

Lithium

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CANADIAN DEVELOPMENTS

Canada's production of lithium concentrates is confidential as there is only one Canadian producer. Similarly, Canadian use of lithium is confidential due to the low number of users.

Tantalum Mining Corporation of Canada Limited (Tanco) is Canada's sole producer of lithium. Tanco's Bernic Lake mine in Manitoba produces a low-iron, high-grade spodumene ($\text{Li}_2 \cdot \text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2$) concentrate for the ceramic and glass industry. In addition to these lithium concentrates, the Bernic Lake mine also produces tantalum, cesium and rubidium concentrates. The company is one of three suppliers in the world of high-grade spodumene. Additional information is available on the Internet at www.cabot-corp.com.

Other lithium deposits of significance have been identified in Quebec, Ontario and the Northwest Territories, as well as in other parts of Manitoba. Canada's only other historical producer, Camsul Inc.'s lithium mine, was located between Val-d'Or and Amos, Quebec. It produced spodumene concentrates from 1950 to 1965 when production was suspended due to poor markets. Subsequent attempts to re-open the mine have been unsuccessful.

EXPLORATION ACTIVITY

In 1994, Lithos Corporation conducted a feasibility study for the construction of a spodumene mine and lithium carbonate plant to supply the Canadian aluminum industry. The company examined the possibility of developing the Sirmac Lake spodumene deposit north of Chibougamau, Quebec. Drill-indicated reserves for the deposit had been estimated at about 300 000 t grading 2.04% lithium oxide. Subsequently, the company transferred the assets to a subsidiary, Limtech Inc., which further developed a patented

production process to produce high-purity (99.999%) lithium carbonate and other value-added products (www.limtech.com). Limtech opened a 750-t/y lithium carbonate plant in Shawinigan in 2000 to supply the electronic, battery and pharmaceutical markets. In 2004, upon its bankruptcy, Limtech assets were transferred to Lithium Metal Industries Inc., the Canadian affiliate of QIE North America LLC, the principal secured creditor of Limtech. Limtech operations continue under the direction of the new owner.

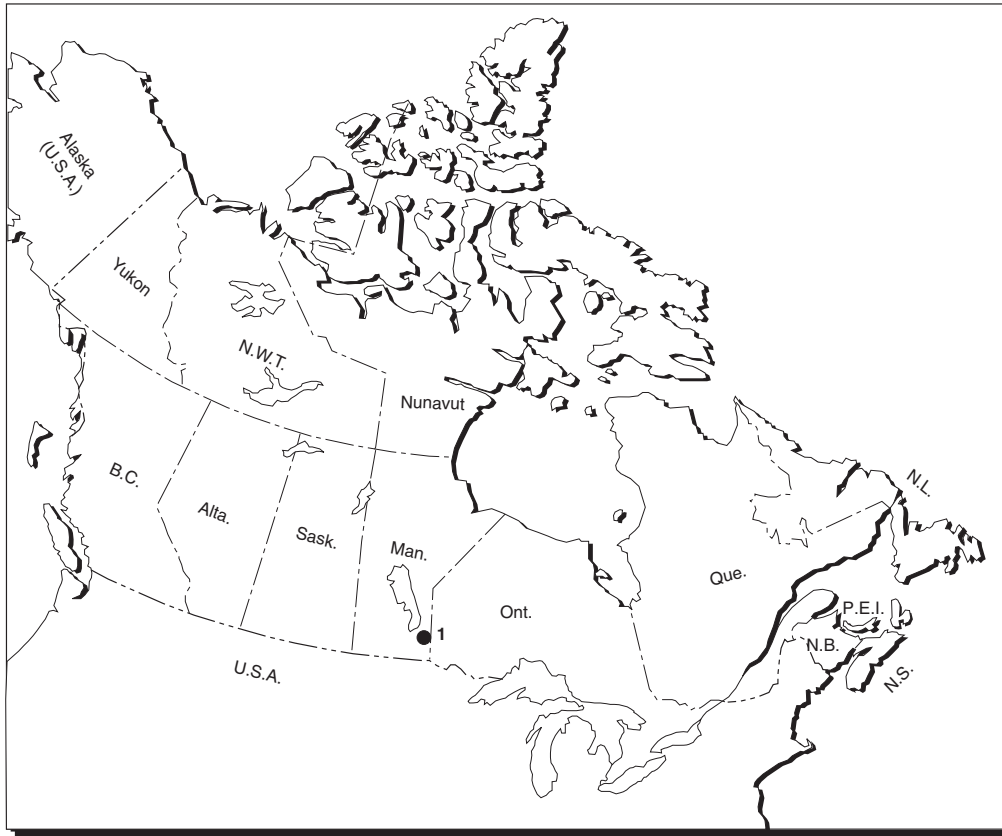
Avalon Ventures Ltd. (www.avalonventures.com) holds its Big Whopper property at Separation Rapids, 70 km north of Kenora in western Ontario. The property hosts a large pegmatite containing lithium, tantalum, cesium and rubidium. The company is focussing on high-lithium feldspar for use in ceramics and glass. It has carried out crucible melt tests on the glass-grade high-lithium feldspar concentrates from the Separation Rapids property to provide qualitative assessment of the melting and quality performance in a container glass formulation. The company continues to investigate potential project financing alternatives.

Angus & Ross PLC of England (50.1%) and Gossan Resources (49.9%) hold a property adjacent to Avalon's in the Separation Rapids area of Manitoba. In 2004, a field program identified a multi-element geochemical soil anomaly, adjacent to Avalon Venture's Big Whopper property, on which further work appears warranted. However, results from four holes drilled in 2004 on the northern portion of the property were disappointing. Additional information is available on the Internet at www.angusandross.com or www.gossan.ca.

Raymor Industries Inc. (www.raymor.com) wrote off its last mining asset, the La Motte lithium property in western Quebec, in 2004 as it focuses on its non-mining interests. However, the company has been exploring the potential production of high-purity lithium metal and the recycling of lithium metal scrap, and intends to proceed with that project when markets develop.

Other companies with Canadian exploration projects with potential for lithium include: Champion Bear Resources, near Separation Rapids, Ontario (www.championbear.com); Globe Star Mining

Figure 1
Spodumene Producers in Canada, 2004



1. Tantalum Mining Corporation of Canada Limited (TANCO)

Corporation, north of Chibougamau, Quebec (www.globestarmining.com); and War Eagle Mining Company Inc. in the southwest corner of the Northwest Territories (property optioned from Strategic Minerals Limited) (www.wareaglemining.com).¹

WORLD DEVELOPMENTS

Chile, China and the United States are the world's leading producers of lithium ore and brine. Other significant producers include Argentina, Brazil, Australia, Portugal, Russia and Zimbabwe.

In Chile, Sociedad Quimica y Minera (SQM) (www.sqm.com) produces lithium carbonate and other

intermediate and specialty lithium chemicals through solar brines. The company is currently constructing a 6000-t/y evaporation of the lithium-containing Salar de Atacama lithium hydroxide facility expected to be in production in mid-2005, and is expanding its lithium carbonate production from the current capacity of 27 000 t/y to 40 000 t/y in 2008.²

Australia's only spodumene producer, Sons of Gwalia Limited, operates a spodumene mine at Greenbushes, Western Australia. Greenbushes supplies over 50% of world demand for lithium minerals in concentrate form. Sons of Gwalia met with financial difficulties in 2004 and was undergoing reorganization in early 2005. (More information is available on the Internet at www.spodumene.com or www.sog.com.au.)

¹ If your company has a lithium property that you wish to be included, contact the Minerals and Metals Sector by telephone at (613) 947-6580 or by e-mail at info-mms@nrcan.gc.ca.

² *Industrial Minerals*, January 2005.

CONSUMPTION AND USES

Lithium is the lightest of the metals in the periodic table with an atomic weight of 6.941. It is a naturally occurring substance that is widely distributed in trace amounts in most rocks, soils and natural waters. Lithium minerals occur mainly in granitic pegmatites. Spodumene, a lithium-aluminum silicate, and naturally occurring lithium-containing brines are the main sources of lithium.

SQM reports that world use of lithium for batteries accounts for 19% of global use, lubricating greases for 16%, frits for 12%, glass for 9%, refrigerants for 8%, aluminum alloying for 6%, pharmaceuticals for 5%, polymers for 5%, and other uses, including those in ceramics and enamels, another 20%.

In the production of glass, the inclusion of lithium-containing materials can result in reduced energy consumption and lower production costs for glass manufacturers through lithium's properties of being a very powerful flux. Lithium also improves the physical qualities of glass quality and strength, lowering thermal expansion. Glass and ceramics containing lithium are preferred for applications such as thermal shock-resistant cookware. Lithium chemicals are also used as catalysts in making synthetic rubbers, as an absorber for carbon dioxide in air conditioners, and in sanitizers and pharmaceuticals. Lithium metal and lithium compounds are used in high-energy lithium, lithium ion and lithium polymer batteries. In the aluminum industry, lightweight lithium alloys are used by the aircraft industry.

Lithium hydroxide is consumed mainly in the production of lithium-containing greases. Their advantages include water and oxidation resistance and good performance under a large temperature range. Lithium greases are used primarily in automotive, military equipment, aircraft and multi-purpose applications.

Lithium is primarily consumed by the aluminum industry as lithium carbonate. As with the manufacturing of glass, the addition of lithium carbonate to the electrolytic cells during aluminum production can result in energy savings.

Lithium carbonate and other lithium compounds are also used in the production of batteries in Canada. Lithium batteries have a small size and large storage capacity, and are long lasting and useable in a wide temperature range. A number of Canadian companies have developed products and technology in this area, including: Avestor, a joint venture of Hydro-Québec and Kerr-McGee Chemical LLC, recently began commercial production and shipments of lithium-metal-polymer batteries (www.avestor.com); E-One Moli Energy (Canada) Limited is the only high-volume manufacturer of cylindrical lithium-ion rechargeable cells in North America (www.molienergy.com); and Electrovaya Inc. develops

and manufactures rechargeable battery products that utilize its proprietary lithium ion SuperPolymer™ technology (www.electrovaya.com).

Lithium salts can also be used to suppress alkali-silica reactions in concrete.

Notes: (1) Although HS codes are often not specific enough to identify individual lithium-containing compounds, if you feel that publication of additional trade statistics for other lithium compounds would assist you or your company, please contact the Minerals and Mining Statistics Division by telephone at 1-800-267-0452 or by e-mail at info-mms@nrca.gc.ca. (2) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 64. (3) Most information in this review was current as of March 31, 2005. (4) This and other reviews, including previous editions, are available on the Internet at www.nrca.gc.ca/mms/cmy/com_e.html.

NOTE TO READERS

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TABLE 1. CANADA, LITHIUM TRADE, 2002-04

		2002		2003		2004(p)	
		(kilograms)	(\$000)	(kilograms)	(\$000)	(kilograms)	(\$000)
EXPORTS							
2825.20	Lithium oxide and hydroxide	36 270	145	–	–	457	5
2836.91	Lithium carbonates	38 250	389	334 946	2 727	853 158	4 500
	Total exports	74 520	534	334 946	2 727	853 615	4 505
IMPORTS							
2825.20.00.10	Lithium oxide	5 952	40	3 057	16	111 127	583
2825.20.00.20	Lithium hydroxide	175 105	967	122 662	686	169 411	958
2828.90.00.30	Lithium hypochlorite	651 241	2 125	566 995	1 852	480 446	1 566
2836.91	Lithium carbonates	911 528	4 021	828 578	3 644	852 173	3 728
	Total imports	1 743 826	7 153	1 521 292	6 198	1 613 157	6 835

Sources: Natural Resources Canada; Statistics Canada.

– Nil; (p) Preliminary.

Note: Numbers may not add to totals due to rounding. Although HS codes may not be specific enough to identify specific lithium containing compounds, if you feel that publication of additional trade statistics for other lithium compounds in future editions of this publication would assist you or your company, please contact the Minerals and Mining Statistics Division by telephone at 1-800-267-0452 or by e-mail at info-mms@nrca.gc.ca.