

LITHIUM

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Canadian Developments

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 ($\text{Li}_2\text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2$) concentrate for the ceramic and glass industry. In addition to lithium, the Bernic Lake mine also produces tantalum, cesium and rubidium.

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 producer, Camsul Inc.'s lithium mine located between Val-d'Or and Amos, Quebec, produced spodumene concentrates from 1950 to 1965 when production was suspended due to poor markets. Subsequent attempts to re-open the mine have not yet been successful.

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 have been estimated at about 300 000 t grading 2.04% lithium oxide. The company has proposed further exploration work to find additional reserves.

World Developments

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

Construction of a new 4000-t/y lithium carbonate plant in Argentina began in 1995; it is expected to begin production in 1996 or 1997. Minera Antiplano is investing \$45 million in the first phase of the project.

In Chile, Sociedad Quimica y Minera was developing a second project that would increase lithium carbonate production by 9000 t/y. Production is expected to begin sometime before the end of the decade.

In 1995, Australia's only spodumene producer, Gwalia Consolidated Limited, was building a lithium carbonate plant at its spodumene mine at Greenbushes, Western Australia. The plant is expected to eventually produce 5000 t/y of lithium carbonate.

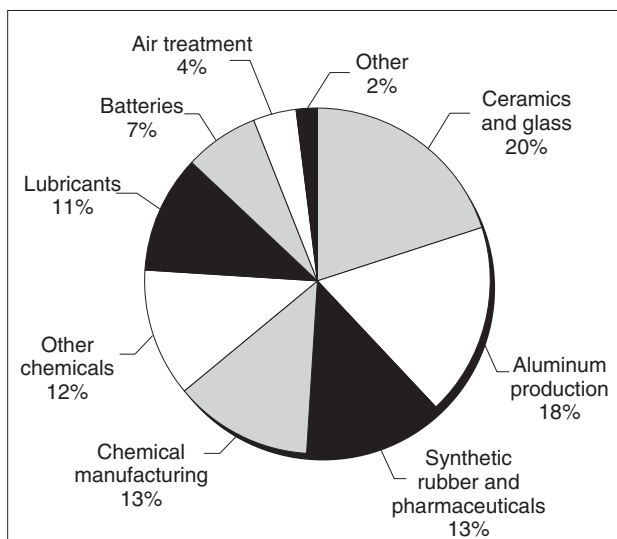
Consumption and Uses

Lithium is the lightest of the metals in the periodic table with an atomic weight of 6.939. 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, is currently the main ore of lithium.

The major uses of lithium are for the production of primary aluminum, lithium-based lubricating greases, and the manufacturing of glasses, ceramics and enamels. Lithium chemicals are also used as catalysts in making synthetic rubbers and as an absorber for carbon dioxide in air conditioners and in sanitizers and pharmaceuticals. Lithium metal is used as an anode in high-energy lithium batteries. In the aluminum industry, lightweight lithium alloys are gaining wider acceptance by the aircraft industry.

The United States is the largest producer and consumer of lithium minerals and compounds worldwide. In Canada, lithium is primarily consumed by the aluminum industry as lithium carbonate. The addition of lithium carbonate to the electrolytic cells during aluminum production lowers the melting point of the cryolite bath allowing for a lower operating temperature, increased electrical conductivity, reduced fluoride emissions, increased production and reduced power consumption.

Figure 1
Lithium Markets in the United States



Source: U.S. Bureau of Mines.

Lithium hydroxide is consumed mainly in the production of lithium soap lubricating greases. Lithium greases account for over 60% of the world's grease market. Their advantages include water and oxidation resistance, as well as good performance under a wide variety of temperatures. Lithium greases are used primarily in automotive, military equipment, aircraft and multi-purpose applications.

The addition of lithium to glass and ceramics in the form of spodumene concentrate or lithium carbonate improves the physical properties and the quality of the glass and ceramics. Lithium improves strength and lowers thermal expansion. Glass and ceramics containing lithium are preferred for applications such as in thermal shock-resistant cookware.

Prices

Prices remained constant from July through to the end of the year for U.S. producer lithium ingot (99.9% purity) in 1000-lb lots at US\$36-\$39/lb, up from the \$33-\$36/lb range in the first half of the year. Spodu-

mene prices (>7.25% Li₂O) traded in the US\$380-\$390/t (f.o.b.) range. Prices for petalite (4.2% Li₂O) traded in the US\$140-\$150/t (f.o.b.) range.

Outlook

Lithium's demand is closely tied to the production of primary aluminum. Increased lithium consumption in the primary aluminum industry continues to have a positive effect on the overall lithium industry. Currently known lithium resources, both spodumene and brine operations, are more than adequate to meet the forecast demand growth. Low-cost brine operations, particularly in Chile, are becoming important sources of supply. The demand for lithium compounds in the glass and ceramics industry is expected to grow modestly. Other markets are expected to remain relatively stable.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 70. (2) Information in this review was current as of February 23, 1996.

TABLE 1. CANADA, LITHIUM PRODUCTION AND TRADE, 1993-95

Item No.	1993		1994		1995 ^p	
	(kilograms)	(\$000)	(kilograms)	(\$000)	(kilograms)	(\$000)
PRODUCTION	x	x	x	x	x	x
EXPORTS						
2825.20	Lithium oxide and hydroxide					
	United States	158	13	303	30	-
	Other countries	1 110	4	140	...	-
	Total	1 268	17	443	30	-
2836.91	Lithium carbonates					
	United States	113	14	20	2	-
	Total	113	14	20	2	-
IMPORTS						
2825.20.00.10	Lithium oxide					
	United States	2 787	15	8 252	43	1 876
	Other countries	-	-	2 276	11	273
	Total	2 787	15	10 528	56	2 149
2825.20.00.20	Lithium hydroxide					
	United States	65 373	382	86 685	511	116 268
	United Kingdom	281	1	41	...	153
	Switzerland	-	-	-	-	23
	Total	65 654	384	86 726	511	116 444
2828.90.90.20	Lithium hypochlorite					
	United States	193 211	693	241 069	877	247 219
	Total	193 211	693	241 069	877	247 219
2836.91	Lithium carbonates					
	United States	902 740	4 351	859 345	4 172	780 444
	Chile	271 050	1 228	306 144	1 494	252 000
	People's Republic of China	19 450	88	35 572	171	17 272
	United Kingdom	-	-	22	...	50
	Total	1 193 240	5 668	1 201 083	5 838	1 049 766
	Total	1 193 240	5 668	1 201 083	5 838	1 049 766

Sources: Natural Resources Canada; Statistics Canada.
 - Nil; ... Amount too small to be expressed; p Preliminary; x Confidential.
 Note: Numbers may not add to totals due to rounding.