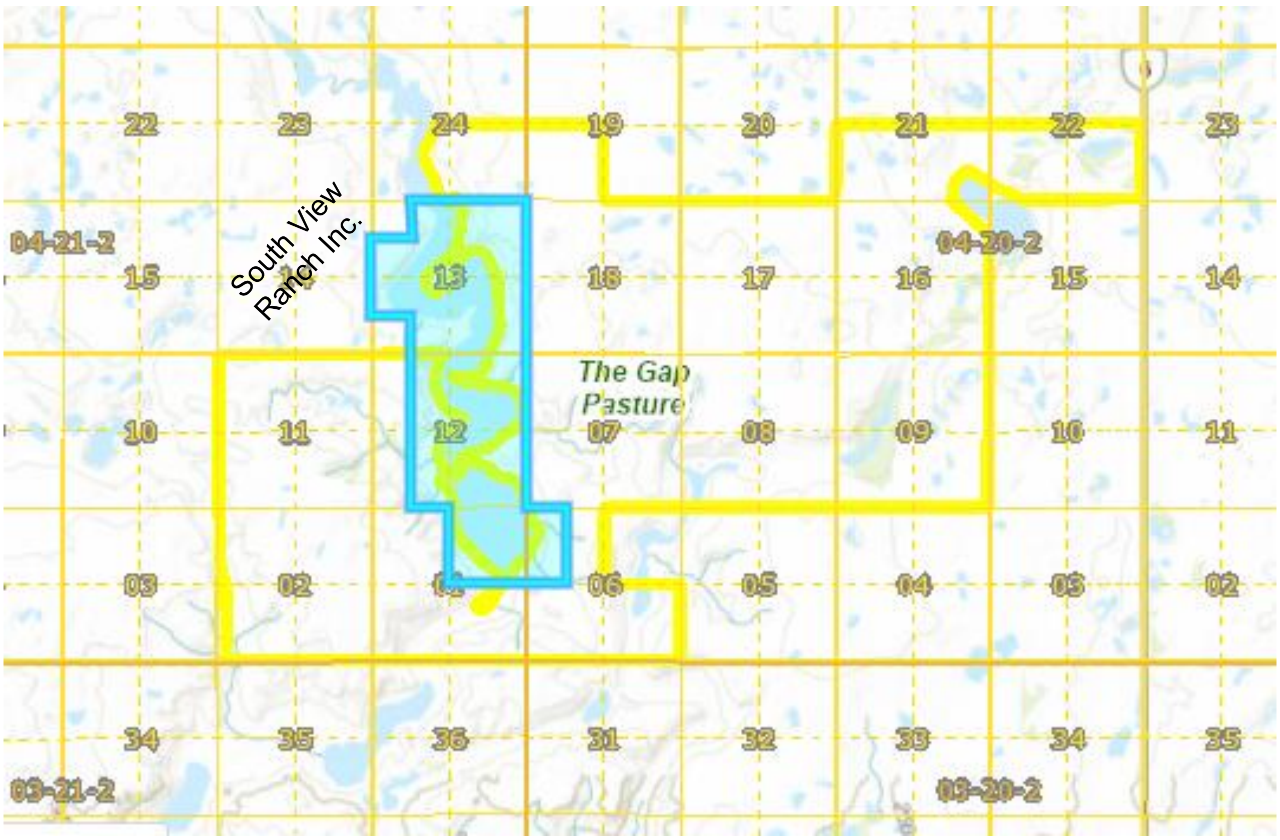


Figure 10--Land ownership on topographic base, Ceylon Lake. Blue is alkali lease Y-4615: yellow outline is border of The Gap community pasture. Land adjacent to NW portion of Y-4615 held by South View Ranch Inc.

Freefight Lake

Land ownership in the vicinity of Freefight Lake is shown on Figure 11. The lake is located entirely within Millie Community Pasture, much of which is designated as WHPA land.

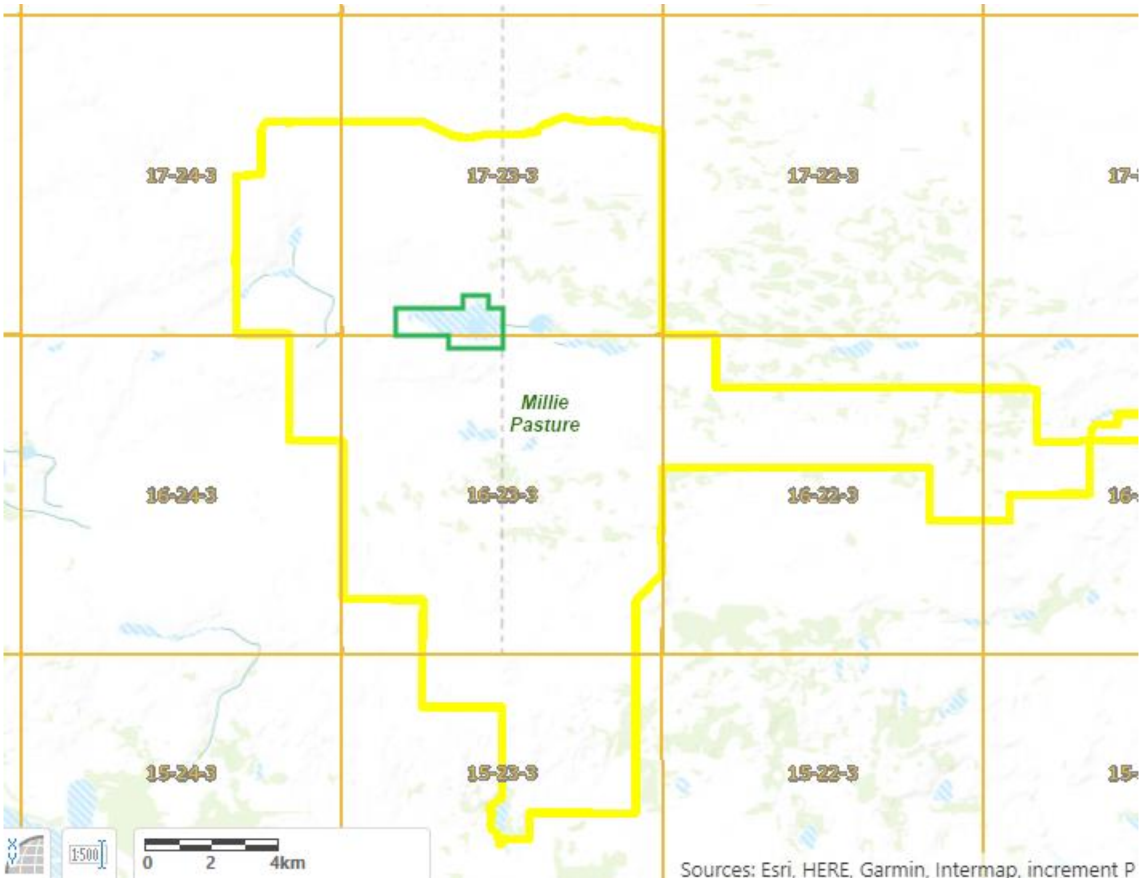


Figure 11--Land ownership in the vicinity of Freefight Lake. Green outline is alkali lease Y-4616. Yellow outline is Millie Community Pasture. The disposition is entirely within the community pasture, most of which is designated as WHPA land.

Cabri Lake

Land ownership in the vicinity of Cabri Lake is shown in Figure 12. All land surrounding the lake is owned by Palmer Ranch Ltd. A block in the middle of the north disposition parcel (Y-4613) is designated as included in the Protected and Conserved Area Network. Minerals in that block are recorded as freehold.

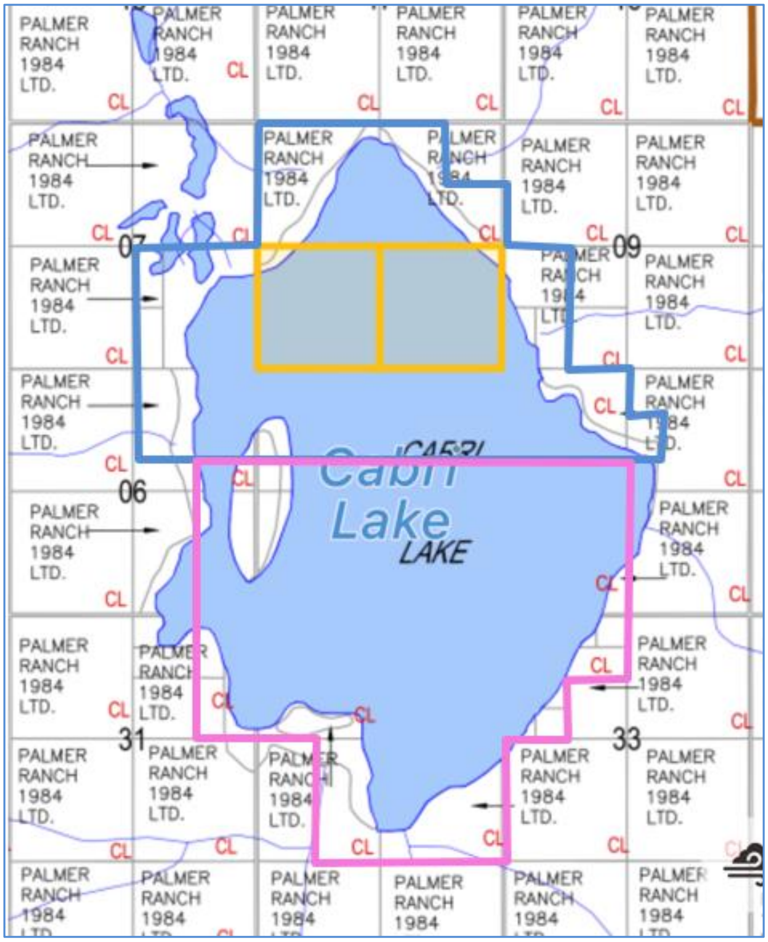


Figure 12--Land ownership in the vicinity of Cabri Lake. Blue outline is alkali disposition Y-4613. Magenta outline is alkali disposition Y-4614. Brown outline and hatch Protected and Conserved Area Network land and freehold minerals..

4.4. Permits, Environmental and Heritage Considerations

This section presents a brief, non-exhaustive, outline of clearances and permits that will be required for exploration of potential resources on the subject properties and environmental and heritage-related considerations that will inform the application for those permits. It is recommended that local technical and legal counsel be sought to navigate what is likely to be a regulatory gauntlet.

4.4.1 Permits

Ministry of Environment (MOE)

In southern Saskatchewan, environmental oversight of mineral exploration has evolved over the last few decades. Protocols are now fairly well established for programs targeting hydrocarbons, coal, and aggregate. However, exploration programs for other commodities, such as alkali minerals or quarriable minerals are relatively uncommon, and MOE has not established explicit protocols for environmental oversight. The author is not aware of any comprehensive commercial exploration of lake-hosted alkali resources for decades.

In the author's recent experience, protocols for other commodities are being adapted by the regulators as needed from those established for oil and gas projects, in consultation with the Ecological Management Specialist in MOE Lands Branch for the relevant MOE district. Those protocols are outlined below, leaning on the MOE document "Environmental Review Guidelines for Oil and Gas Activities" (Saskatchewan Ministry of Environment, 2022).

Exploration programs in general are subject to review by the Lands Branch of MOE. Programs conducted on Crown land require a project proposal and clearance by the Lands Branch before proceeding. Programs on private lands considered non-sensitive are subject to screening using a "Private Lands Checklist" developed by MOE. Programs on private lands considered environmentally sensitive require a project proposal and clearance from the Lands Branch as would a program on Crown land.

The land adjacent to Whiteshore Lake is privately held, and there is public road access to several potential lake access points. However, as mentioned in Section 4.2, the banks and lakebed are property of the Crown, and as such, MOE Lands Branch clearance would be required.

The land adjacent to Ceylon Salt Lake and Freefight Lake is Crown land, so it is likely that a project proposal and clearance from Lands Branch of MOE would be required to conduct exploration. The land adjacent to Cabri Lake is privately held, but the presence of a block of Protected and Conserved Area Network land in the middle of the lake makes it likely that the area would be considered environmentally sensitive and thus exploration would likely require a project proposal and Lands Branch clearance.

Ministry of Agriculture (AG)

As both Ceylon Salt Lake and Freefight Lake are within community pastures, Ag would likely be the lead agency in seeking access to land adjacent to those lakes. As with MOE, protocols are not explicit for mineral exploration and are adapted from hydrocarbon and aggregate programs. AG would, as part of the application process, expect the project proponent to obtain the consent of the community pasture patron board.

Water Security Agency

Saskatchewan shorelines are protected by The Environmental Management and Protection Act, 2010 (EMPA). Under EMPA, any person planning work near water may need an Aquatic Habitat Protection Permit. In general, the water protection provisions of EMPA are designed to protect drinking water and other valued ecosystem components from discharge of pollutants. It is unclear how EMPA would be applied to evaluating a salt lake resource, and again, no exploration has been done on these resources since long before EMPA was enacted.

Heritage Conservation Branch-Ministry of Parks, Culture, Heritage and Sport

The applications for MOE and AG typically require screening through this branch to assess the likelihood of archaeological and/or paleontological resources being present on a parcel of land.

4.4.2 Environmental Considerations

The Ceylon, Freefight and Cabri properties occupy closed basins within grasslands which are managed, as community pastures or private pastures, for cattle grazing. The lands are in whole or large part native prairie—a grassland ecosystem within the Prairie Ecozone. Grasslands are considered a threatened ecosystem, making them a conservation priority in North America (Prairie Conservation Action Plan, 2023). Any modification of native prairie during exploration, including upgrade of access trails would require adherence to strict protocols, including segregating soil horizons and storing soils for future remediation. Reclamation on crown agricultural land is required to follow the Restoration of Saskatchewan Agricultural Crown Rangeland Guidelines (Saskatchewan Ministry of Agriculture, 2019)

One of the tools used for environmental screening is an online GIS product maintained by MOE, the Hunting, Angling, and Biodiversity Information of Saskatchewan (HABISask) application. The author completed HABISask project screening reports for each of the subject properties, including a 1 km buffer from the property boundary. The results are summarized below.

Whiteshore Lake W

Whiteshore Lake occupies a closed basin which is surrounded by privately-owned agricultural land, both cultivated and pastures. Whiteshore Lake was, for some 80 years, a site of sodium sulphate production. Whiteshore Lake is recognized as a migratory bird concentration site. It appears that lakebed on the eastern part of the lake may be enrolled in WHPA. No critical habitat is noted in the HABISask project screening report. Figure 13 summarizes the HABISask screening.

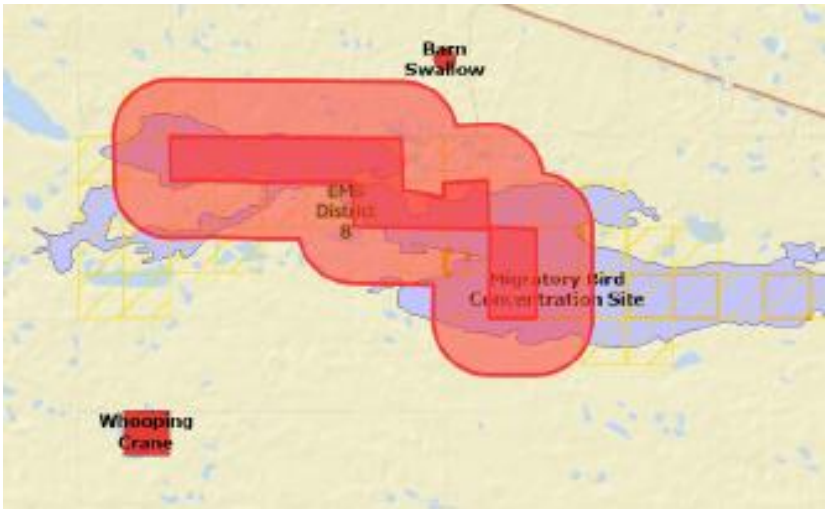


Figure 13—HABISask results map for Whiteshore Lake W

Ceylon Salt Lake

Most of The Gap community pasture is enrolled as Protected and Conserved Area Lands (Figure 14). The NE quarter of Section 13 is enrolled as WHPA land.

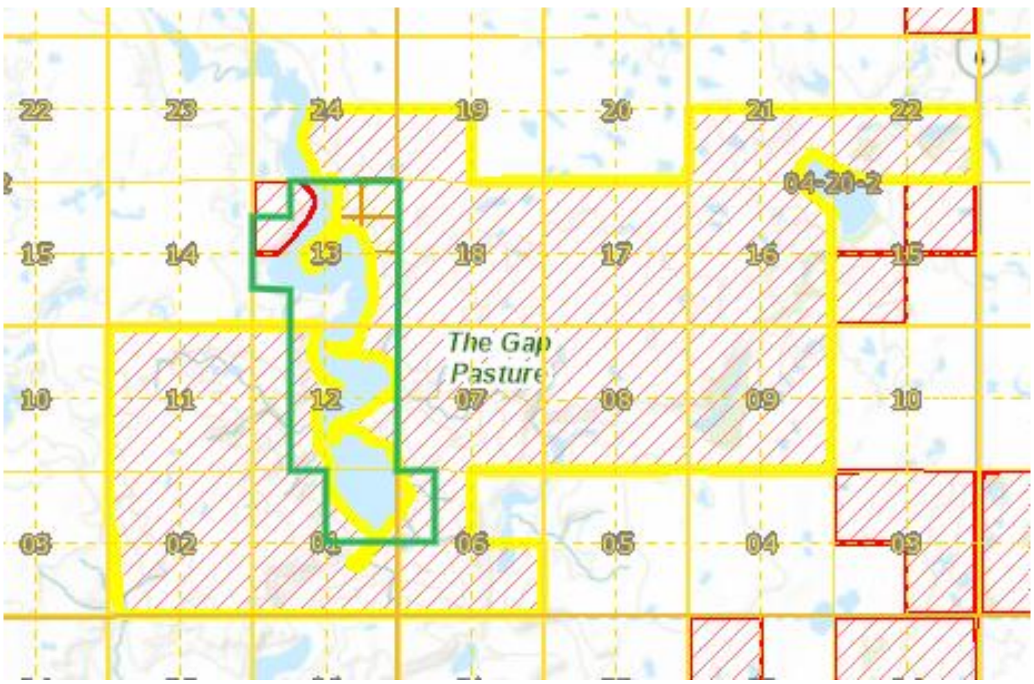


Figure 14--Conservation lands near Ceylon Salt Lake. Boundary of alkali lease Y-xxx in green outline. Community Pasture boundary in yellow. Protected and Conserved Area Network in red hatch.Brown hatch in NE13 is WHPA land.

Figure 15 summarizes results of the HABISask project screening report. Rare and endangered species recorded as observed in the vicinity include Baird's Sparrow, Barn Swallow, Common Nighthawk, Piping Plover and Sprague's Pipit. The shore of Ceylon Salt Lake is identified as sensitive habitat for Piping Plover.

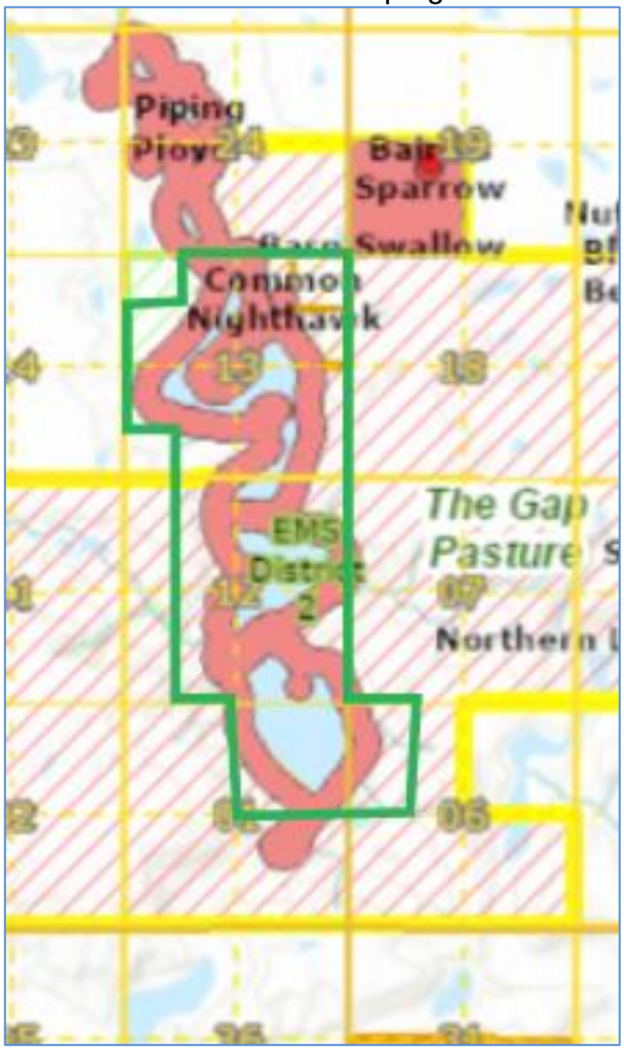


Figure 15--HABISask results map for Ceylon Salt Lake. Species observations noted as posted on map. Shoreline of Ceylon Salt Lake is considered to be potential habitat for Piping Plover.

Freefight Lake

Freefight Lake lies entirely within the Millie Community Pasture. Effectively the entire pasture is enrolled as both WHPA and Protected and Conserved Area Network (Figure 16). Rare and endangered species recorded as observed in the vicinity include Low Pussytoes, Baird's Sparrow, Chestnut-collared Longspur, Great Plains Toad, Lark Bunting, Long-billed Curlew, Piping Plover, Red-headed Woodpecker and Sprague's Pipit. The shore of Freefight Lake is identified as sensitive habitat for Piping Plover.

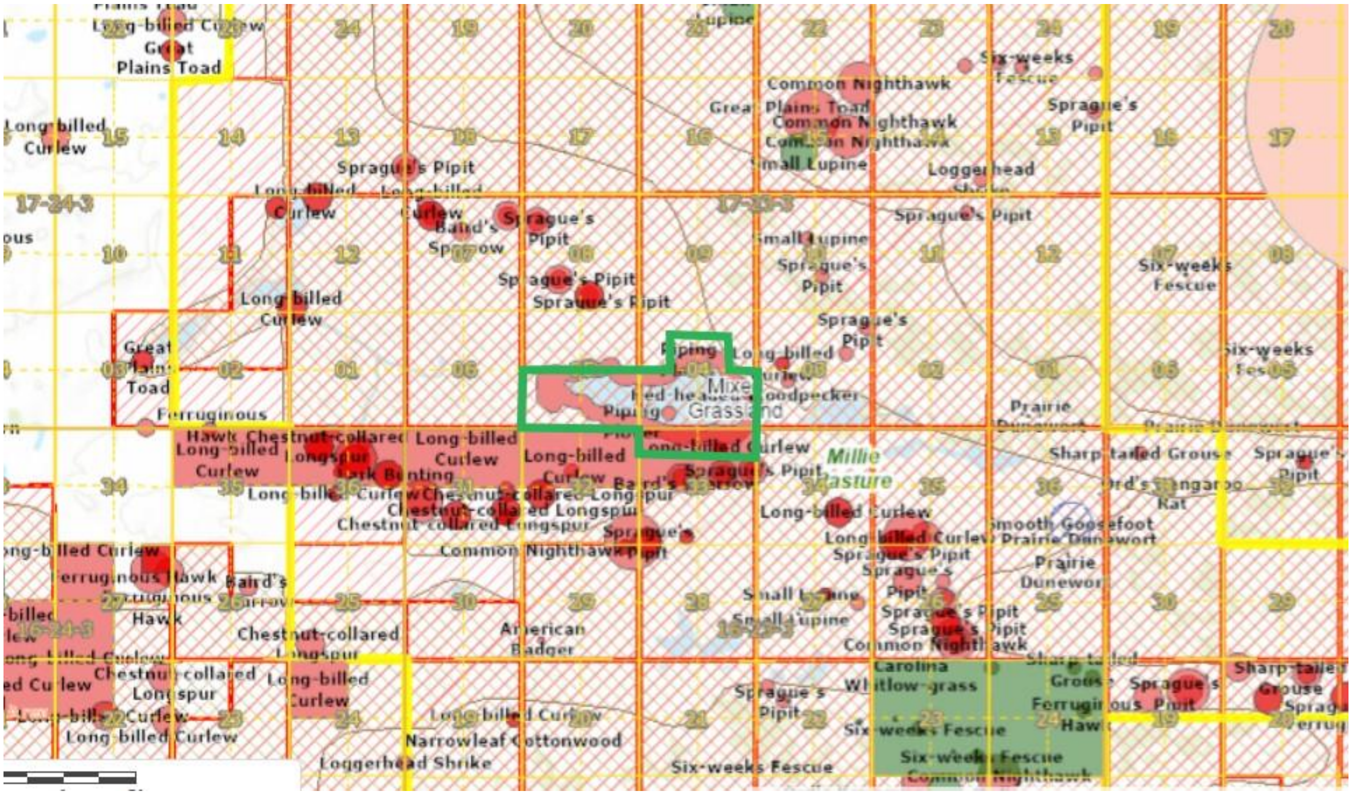


Figure 16--HABISask results for Freefight Lake area. Essentially the entire community pasture is WHPA and PACN land.

Cabri Lake

HABISask results for the vicinity of Cabri Lake are summarized in Figure 17. Most of the land on the east side of the lake is enrolled as WHPA land. Cabri Lake is noted as a Migratory Bird Concentration Site. Rare and endangered species recorded as observed in the vicinity include Powell's Saltbush and Burrowing Owls. Numerous burrowing owl occurrences are noted south and east of the lake.

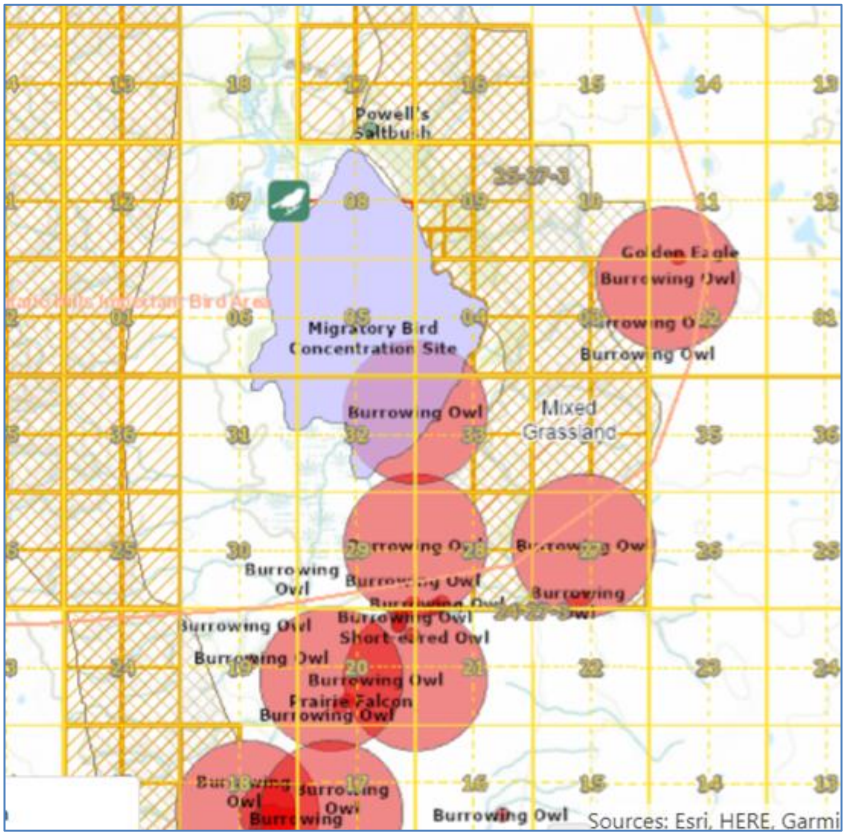


Figure 17--HABISask results for Cabri Lake. See Figure 12 for location of Alkali dispositions and PACN land. Brown hatch is WHPA land, Cabri Lake noted as a migratory bird concentration site.

4.4.3 Heritage Considerations

Heritage Conservation Branch of the Ministry of Parks, Culture and Sport offers a GIS application, the *Developer's Online Screening Tool*, as a planning tool to identify heritage-sensitive areas. A Heritage Sensitivity Screening Report was generated for each of the four subject properties. All four screened as Heritage Sensitive, so that further review by the Heritage Conservation Branch would be required.

4.5. Summary, Environmental and Heritage Considerations

The environmental and heritage considerations outlined above will present challenges to evaluation and development of the subject properties. It is recommended that ELC retain technical and legal counsel versed in obtaining access to public land for the purpose of mineral exploration and evaluation.

5. Access, Climate, Local Resources, Infrastructure, Physiography

5.1. Access, Local Resources and Infrastructure

As the site of a past-producer, Whiteshore Lake W enjoys well-developed access and infrastructure. Ceylon Salt Lake, Freefight and Cabri are relatively far from infrastructure and accessible only by ranch trails which would require considerable improvement to accommodate any sort of commercial traffic.

Whiteshore Lake W

Whiteshore Lake is bisected by and accessible via Provincial Hwy 53, south from Provincial Hwy 14, about 20 km west of the town of Biggar (Fig 18). Located about 100 km west of Saskatoon, Biggar, home to some 2200, is a regional agricultural hub and rail maintenance center and is the administrative center for the RM of Biggar. Banking, accommodations, fuel, food services, and industrial services are readily available.

The main Canadian National rail line parallels Hwy 14, and a rail spur runs south to the now-abandoned Palo plant site. The Canadian Pacific rail line lies a few km north of Hwy14. Major gas transmission and electric power lines also parallel Hwy 14 and service runs to the Palo site.

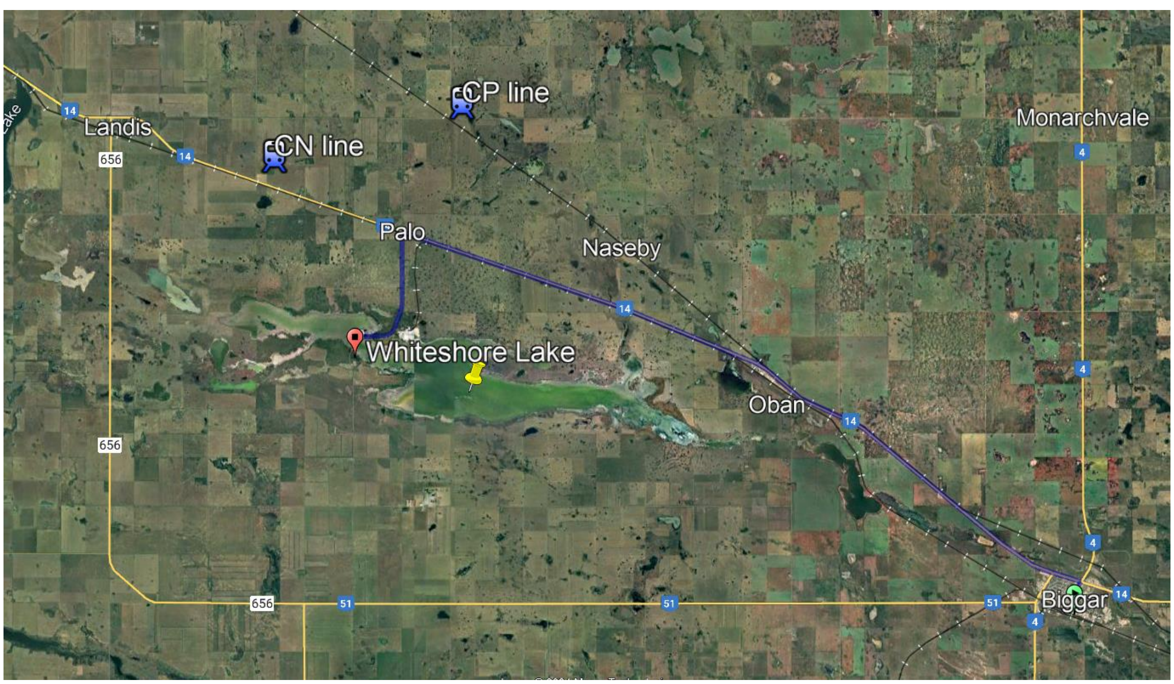


Figure 18—Access to Whiteshore Lake

Ceylon Salt Lake

Ceylon Salt Lake is accessible via a gravel road leading west from Provincial Highway 6, about 12 km south of the village of Ceylon and along ranch trails within the community pasture (Fig 19). From the end of the trail indicated on Figure 19, a ranch trail leads south along the east shore of the lake, toward building foundations at the south end of the lake which are presumed to be remnants of the historic plant.

Ceylon, is a village of about 100, located 110 km south of Regina along SK Highway 6. Ceylon is the administrative center for the RM of The Gap. Power and natural gas service is available in the village of Ceylon, but utility maps suggest that commercial-grade service is not available south of the village. The village is on the CP Radville branch which originates at Bengough and runs northeast through Ceylon to join the CP main line at Weyburn, with access to destinations across North America.

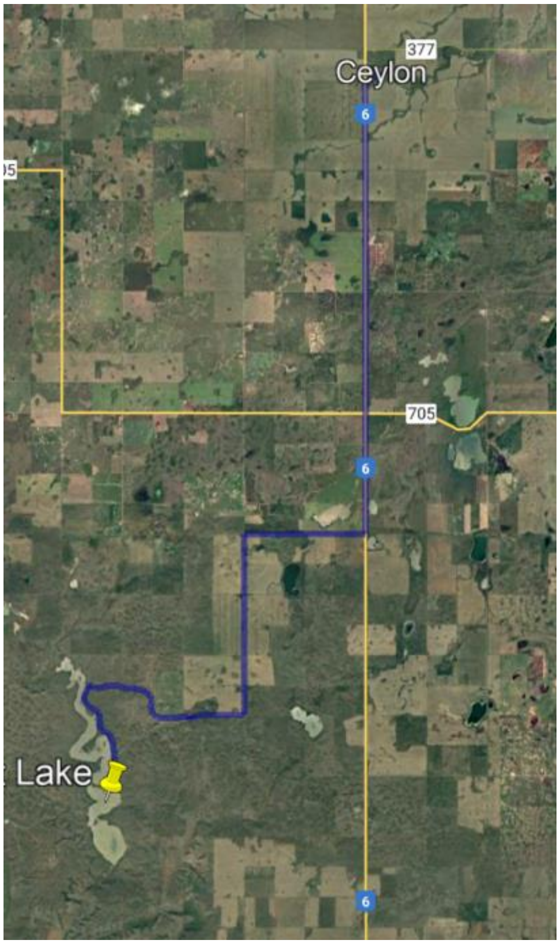


Figure 19--Access to Ceylon Salt Lake.

Freefight Lake

Freefight Lake is accessible from the village of Fox Valley via SK Provincial Highway 21 (Fig 20). Township Road 172 leads west from a point on Hwy 21 approximately 4 km south of the village of Fox Valley. Approximately 11 km east of Hwy 21, Range Rd 3250 leads south for 3 km to the intersection with Twp Rd 170, which turns into a community pasture trail that leads to the south shore of Freefight Lake.

Fox Valley is a community of about 250 just west of the Great Sand Hills. Much of the land is under cultivation, but the sand hills are entirely rangeland. Natural gas production is prolific in the area. Power is available at nearby Ingebrigt Lake, a past producer of sodium sulphate. The nearest rail is the CP Hatton Spur, which terminates at Golden Prairie, about 40 km by road southwest of Fox Valley. The Hatton Spur joins the main East-West CP line at Hatton, a virtual ghost town a few km to the south and near the Alberta border. The Hatton Spur was scheduled to be discontinued in August 2024 (CP Rail, 2022).

Figure 20--Access to Freefight Lake from Fox Valley

Cabri Lake

Cabri Lake is accessible through ranch roads leading north from Highway 635, as shown in Figure 21. The lake is approximately 42 road-kilometres northwest of Leader, a town of about 850, which serves as a regional hub.

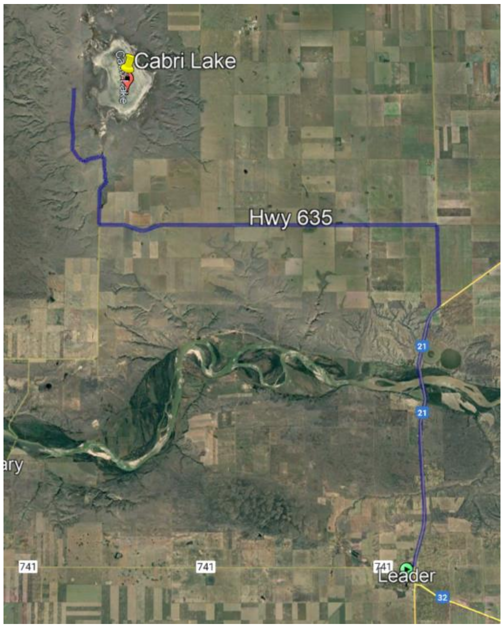


Figure 21--Access map for Cabri Lake

5.2. Climate

Natural sodium sulfate deposits occur in many shallow hypersaline lakes in in the Great Plains of southern Saskatchewan, northwestern North Dakota, northeastern Montana, and east-central Alberta. The deposits are generally recognized to be post-glacial accumulations, developed on thick glacial till, in internally drained basins (Tomkins, 1954; Last & Schweyen, 1983; Broughton, 1984; Last & Slezak, 1987b)

Overall, the Great Plains experience a cold continental climate, with daytime highs below -30º C in winter and above +30º C in summer. As an example, mean daily high temperature during January in Swift Current, Saskatchewan, is about -18º C; during July it is +25 ºC. However, significant variations do exist because of the large geographic area and local relief.

One of the most important climatic factors in helping to create and maintain the saline lakes of this region is the high evaporation/precipitation ratio. Average annual precipitation for the Canadian Great Plains for the period 1961-1990 is shown in Figure 22 and the average number of dry days per year for the same period is shown in Figure 23. Southern Saskatchewan is very dry, with less than 350 mm of precipitation and 270 to more than 290 dry days per calendar year.

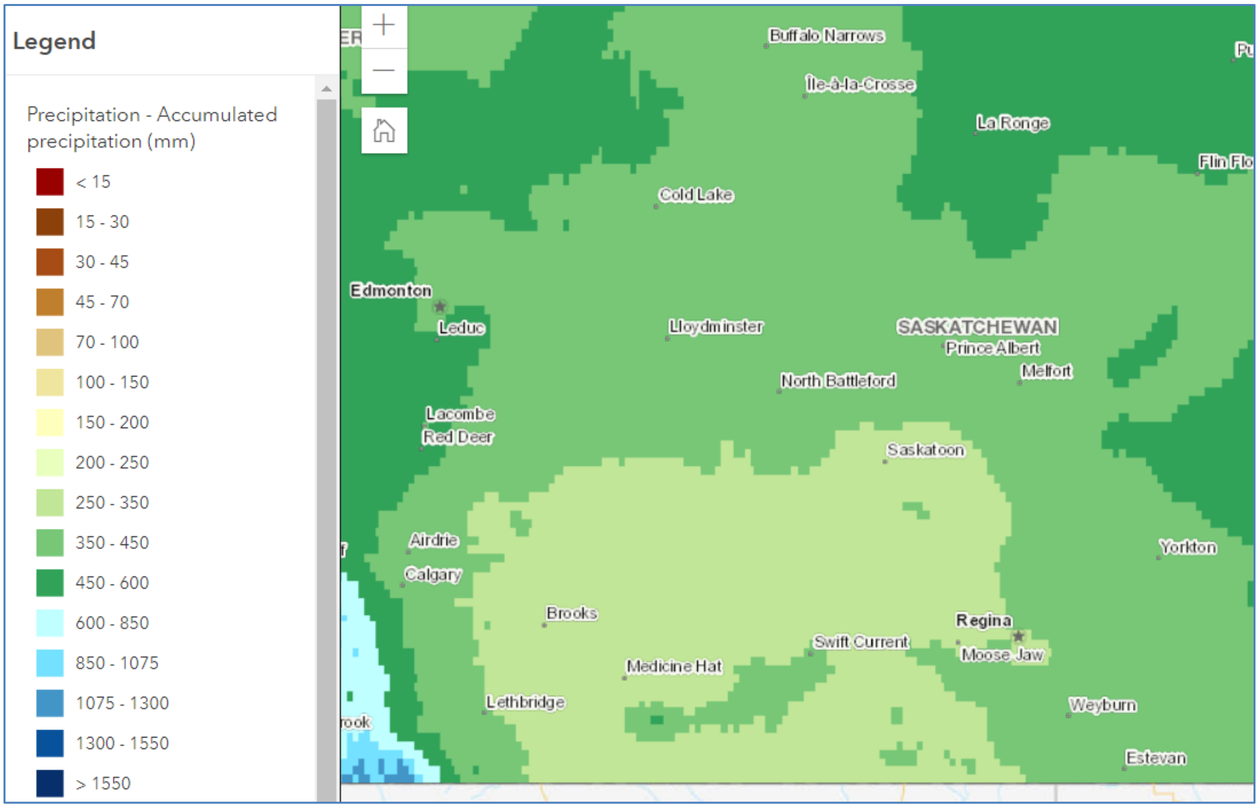


Figure 22--Average precipitation, in mm per year for the Canadian Great Plains, 1961-1990. From (Agriculture Canada, n.d.)

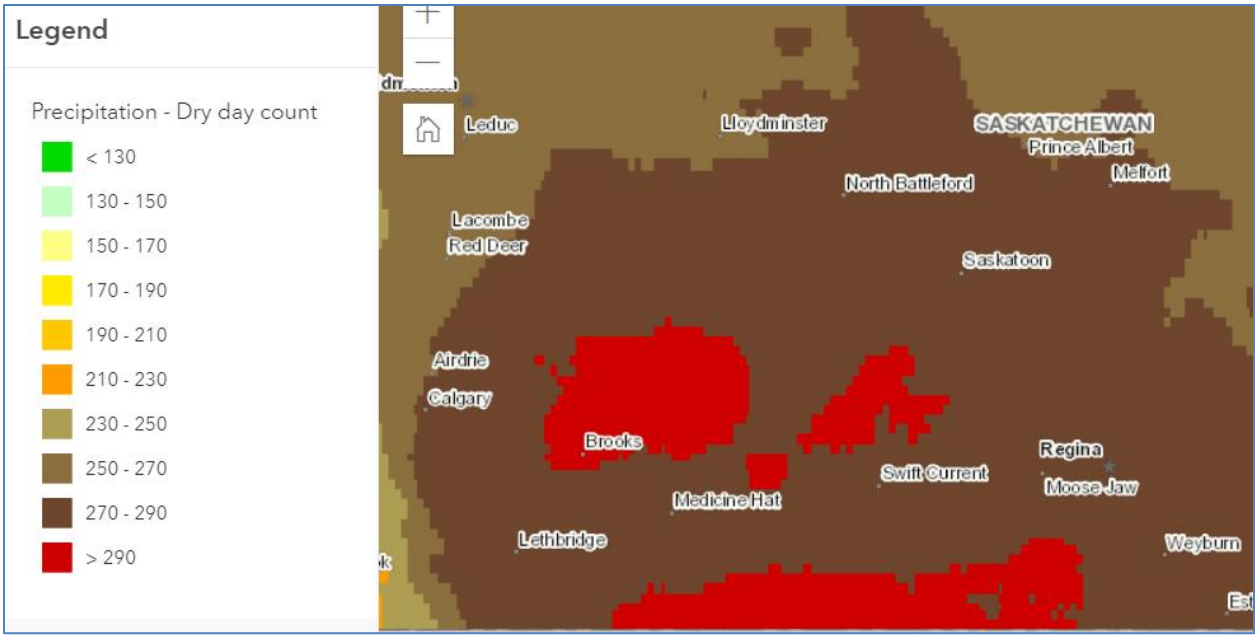


Figure 23--Map of Canadian Great Plains showing average number of dry days per year for the period 1961-1990. From (Agriculture Canada, n.d.)

Figure 24 is a map of potential lake evaporation rates estimated by a pan evaporation survey conducted as a part of the compilation of the Hydrologic Atlas of Canada. The map shows evaporation rates exceeding 900 mm per year, or about three times the annual precipitation rate in the region.

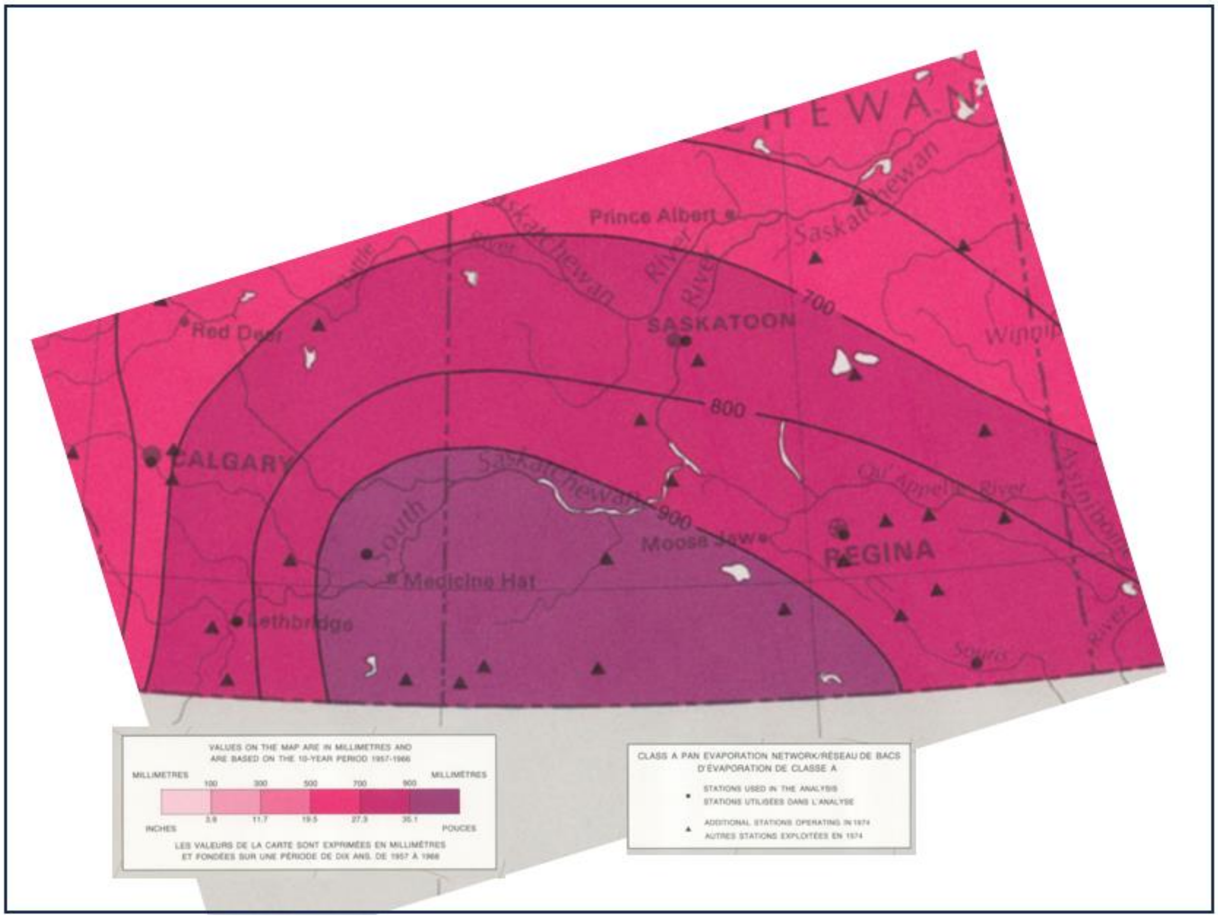


Figure 24--Map of the Canadian Great Plains with estimated lake evaporation rates in mm per year. Rates based on evaporation pan network operated 1957-1966. From (Natural Resource Canada, 2022)

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5.3. Physiography

The northern Great Plains are characterized by hummocky to gently rolling topography interspersed with numerous deep, often terraced, valleys that have been cut by glacial meltwater. The Missouri Coteau, a major topographic feature of the region, is a distinct 50-100 km wide band of knob and kettle topography that extends for over 1200 km through this area from central South Dakota northwestward into central Saskatchewan.

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6. History

Whiteshore Lake W.

Cole (1926) recognized the significance of the sodium sulfate resources at Whiteshore Lake and its favourable location near rail. He assayed brine, permanent crystal bed and intermittent crystal bed, and mapped the extent and thickness of the crystal beds by completing 27 core holes throughout the lake. Cole also reported chemical analysis of the crystalline material, lake brine and discharge from both freshwater and brine springs within the lake basin. Cole's results and other historical exploration results will be summarized in Section 10.

Cole (1926) does not mention commercial exploration or development, but no doubt his thorough description of the potential resource led to interest which culminated in establishment of what came to be known as the Palo Mine. Tomkins (1954) records Canadian Salines Ltd. as operating in 1931 on leases held by Whiteshore Salts and Chemicals. In 1934 the operator is shown as Midwest Chemicals Ltd., still on Whiteshore Salts and Chemicals leases. Broughton (1984) mentioned production at since 1934 at Whiteshore Lake by Midwest Chemicals. Broughton lists the capacity of the plant in 1984 as 90,000 tonnes per year.

Canadian Salines and Midwest Chemicals (and perhaps Whiteshore Salts and Chemicals) were apparently interests of J.W. Millar and were, along with other Millar interests, combined as Millar-Western Industries in 1981 (Millar Western Industries, 2024).

The 1990s and early 2000s saw the producers of natural sodium sulfate under increasing pressure from sodium sulfate produced as a by-product in the manufacture of copper chrome arsenate (a wood preservative used in green pressure-treated lumber) and lead-acid battery recycling. From a dozen or so operations in the early 1980s, the Saskatchewan industry dwindled to a few. Millar-Western shuttered the Palo Mine in approximately 2003.

Following Millar Western's withdrawal from the sodium sulphate business, the plant was operated by Zeox Corporation for a few years. Zeox, affiliated with Nanostructured Minerals Inc., was focused on using the sodium sulfate as a feedstock for the creation of synthetic zeolite minerals. The author believes several other entities tried to resurrect the operation, but failed. The plant site is currently held by Saskatchewan Mines and Minerals. Most of the plant buildings were removed or demolished in approximately 2021.

Ceylon Salt Lake

Ceylon Salt Lake is the only other disposition in the Edison portfolio with a history of previous operation. According to Tomkins (1954), small shipments of Glauber's salt were shipped from Ceylon Salt Lake prior to 1934 when Sodium Sulphate

Company of Saskatchewan was organized, and a plant constructed for processing intermittent crystal harvested by scrapers. A refining process involving steam resulted in poor product recovery and the plant apparently ceased operations in 1936, although other sources suggest it operated into the 1950s. Two concrete foundations remain at the south end of the lake, which are presumed to be the remnants of the plant.

7. Geological Setting

7.1. Regional Geology

Southern Saskatchewan and adjacent parts of Montana, North Dakota and Alberta are underlain by a thick (in excess of 1000 m) sequence of nearly-horizontal sedimentary rock. The Paleozoic section consists predominantly of carbonates and evaporites, whereas the Mesozoic rocks are dominantly marine clastic sedimentary rocks. The Cenozoic section is composed of nearshore and terrestrial clastic sedimentary rocks. The region was subjected to multiple episodes of glaciation during the Pleistocene. The unconsolidated glacial, glaciofluvial and glaciolacustrine sediment (drift) that mantles the bedrock is over 300 m thick in places, and averages about 100 m thick in southern Saskatchewan (Simpson, 1997). The drift is derived primarily from the Cretaceous marine shale (principally the Bearpaw Formation) that underlies the southern part of the province, with varying proportions of the Paleozoic carbonates and Precambrian crystalline rocks that crop out in the northern part of the province. During deglaciation, meltwater carved numerous channels and spillways in the glacial sediment.

Collapse structures caused by the dissolution of Paleozoic evaporites, most notably from the Devonian Prairie Evaporite, have disrupted the horizontal continuity of the underlying stratigraphy over much of southern Saskatchewan (Christiansen, 1967a; Broughton, 1988). Furthermore, the bedrock surface was strongly modified by riverine erosion that took place prior to the onset of Pleistocene glaciation (Christiansen, 1967b). Witkind (1952), Grossman (1968) and Rueffel (1970) noted that alkali lakes often occupy elongate surface depressions that overlie pre-glacial drainage valleys.

7.2. Geologic Setting of Sodium Sulfate Deposits

It is widely accepted that evaporitic enrichment of surface water and groundwater inputs to lake basins is the primary process of sulphate salt accumulation. Early authors (Cole, 1926; Witkind, 1952; Rueffel, 1970; Tomkins, 1954) agreed on basic observations that:

- the sodium sulfate deposits of the northern Great Plains generally occupy internally-drained basins, that is drainage basins with no defined outlet.
- the area in which the deposits is exceedingly dry, with evaporation

exceeding precipitation by three times or more (see section 5.2).

- springs or seepages are generally present beneath the lake bed or proximal to the lake shore.
- the sodium sulfate deposits of the northern Great Plains are post-glacial, that is they began forming following the most recent retreat of glacial ice from the area, about 17,000 to 13,000 years ago. Tomkins (1954, p. 50) described a thought experiment in which he concluded that 12,000 years would be sufficient time for a deposit of 3 million short tons (2.7 million tonnes) of sodium sulfate to accumulate in a hypothetical closed basin receiving 100 gallons per minute (380 lpm) of spring water containing 1000 ppm of sodium sulfate.

Most authors have noted that the deposits are located in areas of active groundwater discharge, as manifested by springs and seeps peripheral to the lakes and in the lake beds However the ultimate source of the salts and the role of lake–groundwater exchange in salt accumulation and loss has not been well understood.

Several hypotheses have been advanced regarding the ultimate source of ions and the scale of groundwater flow systems that transport those ions to discharge at the deposits. McIlveen & Cheek (1994) summarized the hypotheses proposed by previous workers on the sources of dissolved Na+ and SO4= ions as follows:

(1) till (derived primarily from underlying Cretaceous marine shales) containing abundant smectite with exchangeable sodium,
(2) Cretaceous or older marine rocks containing bentonite with exchangeable sodium .
(3) connate water from marine rocks, and
(4) dissolution of deeply buried (>1000 m) Paleozoic evaporites.

Flow systems that previous workers have cited as potential agents for the transport of ions to the surface include:

(1)Meteoric waters flowing over the land surface (runoff)
(2) Shallow flow systems, involving groundwater of Recent (meteoric) origin and/or Pleistocene (glacial) origin that circulates through fractured till and/or intertill aquifers
(3) Flow systems of intermediate depth that involve Recent meteoric water, Pleistocene water, or Cretaceous connate water
(4) Deeply-circulating flow systems involving Paleozoic connate water or water that dissolved salt from the Devonian Prairie Evaporite or other evaporites in the Western Canada Basin.

Grossman (1968) described the spatial association between sodium sulfate deposits of the northern Great Plains and the subcrop of the Prairie Evaporite and suggested that the distribution of sodium sulfate deposits may be related to postdepositional removal of salt from the Prairie by solution.

Last and Slezak (1987b) found Paleozoic evaporites to be an unlikely source of because of incompatible chemistry. Kelley and Holmden (2001) corroborated this finding, based on stable isotope results from springs, seeps and shallow wells near sodium sulfate deposits. Both δD and $\delta^{18}O$ were very depleted compared to data reported for deeper saline Paleozoic aquifers. Bentley, *et al*. (2016) employed hydrogeological, hydrochemical, isotopic and geophysical methods at Lydden Lake. The study concluded that shallow aquifers transmit locally recharged, relatively fresh groundwater toward the lake and that lake brine intrudes landward under a density drive as well as mixing with groundwater from deeper sources. The bi-directional exchange of fresh and saline groundwater along the lakeshore controls the rates of input of dissolved sulphate by fresh groundwater and output by saline water moving out of the lake.

8. Deposit types

Three types of sodium sulfate accumulations are recognized in saline lakes of the northern Great Plains.

(1) As lake brine.

(2) As beds of intermittent crystal, deposited from the brine in autumn as the ambient temperature cools. Intermittent crystal re-dissolves the following spring with dilution of the brine by runoff from the Spring snow-melt.

(3) As permanent beds of mirabilite mixed with other salts, clastics, and organic sediment. The permanent crystal beds are typically 1–5 m thick, but exceed 30 m in a few deposits.

High evaporation rates during the summer month concentrate brines, often to the point of saturation and precipitation of mirabilite crystals (Fig. 25). Water is found in some lakes only during the spring, otherwise the lake beds are salt flats. Evaporation of brine is only partly responsible for formats of salt beds. The solubility of sodium sulfate in water is very high at summer temperatures and decreases dramatically with cold temperatures (Fig. 26), causing precipitation of mirabilite. Repetition of this seasonal cycle is thought to have led to the thick beds of permanent crystal in some locations (Broughton, 1984).

Figure 25—Intermittent crystal rafts in early summer, an example from Corral Lake. Evaporation has increased concentration of salts to saturation, precipitating mirabilite.

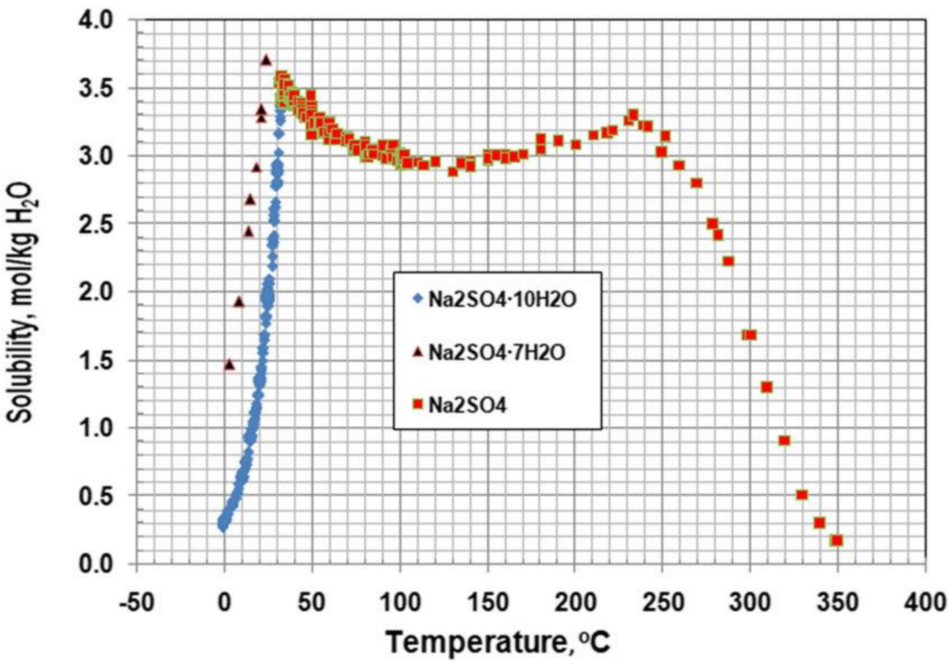

Figure 26--Solubility of sodium sulfate vs temperature. From (Krumgalz, 2018)

Figure 27 illustrates schematically the three types of sodium sulfate accumulations and mining methods historically employed at Saskatchewan operations. Most Saskatchewan companies that mined Na_2SO_4 pumped brine into crystallization ponds (process 1 on Figure 27), where it is concentrated by evaporation over the summer. In the fall, as the ambient temperature cools, Glauber's salt (the commercial name for mirabilite) crystallizes and accumulates on the pond liner. The pond is then drained of any remaining liquid, and the Glauber's salt is harvested from the pond.

Solution mining (process 2 on Figure 24) was carried out for a few years at Ingebrigt and at Metiskow in Alberta, but was eventually abandoned in favour of dredging (Broughton, 1984) At least two operations, Ingebrigt and Ormiston, mined the lake bed using a dredge- mounted excavator (process 3).

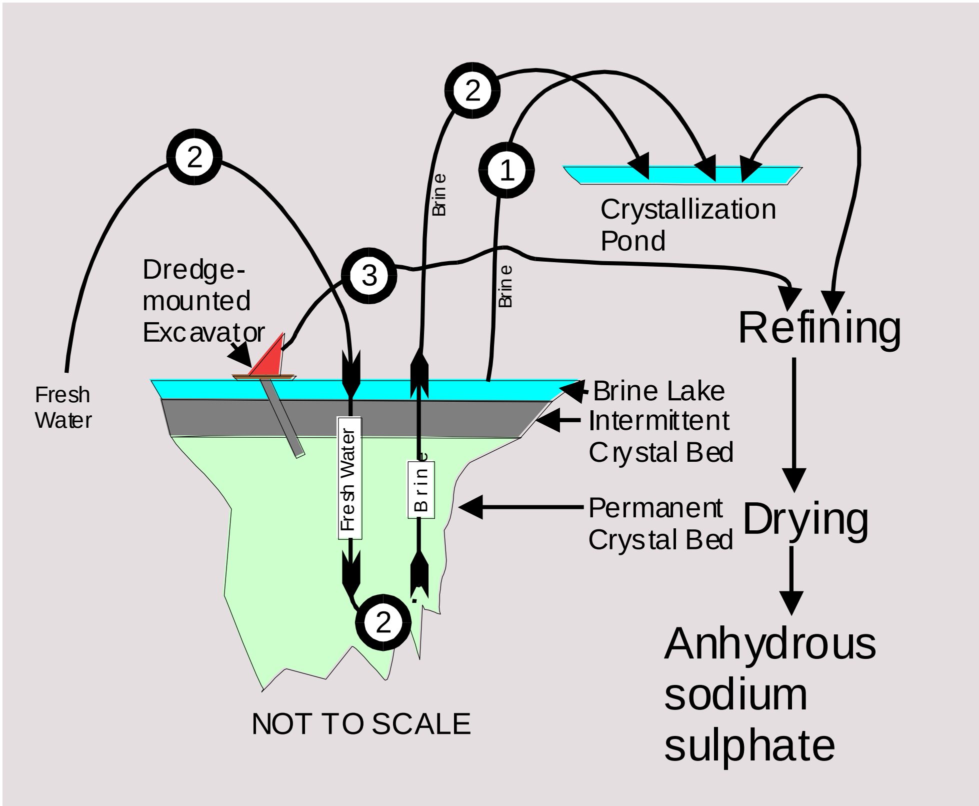

Figure 27--Schematic cross-section of idealized Saskatchewan sodium sulfate deposit. Mining methods illustrated are: (1) Evaporative concentration of lake brine in crystallization pond, followed by precipitation of Glauber's salt (mirabilite as the brine cools in autumn; (2) Solution mining of thick crystal beds. The brine is treated as in 1; and (3) Excavation of lake-bottom crystal beds (Kelley & Holmden, 2001).

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9. Historic Exploration

The mineral potential of alkali lakes and sloughs occurring in the Great Plains was first investigated during World War I, in a search for potash for munitions manufacture. Many claims were staked, and and many samples of brines and salts were analyzed. No significant quantities of potash were discovered, but the prospecting demonstrated the occurrences of sodium compounds in the alkali lakes, particularly sodium sulfate (Cole, 1926).

At the end of the war, in 1918, reports of a large deposit of potash-bearing salts led to a staking rush which covered nearly all the saline lakes and sloughs across the Prairie provinces. When the discovery could not be substantiated, nearly all the dispositions were allowed to lapse (Cole, 1926).

Immediately after the war, the Canada Department of Mines launched a four-year (1921-1924) research program to investigate the sodium sulphate deposits of the Prairies, culminating in Cole's 1926 monograph, entitled *Sodium Sulphate of Western Canada: occurrence, uses and technology.* Cole's work and a similar study carried out by the Saskatchewan Department of Mineral Resources, *Natural Sodium Sulphate in Saskatchewan* (Tomkins, 1954), endure as authoritative reference works.

Note that any resource quantities mentioned in this section are historically significant as estimates by earlier authors but are not in any way compliant with CIM Best Practice Guidelines or NI43-101 standards.

9.1. Whiteshore Lake W

Cole (1926) recognized the significance of the sodium sulphate resources at Whiteshore Lake and its favourable location near rail. He described the lake as being about 10.5 miles (17 km) in length and averaging a half-mile (1 km) wide. The lake occupies the western part of a long, narrow valley, oriented WNW.

Cole described permanent and intermittent crystal beds on several parts of the lake, the presence of freshwater springs around the margins of the lake and brine springs within the crystal bed. Cole's map, presented as Figure 28, summarizes the exploration results.

Springs

Cole sampled two freshwater springs and one brine spring. Spring No 1 was a minor seep while Cole estimated flow from Spring No 2 at 100 to 150 gallons per minute (500 lpm). Results are summarized on Table 3. He noted that the brine spring (sample 3) may have interacted with the crystal bed through which it discharges.

	ppm							
Sample	Na^+	Ca^{2+}	Mg^{2+}	Cl^-	SO_4^{2-}	HCO_3^{-1}	CO_3^{-2}	TDS
1	290	tr	90	tr	520	570	--	1470
2	2660	2	20	10	4580	840	230	8342
3	180	tr	8620	8570	22200	1640	--	41210

Table 3--Chemical analysis of spring discharge, Whiteshore Lake, from Cole, 1926. Samples 1 and 2 are freshwater springs on the margin of the lake and Sample 3 a brine springe on the lake bed.

Lake Brine

The results of lake brine samples collected by Cole from the east and west halves of the lake are reported in Table 4. The samples were collected in late July to early August, 1924 and Cole suggested they were highly concentrated compared to earlier in the summer, due to evaporation. Cole reported that the deepest brine was found at the narrows, beneath the HWY 53 bridge, where it remained clear and up to two feet deep even in late summer.

	ppm						
Sample	Na^+	Mg^{2+}	Cl^-	SO_4^{2-}	HCO_3^{-1}	TDS	Spec. Gravity
East half	28930	6820	6700	77700	1010	121160	1.112
West half	36890	11120	10220	106200	1940	166370	1.158

Table 4--Lake brine samples from Cole, 1926.

Tomkins (1954) did not add much detail to Cole's description of Whiteshore Lake, but reported on two brine samples collected in May and July which reflect the evaporative concentration that occurs over the summer. Tomkin's results are presented in Table 5.

	May	July
Na_2SO_4	9.12%	13.65%
$MgSO_4$	1.15	3.11
NaCl	0.36	1.05
TOTAL	10.63	17.81
Specific Gravity	1.097	1.172

Table 5--Analysis of Whiteshore Lake brines sampled in 1951 from Tomkins, 1954. Exact sampling locations not specified.

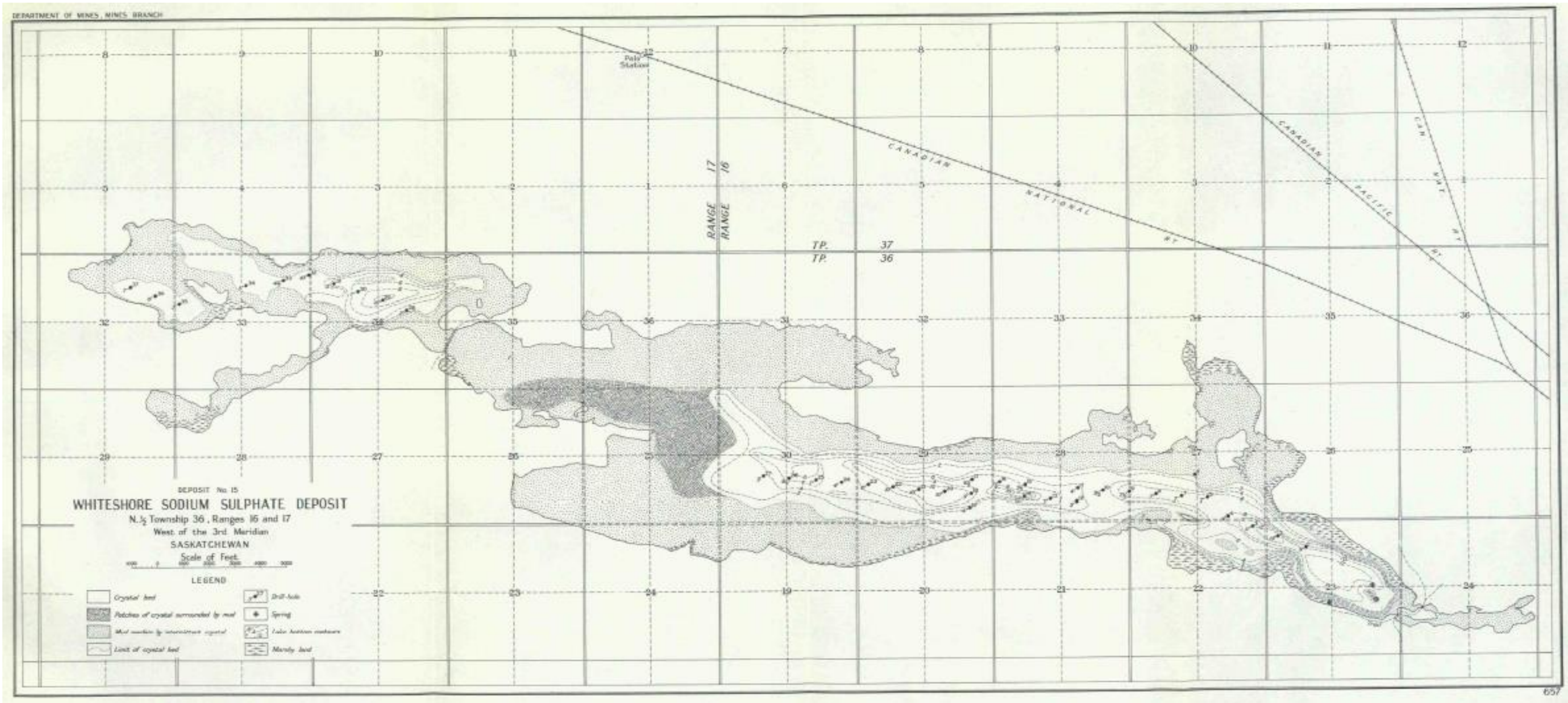

Figure 28—Exploration compilation from Cole 1926.

Intermittent Crystal

Cole described the lake bed as comprised of both permanent crystal, as described below, and black mud. Intermittent crystal was found to overlay both mud bottom and permanent crystal beds. At the time of Cole's mid-summer sampling, intermittent crystal was formed over parts of the lake and seemed to be thickest where the brine was deepest, reaching up to 14 in. (35 cm) in the middle of the lake. Cole reported the intermittent crystal to be very clear and fee of mud.

Permanent Crystal Bed

Cole drilled 27 holes in the eastern lake bed, and measured crystal bed thickness in locations in the western part of the lake by excavating with an iron bar. Test-hole locations and crystal bed thickness contours are shown on Fig 28. Two main beds, occupying the eastern and western parts of the lake basin are evident. Thicknesses reach 10 feet or more over broad areas along the centre-line of the lake. Analytical results for samples of the crystal bed were aggregated and averaged by depth, and recorded as Table 6.

—		0 to 5′	5′ to 10′	10′+
Insoluble	Per cent	8·73	6·77	11·10
$NaCl$	"	0·86	0·69	0·72
$NaHCO_3$	"	0·81	0·69	0·83
$CaSO_4$	"	4·50	3·04	4·31
$MgSO_4$	"	6·99	7·78	11·57
Na_2SO_4	"	77·66	80·62	71·02
Totals	"	99·55	99·59	99·55

Table 6--Chemical analysis of crystal bed samples, Whiteshore Lake, from Cole, 1926. The analyses of all samples from permanent crystal lake bed were classified by depth range and averaged.

9.2. Ceylon Salt Lake

Cole (1926) described Ceylon Salt Lake as a series of four lakes joined by narrow channels. In map view, the lake appears to occupy a meandering channel some 50 m below the surrounding prairie (Fig 29). Cole described the banks of the channel as steeply-sloping morainic hills composed of very stony boulder clay, in some places almost a gravel. He reported the presence of a few marginal springs, but none of great size. He described brine of 1 foot or more in depth in spring, but when near saturation averaging only 6 inches deep. One analysis of brine indicated a salt concentration of 82,000 ppm, of which Na_2SO_4 dominated. The time of sampling is unclear.

Lynn I. Kelley, P.Geo.
LKgeoscience@gmail.com

Figure 29--Ceylon Salt Lake, looking SSW from east bank of lake near north tip.

Cole described intermittent crystal in the fall of 1923 averaging 12 inches in depth. At that time, harvesting and shipping of intermittent crystal had been carried on in a small way each fall for several years. The intermittent crystal was reported as very pure, and this was substantiated by an analysis showing it to be 98.3% Na_2SO_4.

Cole found permanent crystal bed in the three southernmost portions of the lake and explored their depth and obtained samples by drilling and probing with a bar (Figure 30). Thicknesses ranged up to 8 feet, and while considerable mud was intercalated with the crystalline material, the samples contained 60 to nearly 90 percent Na_2SO_4 (Table 7). Cole concluded that 2,400,00 tons of hydrous salts were available in the intermittent and permanent crystal beds at Ceylon Salt Lake.

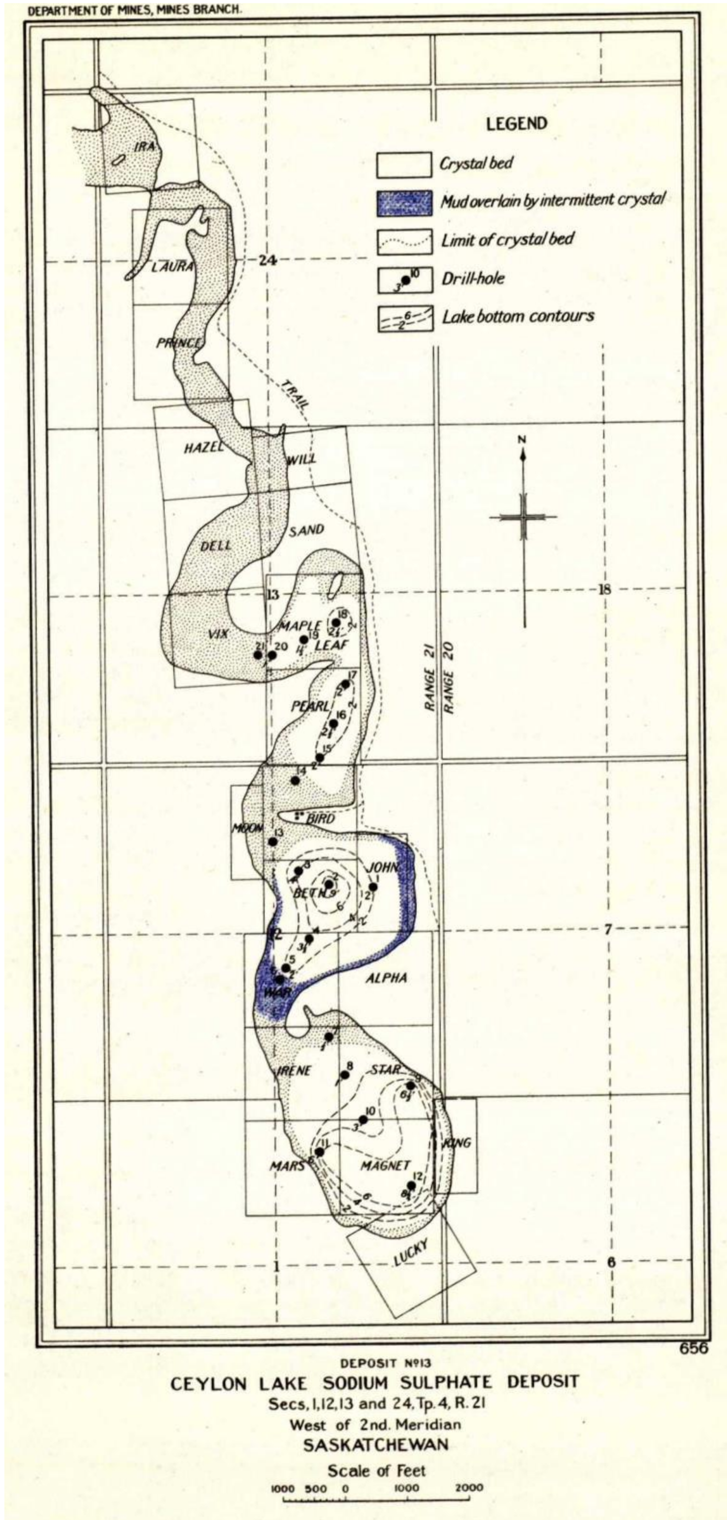

Figure 30--Isopach map of thickness of permanent bed, Ceylon Salt Lake from Cole (1926).

Lynn I. Kelley, P.Geo.
LKgeoscience@gmail.com

Hole No.	1	2	3	4	9	10	11	12
Insoluble..........Per cent	24·50	6·87	15·87	7·02	32·41	6·73	12·93	13·21
NaCl............ "	0·08	tr.	none	tr.	0·81	tr.	tr.	0·17
$NaHCO_3$.......... "	0·83	0·94	0·68	0·94	1·18	0·94	0·68	0·59
$Al_2(SO_4)_3$.......... "	2·25	1·17	1·00	1·17	2·61	1·00	2·08	....
$CaSO_4$............ "	0·67	0·86	0·94	0·83	1·36	0·90	0·70	1·26
$MgSO_4$............ "	....	....	....	....	....	....	....	1·10
Na_2SO_4........... "	68·63	89·41	77·97	89·18	57·96	89·02	79·18	83·42
	97·34	99·64	97·30	99·50	96·93	98·95	97·42	99·75

Table 7--Analytical results from drill holes depicted in Figure 26. From Cole (1926, p. 128)

Tomkins (1954) sampled brine from Ceylon Salt Lake in May 1951 and reported the brine as saturated, with S.G. of 1.124 and containing 12.7% Na_2SO_4. He observed about four inches of intermittent crystal and four inches of brine. Sodium Sulphate Company of Saskatchewan was organized to operate at Ceylon in 1934, and the company still held leases in the early 1950s, but the operations used an open steam process which resulted in poor recoveries. The plant had been dismantled by the time of Tomkins' report, but concrete foundations remain at the south end of the lake. Tomkins estimated the total sodium sulphate available at one million tons.

Ceylon Salt Lake was a focal point of Last's prolific work on the saline playas of the northern Great Plains. He found considerable spatial variation in brine composition and concentration as illustrated in Fig 31. He also reported temporal variation in brine concentrations, with brines collected in May averaging 68,000 ppm TDS and increasing to 241,000 ppm in August (Last W. M., 1986). Last (1989) described sediment facies in detail and reported as much as 80% of the lake bed as salt pan facies dominated by evaporite minerals, principally mirabilite, thenardite and bloedite.

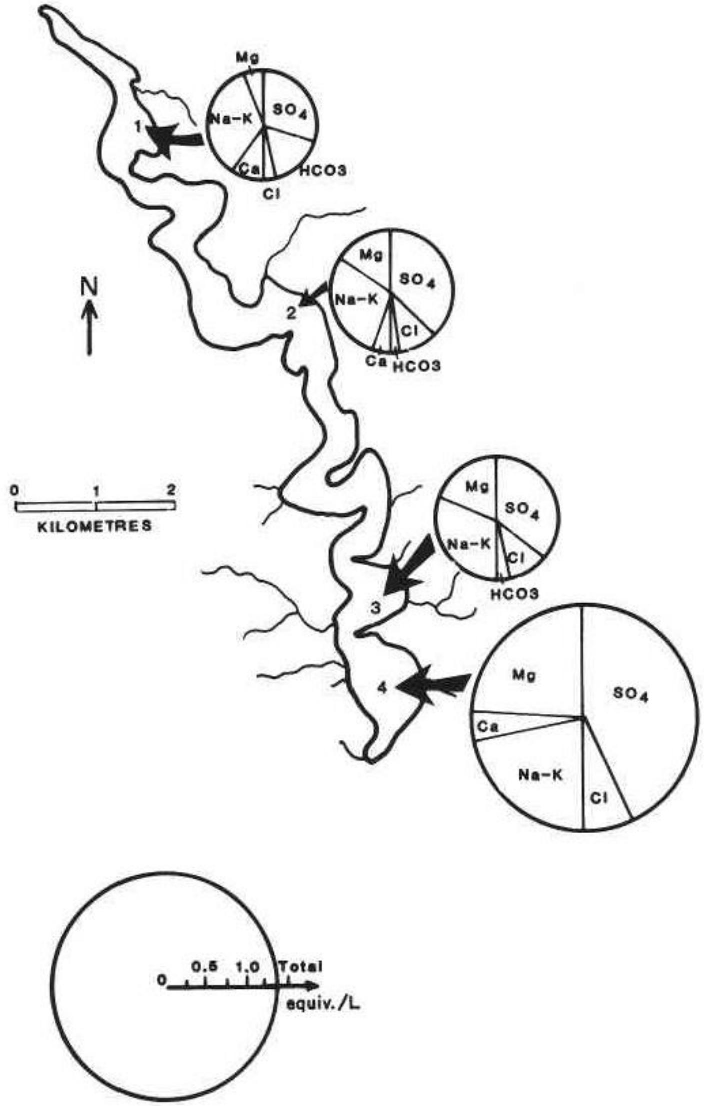

Figure 31--Spatial variation in brine chemistry in Ceylon Salt Lake on 24 June 1982. From Fig 6 in Last (1984)

9.3. Freefight Lake

Freefight Lake has not been previously explored as a mineral resource. Neither Cole (1926) nor Tomkins (1954) mention Freefight. Last (1993) described Freefight as Canada's deepest salt lake, with a maximum depth approaching 25 m (Last & Slezak, 1987a). The lake is of two parts, the main permanent lake to the east (2.6 km^2) and the seasonally flooded flats to the west (1.5 km^2). The lake morphology is shown in map view on Figure 32 and in cross sections on Figure 33.

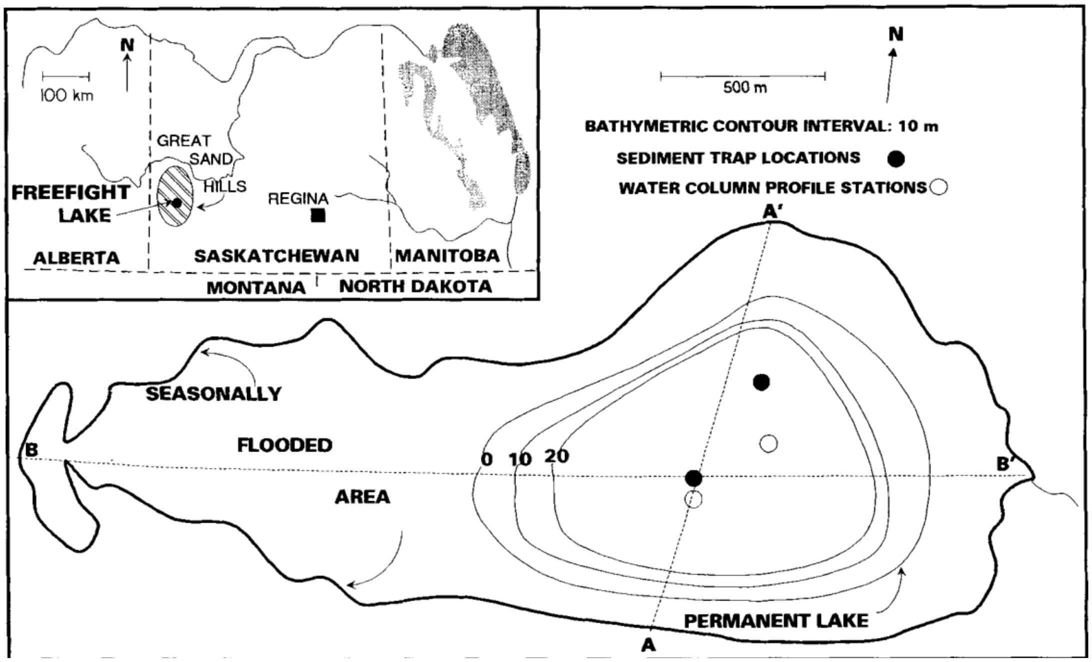

Figure 32--Bathymetry of Freefight Lake, with lines of cross-sections shown in Fig 33. From (Last W. M., 1993)

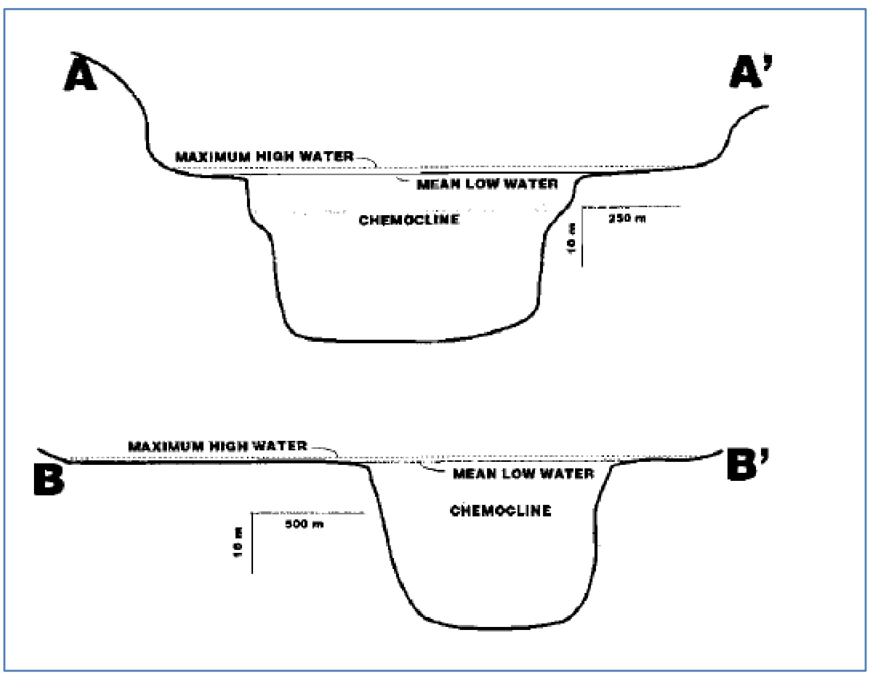

Figure 33--Cross-sections through Freefight Lake. See Fig 32 for lines of cross-sections. Vertical exaggeration for Section A approximately 20x, for Section B, approximately 40x. From (Last W. M., 1993)

Freefight is a meromictic lake, that is the water column is permanently stratified. A chemocline at 5 to 6 m depth divides the water into an oxygenated mixolimnion and an anoxic monimolimnion (Slezak, 1989). TDS concentrations in the water above the chemocline average 124,000 ppm, and the lower waters average 175,000 ppm. Both water masses are dominated by Na^{+} Mg^{2+} and $S0_4^{2-}$ (Last & Slezak, 1987a; Last W. M., 1994).The lower water mass is at or slightly above saturation with respect to Na, Mg and Na-Mg sulphates (mirabilite, thenardite, bloedite, epsomite) at all times (Last W. M., 1993).

Last (1994) reported that the entire lake bottom below water depths of about 7.5 m is covered with salt. Total thickness of the lake-bottom salt bed is unknown, as coring did not penetrate a complete section in the basin center, but in water depths greater than 23 m, coring confirmed salt thicknesses in excess of 1 m. Slezak (1989) estimated Na_2SO_4 “reserves” at 1,000,000 tonnes aqueous and >740,000 tonnes bedded. Note that although Slezak used the word “reserve” to characterize the quantity estimate, this historical estimate does not meet the standards of National Instrument 43-101 or CIM Best Practice Guidelines.

9.4. Summary of historic exploration

Virtually no detailed information on Whiteshore Lake is in the public domain beyond the work of Cole (1926) and Tomkins (1954). The Palo mine, and most of the other Saskatchewan operations were in private hands and operated before public disclosure of resource details were common or mandated by securities regulators. Last and his colleagues and students chose to work on lakes which were undisturbed by industrial development. This is why there is a more recent record of observations at Ceylon and Freefight.

Establishment of resources to modern standards would require a systematic evaluation program, but Cole’s thoroughness will inform any future efforts. While none of the resource estimates found in literature are compliant with NI 43-101 or CIM standards, they are compiled on Table 6 for historic interest.

It should be noted that no qualified person (in the sense of NI43-101) has verified the historical estimates. The various authors whose estimates are summarized in Table 8 provided little or no detail regarding the dataset used to calculate their estimates or their estimate methodologies. The author believes that the historic estimates are relevant to appraisal of the merits of the properties and may inform further exploration, but the historical estimates should not be relied upon.

Lake	Author	Date	Material	Mass
Whiteshore	Cole	1926	hydrous salts	19,760,000 short tons
Whiteshore	Tomkins	1954	anhydrous sodium sulfate	>6,500,000 short tons
Ceylon	Cole	1926	hydrous salts	2,400,000 short tons
Ceylon	Tomkins	1954	sodium sulfate	1,000,000 short tons
Freefight	Slezak	1989	aqueous Na_2SO_4	1,000,000 tonnes
Freefight	Slezak	1989	bedded Na2SO4	740,000 tonnes

Table 8--Summary historic resource estimates by various authors. Note that none of these estimates are compliant with NI43-101 or CIM Best Practice reporting standards. They are presented for historical interest only.

10. Exploration

No systematic exploration has been conducted beyond the field visits to Ceylon Salt Lake, Freefight Lake and Cabri Lake in September 2023. At Ceylon and Freefight Lakes, grab samples of brine and crystalline material were collected on a reconnaissance basis for analysis as described in Section 11.

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10.1. Field Procedures

Reconaissance grab samples were collected at opportune and accessible locations on Ceylon Salt Lake and Freefight Lake during the field visit of September 2023. Attempts to access Cabri Lake for sample collection were fruitless. Samples of crystalline material were obtained from near shore crystal beds and dusty efflorescent horizons near the shore. Lake brine samples were collected by reaching from shore and scooping brine samples with a pitcher affixed to a 5 m aluminum pole (Fig 34).

Figure 34--Brine sampling at Ceylon Salt lake

11. Sample Preparation, Analysis and Security

11.1. Sample Collection and Preparation

Samples of solid material were collected by placing material into zip lock clear plastic bags using a trowel or a shovel. Brine samples were poured from the collection pitcher into 250 ml HDPE sample jars. Each sample was labeled with a sample number and the location of the sample was logged with a hand-held Garmin GPS. As this was considered reconnaissance sampling, liquid samples were not filtered nor preserved. No field duplicates were collected.

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11.2. Analysis

The Saskatchewan Research Council (SRC) laboratory competed ICP whole rock assay on the solid samples, along with ICP total digestion for other major elements and oxides, ICP MS total digestions for minor elements and determined Br,Cl and B by other techniques. Loss-on-ignition was determined by heating a 1 g sample to 1000° C for 8 hours.

Brine chemistry was analyzed by ICP-MS and ICP-OES. The brines were also measured for pH, and specific gravity.

Sample location maps, sample descriptions and analytical reports are included as Appendix A.

11.3. Laboratory Quality Assurance/Quality Control

SRC follows standards which specify quality assurance checks. Analysis of sample FF03A was repeated with no significant difference between the original and the duplicate. A laboratory potash standard SRC DCB01 was also analyzed as a benchmark.

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11.4. Sample Security

Samples were in the custody of the author for approximately one week while arrangements were concluded with SRC, at which time they were delivered by a messenger service, with SRC confirming receipt.

11.5. Analytical Results

Crystalline solids

While quality control issues discussed in Section 12 remain unresolved, some observations can be gleaned from the analytical results. For crystalline samples, Na_2O concentrations ranged up to 40 % and S up 250,000 ppm, equivalent to approximately 60 %. While MgO was in the range of 1 to 3 % for samples collected from Ceylon, MgO was recorded up to 22% for samples from Freefight. Boron was also generally more abundant in material from Freefight, exceeding 200 ppm in all samples. Cl was present as a minor constituent, not reaching 1 % in any of the samples from either lake.

Brines

Samples from both Ceylon and Freefight lake contained approximately 10,000 to nearly 40,000 ppm of dissolved Na, while S ranged from 16,000 ppm to nearly 40,000 ppm. As with the crystalline material Mg was generally more abundant in brine samples from Freefight. With one exception (CEY 06B), all of the waters were alkaline, with pH generally in the range of 8 to 8.5. Specific gravities reflect the high dissolved solids content, ranging from 1.06 to 1.16.

12. Data Verification

The major oxide concentrations reported in the whole rock analyses would routinely be summed with the LOI to obtain a sense of the analytical accuracy. As sulfur is a major component of the crystalline material and sulfur species were excluded in the whole rock scan, an attempt was made to capture the elemental S analysis recorded by ICP total digestion, convert the analysis to an oxide weight, and use the oxide to balance the whole rock scan. With this adaptation, the whole rock assays summed to between 90 and 130 per cent, still a problematic result.

Sampling during the field visits to Ceylon and Freefight was generally *ad hoc.* Common sampling protocols for sampling of natural waters, such as filtering, preservation and refrigeration were not observed. The analysis may not have included some key constituents. Nevertheless, the results are discussed and appended here as they do illustrate some variations to be expected from lake to lake and within individual lake systems. These results may also inform a more systematic and robust sampling program that would be required for resource evaluation.

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13. Mineral Processing and Metallurgical Testing

No mineral processing or metallurgical testing has been conducted to date.

Edison's plans include metallurgical research towards 1) Refining sodium sulphate from naturally-occuring brine from Whiteshore Lake and 2) extracting sodium hydroxide and other Na-ion battery components from natural sodium sulphate. Edison management is of the opinion that sodium-ion batteries may become accepted in the marketplace as an alternative energy source for low-cost, local-range vehicles and other applications. Edison believes that multiple sodium resources may be tapped as sources for the various electrode and electrolyte components of Na-ion batteries, and that sodium sulphate may prove to be a viable feedstock for sodium hydroxide and other sodium compounds. Although not commercially tested, electrodialysis of sodium sulfate has been laboratory-modeled to produce sodium hydroxide (Noureddine, Said, Mahacine, Mohamed, & Azzeddine, 2013; Pisarska, et al., 2017).

14. Mineral Resource Estimates

No attempt has been made at estimating mineral resources. Historical estimates, none of which are compliant with NI 43-101 or CIM Best Practices, are summarized in Table 8.

15. Mineral Reserve Estimates

No engineering studies have been undertaken to calculate a mineral reserve.

16. Mining Methods

There have been no studies of potential mining methods.

17. Recovery Methods

No study of potential recovery methods was conducted. Edison plans to initiate a research program directed at the production of commercial grade sodium sulfate from lake brines.

18. Project Infrastructure

No studies were undertaken to estimate infrastructure requirements. Infrastructure, including rail, gas, power and labour force are well-established near the former producing Palo Mine at Whiteshore Lake. No significant infrastructure is available near Ceylon Salt Lake, Freefight or Cabri.

19. Market Studies and Contracts

Edison has no contracts for Na-ion battery components. Management has taken the position that markets for Na-ion powered EVs will grow and markets for Na-ion battery components may expand rapidly. Given the various battery constructions and chemistries being examined (Siddiqi, 2024), and the high concentrations of sodium in the lake brines, Edison considers the deposits associated with alkali lakes to be attractive targets for production of Na-ion battery ingredients.

Edison's plans include a market study to investigate the demand for high purity Na-compounds for potential Na-ion battery component products, or other technological or agricultural applications.

20. Environmental Considerations

A detailed discussion of permits and environmental considerations is beyond the scope of this report, but a few thoughts are offered below.

20.1. Regulatory/Jurisdictional

Ceylon Salt Lake and Freefight Lake are in community pastures under the control of the Ministry of Agriculture, while land around Cabri is privately held. All three of these properties screened as environmentally sensitive, as outlined in Section 5, and all three are surrounded by Native Prairie. Entry for exploration for the Agriculture properties would probably require a proposal that extensively documents ecological and heritage resources and measures to protect them. A similar proposal would be required for all three by the Ministry of Environment. Consultation with the public and NGOs interested in the preservation of Native Prairie would usually be required by the Ministries.

Exploration at Whiteshore Lake would also be held to environmental standards, and systematic exploration would likely require a proposal to the Ministry of Environment. As a brownfield site, permissions may be more readily obtainable for a project at Whiteshore Lake.

20.2. Infrastructure-related

Currently access to Ceylon Salt Lake, Freefight Lake and Cabri Lake is through ranch trails, which are passable only in dry weather. Commercial development would require significant disturbance of the landscape in order to upgrade access and extend service utilities to the site of any potential development.

Whiteshore Lake is bisected by a paved highway (at the Narrows and within the bounds of A-4593), and is accessible in several locations from grid roads. As a previous producer, all utilities are readily available nearby. The environmental impact of re-establishing production at Whiteshore Lake would be considerably less than any of the other Edison properties.

21. Capital and Operating Costs

No studies were undertaken to support capital and operating cost estimates.

22. Economic Analysis

No studies were undertaken to support an economic analysis.

23. Adjacent Properties

Edison holds disposition A-4593 at the west end of Whiteshore Lake. Upcycle

Minerals holds two dispositions covering the east part of the lake, as shown in Figure 4. The exploration history and historical resource estimates discussed in Section 10.1 generally cite legacy information that pertains to the entire lake.

If the crystal bed were to be mined, division of the resource amongst two or more holders of mineral rights would probably be straight-forward. There are certainly many precedents in metals mining of competing interest holding rights to different parts of an orebody.

As the sodium sulfate industry evolved, Saskatchewan producers moved towards production by pumping brine from the lake into crystallization ponds and extracting crystalline material from the ponds after a period of evaporative concentration and freeze-out. In this case, where the liquid “ore” can move across the lake basin, ownership of minerals may be nuanced.

24. Other Relevant Data and Information

No other relevant data or information was used in preparing this report.

25. Interpretation and Conclusions

25.1. Interpretations

- The alkali dispositions discussed herein pertain to the crystalline material beneath each lakebed and the brine within each lake. If any of the prospects would proceed to commercial production, Edison would eventually need to acquire adjacent or nearby surface rights on which to construct and operate a recovery plant.

- Previous work on sodium sulphate in closed-basin lakes has intimated that the deposits are, to some extent, renewable resources. Tomkins (1954, p. 50) described a thought experiment in which he concluded that 12,000 years would be sufficient time for a deposit of 3 million short tons (2.7 million tonnes) of sodium sulfate to accumulate in a hypothetical closed basin receiving 100 gallons per minute (380 lpm) of spring water containing 1000 ppm of sodium sulfate. Cole observed a spring at Whiteshore Lake for which he estimated discharge at 100 to 150 gpm (500 lpm), at a TDS (dominantly Na^{2+} and SO_4^{2-}) concentration of 8342 ppm. This flow rate equates to approximately 250,000,000 litres per year, and at the observed concentration rate, would contribute 21,000 tonnes per year of dissolved solids. Multiple springs and overland flow contribute to the water balance and dissolved solids budget of these lake systems. While considering them to be a renewable resource might be a stretch, they are certainly self-perpetuating to some extent.

As an illustration of the notion of these deposits being perpetual, it should be noted that (Tomkins, 1954) estimated an historical resource of 3 million short tons of anhydrous sodium sulfate at Chaplin, taking into account material in solution in the lake brine and the thin salt bed on the lake bottom. The operation has produced over 11 million tonnes to date. (SMMI, 2024b).

- The search for lithium feedstock for batteries has involved exploration of hardrock, salar and deep-brine resources. In a similar way, a variety of sodium sources may be required to satisfy demand if sodium battery-powered EVs enter the marketplace in a significant way. Sodium is infinitely abundant in ocean water and halite deposits, but the sulfate form may be advantageous for some processes.

- Whiteshore Lake, a past-producer with ready infrastructure and labour nearby, probably poses fewer challenges related to environmental and heritage considerations than the other three properties discussed herein.

25.2. Conclusions

- Sodium ion batteries present a cheaper alternative to Li-ion batteries and are potentially less impactful on the environment, as their formulation does not require nickel, cobalt and other scarce metals.

- The alkali lakes of the Great Plains, long sources of sodium sulfate for traditional markets in detergents, textiles and other products may be a viable source for production of sodium hydroxide and other sodium compounds for battery production. It is not known whether commercial production of sodium hydroxide or other sodium compounds could be achieved from natural sodium sulphate in brine or solid form.

- Multiple ownership of mineral rights at Whiteshore Lake may be problematic were the project to proceed to commercial production.

26. Recommendations

26.1. Property focus

Whiteshore Lake, as a past-producer with ready infrastructure, including labour, nearby, probably poses fewer challenges related to environmental and heritage considerations than the other three properties discussed herein. As well, the resource potential of Whiteshore Lake, based on the lake's size and historical resource estimates appears to be much larger than the other properties. Whiteshore Lake should be the focus of further exploration.

26.2. Preliminary evaluation of resource and potential products

a) Brine concentrations in the salt lakes of the Great Plains are known to vary seasonally and spatially. A first step towards a resource estimate would be to measure the variations in brine concentrations seasonally and in three dimensions across the breadth and depth of the lake. It is recommended that samples be collected from Whiteshore Lake at regular intervals over the summer season. Periodic (monthly) collection will provide an estimation of the variation in salt concentration in lake brine as the lake undergoes concentration by evaporation and fall freeze-out.
   - Sample stations should be established at several locations to establish any spatial variation in concentrations, and if it is possible to access deeper parts of the lake, samples should be collected at multiple depths to document stratification.
   - Edison should develop a standard sampling protocol that ensures robust and appropriate field and analytical methods. The protocol should include collection of field data including positional information, brine parameters such as pH, conductivity and temperature, and if appropriate, filtering, preservation and refrigeration. Informed by the shortcomings of the analysis reported in this document, the protocol should include appropriate analytes and methods, facilitate routine QA/QC and establish a routine for umpire assays.

   If the metallurgical evaluation is favourable, the data generated from the sampling described in b) above, along with lake bathymetry and other field observations will inform future resource estimations.

b) Edison should engage with an individual or firm familiar with process metallurgy of salts to conduct metallurgical evaluation of the feasibility and procedures for producing sodium sulfate from lake brine derived from the company's tenure on Whiteshore Lake. Successful completion of this work should be followed by a market study to develop detailed understanding of current and potential future demands for sodium compounds required for battery production.

c) Results of c) above would inform further work, probably beginning with bench scale studies of production of high-purity sodium compounds identified in the market study.

A preliminary budget for the recommended work is summarized in Table 9.

a--Assess temporal and spatial variations in lake brine concentrations			
per sampling event			
Item	Quantity	unit cost	total
Project Leader	2 days	$500	$1,000
Field assistant	2 days	$350	$700
vehicle	1000 km	$0.50	$500
hotel	1	$200	$200
sustenance	2x2	$100	$400
labware/consumables/filters/ice/sample preservative			$200
instrument charges--pH, SG, Eh			$200
Sample analyses, including duplicate and umpire samples.	8	$500	$4,000
Project management/Data compilation	1.5	$1,000	$1,500
Sub total, per sampling event			$8,700
Total, five sampling events per season			~$50,000
Assumption--three sampling stations will be established and visited on each sampling event. Samples from two depths will be collected at each station.			
b--sodium sulfate refining and market study			
Investigate methods for production of sodium sulfate from lake brine feed		contract maximum	$50,000
Markets for sodium compounds required for battery production		contract maximum	$30,000
c-production of sodium compounds			
Bench-scale studies		contract maximum	$50,000

Table 9--Budget estimates for preliminary evaluation of resources and potential products..

26.3. Mineral rights

Edison should establish a formal working relationship with the other owners of mineral rights on Whiteshore Lake to avoid conflict over potential exploitation of a resource that flows.

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28. Certificate of Author

I, Lynn I. Kelley, P. Geo., do hereby certify that:

1. I reside at 1347 McVeety Drive, Regina, Saskatchewan, Canada.
2. I graduated with a B.A. degree in Earth Science from Millersville University (Pennsylvania) in 1977.
3. I graduated with a M.Sc. degree in Geology from the University of North Dakota in 1980.
4. I am Registered Member 9824 of the Association of Professional Engineers and Geoscientists of Saskatchewan, with permission to consult.
5. I have worked as a geologist for more than 40 years since my graduation from university. My professional experience has focused on industrial minerals, but also includes work in gold, base metal and diamond exploration and research in Canada and the US.
6. I am a sole practitioner engaged in providing geological consulting services, primarily in the practices of industrial minerals evaluation and environmental matters related to mining developments.
7. I spent 10 years as the Industrial Minerals geologist with the Saskatchewan Geological Survey, conducting research on a host of commodities and providing technical assistance to mineral developers. In particular, from 1998 to 2005, with colleagues from the Universities of Saskatchewan and Calgary, I carried out research into the origin of sodium sulphate deposits in closed-basin lakes in Saskatchewan.
8. I am the primary author of this report entitled “Alkali Minerals Dispositions-Technical Report” which has an effective date of 17 September 2024. I have received assistance from various members of Edison’s team as noted in Section 3.
9. I visited Ceylon Salt Lake, Cabri Lake and Freefight Lake on September 12 and 13, 2023, in the company of Luisa Moreno and Roger Dahn of Edison, and I have visited Whiteshore Lake many times during the period 1998-2005.
10. I have not had prior involvement with the companies that are the subject of the Technical Report and neither own nor control a beneficial interest in the mineral properties that are the subject of this report nor any adjacent or nearby properties.
11. I am independent of the issuer applying all the tests in section 1.5 of NI 43-101; since I have no financial interest in Edison Lithium Corp or Edison Saskatchewan Resources Corp, nor do I have an interest in the properties that are the subjectof this report.
12. I am not aware of any material fact or material change with respect to the subject matter of the TechnicalReport, the omission to disclose which makes the Technical Report misleading.
13. I have read NI 43-101 and Form 43-101F and the Technical Report has been prepared in compliancewith that instrument and form.
14. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority andany publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.
15. At the effective date of this report and to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated this 17th day of September 2024

Lynn I. Kelley, P.Geo.

Appendix A-Reconnaissance Geochemistry

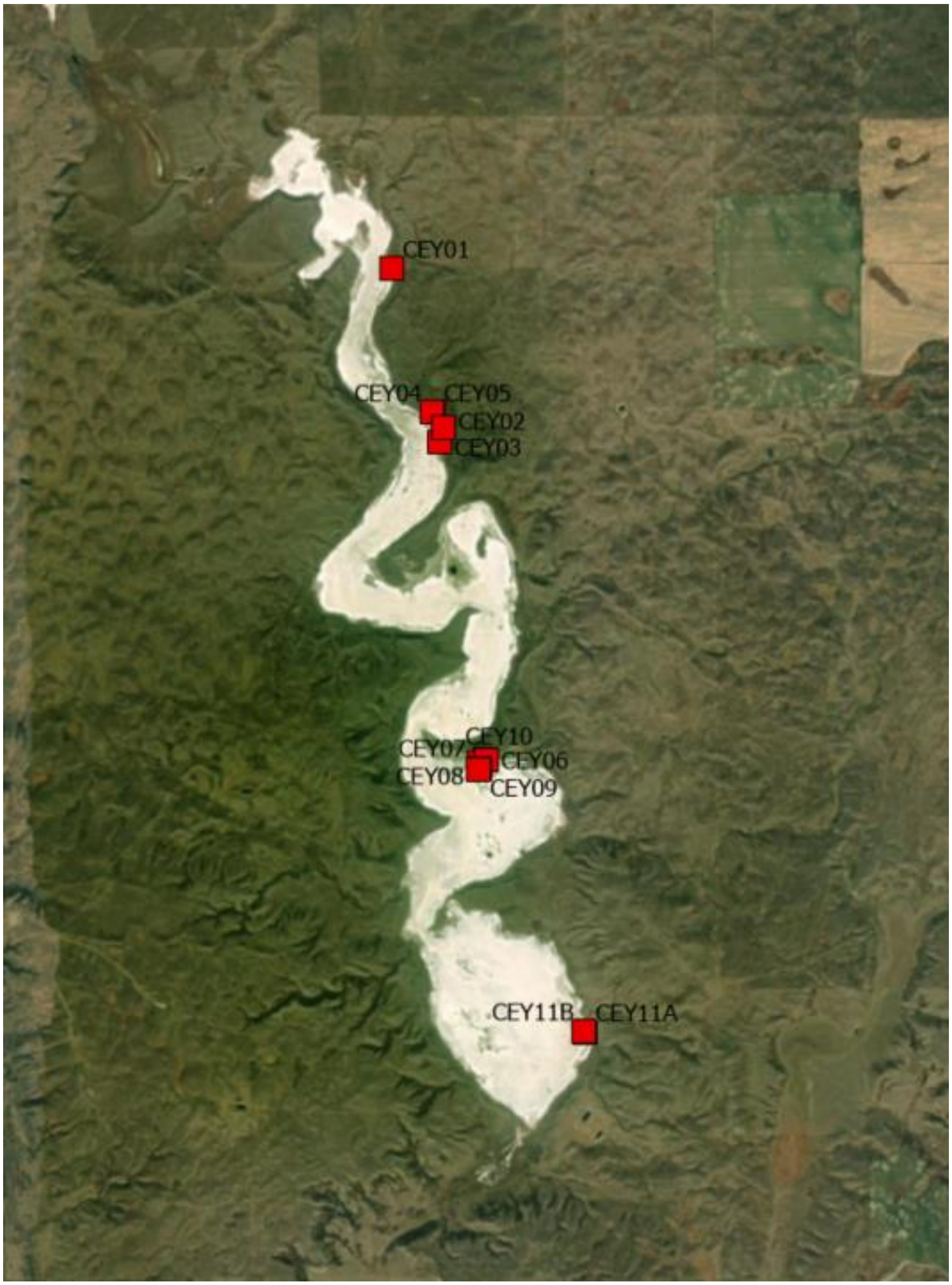

Figure 35--Sample locations, Ceylon Salt Lake

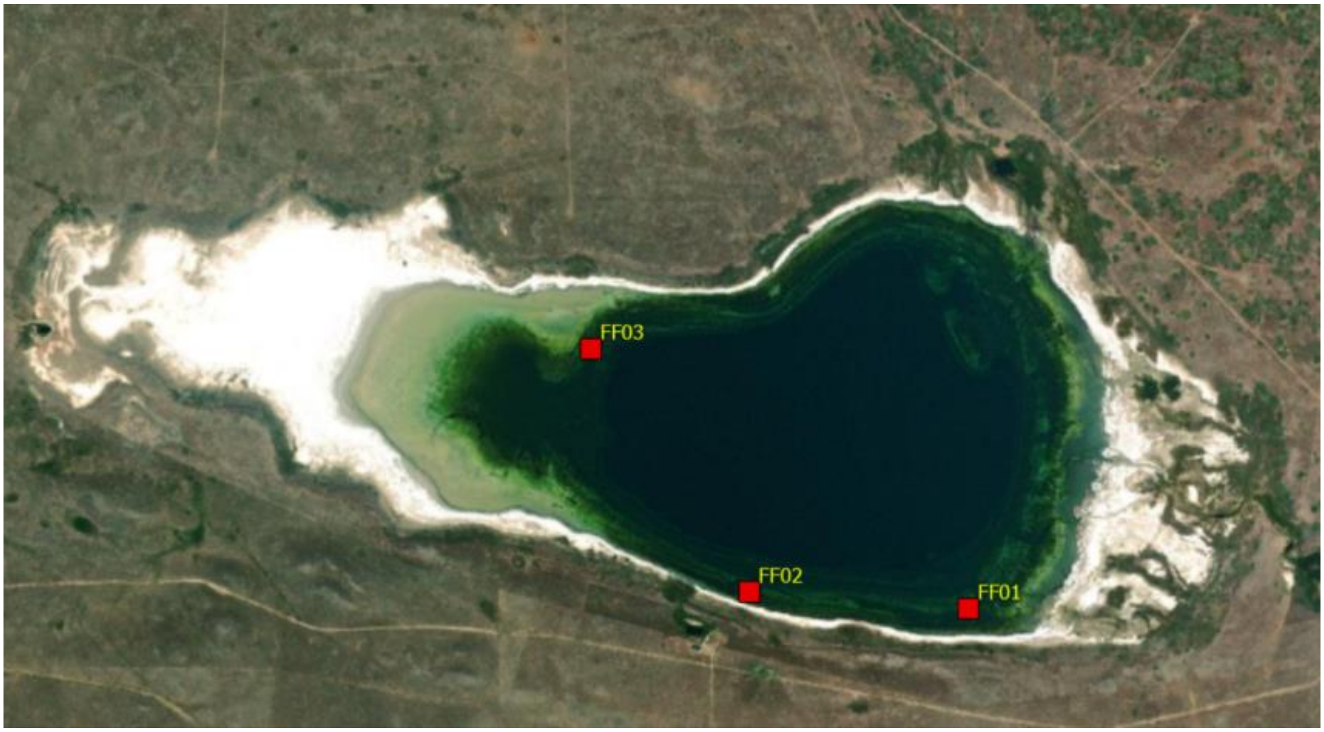

Figure 36--Freefight sample locations

Sample Descriptions

					NAD 83 Zone 13				
Location	Collection Date	Time	Latitude	Longitude	Easting	Northing	Samples	Sample media	Description
FF01	13-Sep-2023	15:42:00	50.3971	-109.1078333	208083.235	5590851.787	FF01A	solid	v. light grey-white chalky crystal crust, low specific gravity.
							FF01B	liquid	liquid from a few m offshore location FF01
FF02	13-Sep-2023	16:07:00	50.3972	-109.1153167	207552.225	5590892.345	FF02A	solid	v. light grey-white chalky crystal crust, low specific gravity, very similar to FF01A.
							FF02B	liquid	liquid from a few m offshore location FF02
FF03	13-Sep-2023	17:23:00	50.4023	-109.1211667	207168.1059	5591482.206	FF03A	solid	fluffy white crystal low specific gravity, NW corner of open water.
							FF03B	liquid	liquid from a few m offshore location FF03
CEY01	12-Sep-2023	12:46:00	49.31163333	-104.7088667	521076.7346	5462127.184	CEY01A	solid	White to glassy massive xtalline crust about 1.5 cm thick floating on black muck
							CEY01B	solid	Black organic muck, sulphurous odour, thickness unknown, underlies xtalline crust
CEY02	12-Sep-2023	13:22:00	49.30353333	-104.7061333	521364.0709	5461239.73	CEY02	liquid	Brine sample dipped near apparent spring?~ 3 m off shore in brine approx 0.5 m deep. The liquid is slightly tan in coulour, contains pink shrimp.
CEY03	12-Sep-2023	13:28:00	49.30281667	-104.7064333	521342.5713	5461159.974	CEY03	solid	Clear crystalline mirabilite. Appearance like crushed ice, transparent, glassy particles < 1 cm.Liquid beneath crystal layer and some liquid captured with sample.
CEY04	12-Sep-2023	13:44:00	49.30431667	-104.707	521300.7269	5461326.57	CEY04	solid	White to glassy massive xtalline crust, similar to CEY01, but 3-3.5 cm thick. Floating on black muck.
CEY05	12-Sep-2023	13:49:00	49.30431667	-104.7069	521307.9964	5461326.599	CEY05	solid	Fluffy white powder, blown off lake and accumulating on shore--ripple marks on upper surface.
CEY06	12-Sep-2023	15:05:00	49.2869	-104.7029833	521602.568	5459387.829	CEY06A	solid	Along the shore are a cluster of cone-shaped depressions, reminiscent of small volcanic vents, 0.5 m in diameter, slightly wider at surface than at the bottom, and 0.5 m deep. Liquid at bottom. The sides are lined with cauliflow-like botryoidal crystalline material, presumably a sulphate miineral. Under magnification, the botryoidal material appears to be glassy and roughly equidimensional crystals.
							CEY06B	liquid	Liquid collected from bottom of a vent. Brown, full of shrimp, specific gravity elevated??
CEY07	12-Sep-2023	15:19:00	49.28678333	-104.7034833	521564.8359	5459373.293	CEY07	liquid	prominent spring--North end of the 3rd lake from the north
CEY08					521559.2941	5459334.993	CEY08	liquid	open water~30 m SE of CEY07
CEY09					521565.6439	5459339.437	CEY09	solid	glassy xtalline crust adjacent to open water of CEY08
CEY10	12-Sep-2023	15:44:00	49.28695	-104.70305	521597.2893	5459390.523	CEY10	solid	White dust on shore, rippled surface, Stong onshore wind today may be actively transporting this sort of stuff.
CEY11	12-Sep-2023	16:25:00	49.27371667	-104.6952167	522153.4597	5457871.213	CEY11A	liquid	Large spring near old plant at S end of lake
							CEY11B	liquid	Large spring near old plant at S end of lake

Table 10--Sample descriptions

	Analytical Method	LECO Induction Furnace	MS Anions		Boron by Fusion	ICP Total Digestion																	
	Element or oxide	C	Br	Cl	B	Al2O3	Ba	CaO	Ce	Cr	Fe2O3	K2O	La	Li	MgO	MnO	Na2O	P2O5	S	Sr	TiO2	V	Zr
	Units	wt %	wt %	wt %	ppm	wt %	ppm	wt %	ppm	ppm	wt %	wt %	ppm	ppm	wt %	wt %	wt %	wt %	ppm	ppm	wt %	ppm	ppm
Description	Sample Type																						
DCB01/SY5/POT003I	Standard		0.036	51.7	14	11.2	388	1.51	127	271	3.33	2.44	65	41	1.7	0.035	0.57	0.211	3980	415	0.799	101	411
CEY01A	Solid		0.008	0.62	100	0.53	35	2.92	1	3	0.22	0.407	1	25	3.02	0.008	32.8	0.027	216000	295	0.022	4.1	5
CEY01B	Black organic mud	3.82				4.81	347	9.24	17	37	1.37	1.24	10	42	4.54	0.051	6.52	0.097	44700	786	0.198	29	52
CEY03	Solid		0.001	0.22	18	0.01	1	0.06	<1	1	<0.01	0.059	<1	4	0.278	<0.001	23	0.003	145000	5	<0.002	<0.1	<1
CEY04	Solid		0.003	0.26	32	0.04	3	0.53	<1	1	0.02	0.127	<1	8	0.957	<0.001	38.4	0.006	235000	57	<0.002	<0.1	<1
CEY05	Solid		0.01	0.65	162	0.59	39	1.25	1	2	0.24	0.469	1	24	3.6	0.008	27.3	0.178	180000	123	0.021	3.1	4
CEY06A	Solid		0.003	0.21	35	0.04	3	0.1	<1	1	0.01	0.132	<1	7	0.719	<0.001	20.1	0.004	128000	9	<0.002	0.1	1
CEY09	Solid		0.001	0.12	26	0.2	13	0.65	<1	2	0.09	0.099	<1	8	0.758	0.003	39.7	0.009	241000	68	0.01	1.9	2
CEY10	Solid		0.003	0.25	58	0.13	8	0.38	<1	1	0.05	0.241	<1	14	1.37	0.002	40.5	0.022	246000	41	0.007	0.8	1
FF01A	Solid		0.009	0.93	217	1.36	114	2.74	13	7	0.33	1.34	7	62	12.1	0.01	10.3	0.032	141000	210	0.087	6	32
FF02A	Solid		0.007	0.69	214	0.62	51	2.13	4	<1	0.18	1.18	2	58	17.2	0.006	8.55	0.03	156000	88	0.025	4.3	8
FF03A	Solid		0.008	0.76	286	0.39	41	2.08	<1	<1	0.08	1.02	<1	65	21.4	0.004	9.5	0.016	112000	78	0.014	2.1	6
FF03A R	Repeat		0.008	0.76	289	0.38	34	2.19	1	<1	0.08	1.04	1	66	21.6	0.004	9.54	0.016	115000	78	0.014	2.3	5

	Analytical Method	ICP MS Total Digestion																	
	Element or oxide	Ag	Be	Bi	Cd	Co	Cs	Cu	Dy	Er	Eu	Ga	Gd	Hf	Ho	Mo	Nb	Nd	Ni
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Description	Sample Type																		
DCB01/SY5/POT003I	Standard	2.76	1.8	7.7	0.6	18.3	1.2	274	4.43	2.24	1.36	15.3	6.4	11.8	0.76	13.9	20.7	49.8	100
CEY01A	Solid	<0.02	<0.1	0.1	<0.1	0.55	0.1	9.9	0.16	0.09	0.05	0.6	0.2	0.2	0.03	0.28	0.4	1.1	2.5
CEY01B	Black organic mud	0.11	0.6	0.2	0.1	3.99	0.9	8.2	1.18	0.65	0.47	5	1.4	1.4	0.21	1.22	3.4	9.3	14
CEY03	Solid	<0.02	<0.1	<0.1	<0.1	<0.02	<0.1	6.1	<0.02	<0.02	<0.02	<0.1	<0.1	<0.1	<0.02	0.04	<0.1	<0.1	<0.1
CEY04	Solid	<0.02	<0.1	<0.1	<0.1	0.07	<0.1	9.4	<0.02	<0.02	<0.02	<0.1	<0.1	<0.1	<0.02	0.06	<0.1	<0.1	0.3
CEY05	Solid	<0.02	<0.1	<0.1	0.1	0.62	0.1	8.6	0.12	0.08	0.05	0.6	0.2	0.1	0.02	0.1	0.4	1	2.4
CEY06A	Solid	<0.02	<0.1	<0.1	<0.1	0.05	<0.1	5.9	<0.02	<0.02	<0.02	<0.1	<0.1	<0.1	<0.02	0.08	<0.1	<0.1	0.2
CEY09	Solid	<0.02	<0.1	<0.1	<0.1	0.23	<0.1	10.7	0.06	0.03	<0.02	0.2	<0.1	<0.1	<0.02	0.05	0.2	0.4	0.7
CEY10	Solid	<0.02	<0.1	<0.1	<0.1	0.14	<0.1	10.6	0.03	<0.02	<0.02	0.1	<0.1	<0.1	<0.02	0.09	0.1	0.2	0.6
FF01A	Solid	0.02	0.1	<0.1	<0.1	0.82	0.1	3.3	0.52	0.28	0.16	1.4	0.8	0.8	0.09	0.25	1.4	6	2.5
FF02A	Solid	<0.02	<0.1	<0.1	<0.1	0.54	0.1	2.9	0.22	0.11	0.06	0.6	0.3	0.2	0.04	0.54	0.5	2.4	2
FF03A	Solid	<0.02	<0.1	<0.1	<0.1	0.3	<0.1	2.7	0.09	0.06	0.04	0.4	0.1	0.1	0.02	0.76	0.4	0.7	1.3
FF03A R	Repeat	<0.02	<0.1	<0.1	<0.1	0.3	<0.1	2.9	0.08	0.05	0.04	0.4	0.1	<0.1	<0.02	0.8	0.3	0.8	1.3

	Analytical Method	ICP MS Total Digestion																	
	Element or oxide	Pb204	Pb206	Pb207	Pb208	PbSUM	Pr	Rb	Sc	Sm	Sn	Ta	Tb	Th	U	W	Y	Yb	Zn
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Description	Sample Type																		
DCB01/SY5/POT003I	Standard	1.33	33.6	19.6	47.1	102	14.8	62.4	7.2	7.9	3.58	1.93	0.77	53.8	127	11.2	22.3	2.05	126
CEY01A	Solid	0.035	0.624	0.516	1.24	2.41	0.3	3.4	0.4	0.2	0.91	0.02	0.02	0.62	0.45	0.1	0.9	0.08	9
CEY01B	Black organic mud	0.079	1.44	1.2	2.88	5.6	2.6	25.8	3	1.7	0.47	0.22	0.18	2.76	2.14	0.4	6.2	0.62	30
CEY03	Solid	<0.001	0.024	0.02	0.042	0.085	<0.1	0.2	<0.1	<0.1	0.04	<0.02	<0.02	0.06	<0.02	<0.1	<0.1	<0.02	5
CEY04	Solid	0.002	0.04	0.033	0.079	0.153	<0.1	0.4	<0.1	<0.1	0.06	<0.02	<0.02	0.05	0.03	<0.1	<0.1	<0.02	5
CEY05	Solid	0.013	0.235	0.198	0.476	0.923	0.3	3.8	0.3	0.2	0.07	0.02	<0.02	0.33	0.25	<0.1	0.7	0.07	17
CEY06A	Solid	<0.001	0.046	0.024	0.055	0.126	<0.1	0.3	<0.1	<0.1	0.03	<0.02	<0.02	0.03	0.31	<0.1	<0.1	<0.02	6
CEY09	Solid	0.004	0.087	0.075	0.168	0.335	0.1	1.4	0.2	0.1	0.03	<0.02	<0.02	0.16	0.13	<0.1	0.3	0.03	6
CEY10	Solid	0.004	0.062	0.056	0.125	0.246	<0.1	0.9	<0.1	<0.1	0.04	<0.02	<0.02	0.11	0.1	<0.1	0.2	<0.02	6
FF01A	Solid	0.027	0.47	0.381	1.09	1.97	1.7	7.8	1	1	0.11	0.08	0.09	3.4	0.83	<0.1	2.9	0.26	10
FF02A	Solid	0.011	0.231	0.176	0.48	0.897	0.7	4.2	0.4	0.4	0.06	0.03	0.04	1.3	0.8	<0.1	1.2	0.09	10
FF03A	Solid	0.009	0.163	0.142	0.326	0.64	0.2	2.8	0.2	0.2	0.06	0.03	<0.02	0.27	1.04	<0.1	0.6	0.06	9
FF03A R	Repeat	0.008	0.14	0.118	0.285	0.551	0.2	2.8	0.2	0.2	0.07	<0.02	<0.02	0.28	1.04	<0.1	0.5	0.04	9

	Analytical Method	ICP Whole Rock Assay																	
	Element or oxide	SiO2	Al2O3	CaO	Fe2O3	K2O	MgO	MnO	Na2O	P2O5	TiO2	Ba	Cr	Sc	Sr	Y	Zr	LOI	SUM
	Units	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	ppm	ppm	ppm	ppm	ppm	ppm	wt %	
Description	Sample Type																		
DCB01/SY5/POT003I	Standard	49.8	14.3	7.15	10.7	4.08	3.24	0.13	4.07	2.05	1.78	6390	153	12	3090	54	741		97.14
CEY01A	Solid	3.8	0.5	2.86	0.22	0.35	2.97	<0.01	34.5	0.04	0.02	51	11	<2	285	<2	18	10.2	55.46
CEY01B	Black organic mud	39.6	4.9	10.7	1.48	1.38	4.54	0.06	6.78	0.1	0.23	355	64	3	772	8	117	23.9	93.67
CEY03	Solid	4.2	0.57	3.23	0.23	0.42	3.28	<0.01	33.8	0.02	0.03	39	9	<2	286	<2	12	51.6	97.38
CEY04	Solid	0.1	0.02	0.07	0.03	0.05	0.26	<0.01	22.6	<0.01	<0.01	2	5	<2	5	<2	<2	9.1	32.23
CEY05	Solid	0.3	0.05	0.73	0.03	0.13	0.88	<0.01	39.3	<0.01	<0.01	3	5	<2	65	<2	<2	22.7	64.12
CEY06A	Solid	5	0.62	1.42	0.23	0.61	3.86	<0.01	28.5	0.2	0.02	41	9	<2	126	<2	13	49.4	89.86
CEY09	Solid	0.3	0.02	0.19	0.02	0.14	0.84	<0.01	22	<0.01	<0.01	2	5	<2	9	<2	<2	3.9	27.41
CEY10	Solid	1.2	0.19	0.74	0.1	0.12	0.78	<0.01	40.2	<0.01	0.01	11	6	<2	63	<2	3	4	47.34
FF01A	Solid	0.9	0.13	0.5	0.06	0.22	1.36	<0.01	40.4	0.01	<0.01	10	5	<2	43	<2	<2	34.6	78.18
FF02A	Solid	16.5	1.42	3.16	0.35	1.5	13.3	0.01	10.5	0.03	0.08	115	25	<2	198	4	142	44.2	91.05
FF03A	Solid	4.3	0.53	2.43	0.15	1.1	22.1	<0.01	9.07	0.02	0.03	36	9	<2	83	<2	11	45	84.73
FF03A R	Repeat	4.2	0.5	2.41	0.14	1.08	22.4	<0.01	9.08	0.02	0.02	34	8	<2	82	<2	12	44.7	84.55

Table 2--Chemical analysis of solid samples

Group															
2023-2419															
		Al	**Ca**	**Cr**	**Cs**	**Fe**	**K**	**Li**	**Mg**	**Mn**	**P**	**Rb**	**Ti**	**V**	**Ce**
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
CEY 02		0.014	326	0.033	<0.01	1.45	318	19.1	1430	0.741	0.331	0.025	0.897	<0.01	0.051
CEY 07		<0.01	162	0.040	<0.01	0.552	621	10.3	2720	0.117	1.41	0.057	1.28	<0.01	0.040
CEY 06B		<0.01	114	0.110	<0.01	0.670	1520	13.6	4980	0.013	5.74	0.089	1.40	<0.01	0.011
CEY 08		0.027	136	0.034	<0.01	0.663	357	6.39	1550	0.128	0.704	0.038	1.13	<0.01	0.038
CEY 11B		<0.01	69.1	0.024	<0.01	0.635	231	5.15	906	<0.01	0.016	0.023	0.722	<0.01	0.033
CEY 11A		<0.01	69.6	0.027	<0.01	0.592	249	5.61	1020	<0.01	<0.01	0.024	0.660	<0.01	0.037
FF02B		<0.01	78.9	0.053	<0.01	0.891	2020	9.78	6510	0.008	<0.01	0.106	0.692	<0.01	0.102
FF01B		<0.01	92.5	0.057	<0.01	0.950	2240	10.6	7380	0.005	<0.01	0.122	0.774	<0.01	0.076
FF03B		<0.01	88.2	0.054	<0.01	0.970	2060	9.81	6750	0.005	<0.01	0.116	0.729	<0.01	0.077

Table 3--Brine Chemistry by ICP-MS

Group																	
2023-2419																	
		Al	**Ca**	**Cr**	**Cs**	**Fe**	**K**	**Li**	**Mg**	**Mn**	**Na**	**P**	**Rb**	**S**	**SO_4^{2-}**	**Ti**	**V**
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
CEY 02		< 0.05	231	< 0.05	< 0.05	0.29	220	11.3	1370	0.438	9600	0.863	0.013	16600	49634	1.21	0.006
CEY 07		< 0.05	149	< 0.05	< 0.05	0.066	491	11.2	3240	0.079	10200	2.14	0.038	17600	52624	1.45	0.006
CEY 06B		< 0.05	164	< 0.05	< 0.05	0.576	1370	14.6	6490	0.017	9030	8.65	0.063	15800	47242	1.60	0.020
CEY 08		< 0.05	104	< 0.05	< 0.05	0.077	265	8.67	1480	0.069	23100	1.27	0.023	18400	55016	1.38	0.008
CEY 11B		< 0.05	57.0	< 0.05	< 0.05	< 0.005	169	7.76	829	< 0.05	23200	0.278	0.015	19100	57109	0.785	0.007
CEY 11A		< 0.05	53.9	< 0.05	< 0.05	< 0.05	174	8.60	979	< 0.05	38900	0.105	0.016	32000	95680	0.736	0.005
FF02B		< 0.05	72.7	< 0.05	< 0.05	0.242	1470	14.6	6480	< 0.05	42300	< 0.05	0.073	39600	118404	0.687	< 0.05
FF01B		< 0.05	77.1	< 0.05	< 0.05	0.255	1590	16.5	7680	< 0.05	39900	< 0.05	0.086	34600	103454	0.787	< 0.05
FF03B		< 0.05	75.1	< 0.05	< 0.05	0.443	1490	16.4	7100	< 0.05	37300	< 0.05	0.078	30800	92092	0.765	0.006

Table 4--Brine Chemistry by ICP-OES

Group		
2023-2419		
	pH	
CEY02	8.15	
CEY07	8.08	
CEY06B	5.53	
CEY08	7.73	
CEY11B	8.71	
CEY11A	8.53	
FF02B	8.53	
FF01B	8.55	
FF03B	8.49	

Table 5--pH of brine samples

Sample ID	Density [g/ml]
CEY02	1.099
CEY07	1.146
CEY6B	1.161
CEY08	1.106
CEY11B	1.062
CEY11A	1.059
FF02B	1.055
FF01B	1.063
FF03B	1.063

Table 6--Brine sample density