U.S. Department of the Interior
U.S. Geological Survey

MINERAL COMMODITY SUMMARIES 2009

Abrasives
Aluminum
Antimony
Arsenic
Asbestos
Barite
Bauxite
Beryllium
Bismuth
Boron
Bromine
Cadmium
Cement
Cesium
Chromium
Clays
Cobalt
Copper
Diamond
Diatomite
Feldspar
Fluorspar
Gallium
Garnet
Gemstones
Germanium
Gold
Graphite
Gypsum
Hafnium
Helium
Indium
Iodine
Iron Ore
Iron and Steel
Kyanite
Lead
Lime
Lithium
Magnesium
Manganese
Mercury
Mica
Molybdenum
Nickel
Niobium
Nitrogen
Peat
Perlite
Phosphate Rock
Platinum
Potash
Pumice
Quartz Crystal
Rare Earths
Rhenium
Rubidium
Salt
Sand and Gravel
Scandium
Selenium
Silicon
Silver
Soda Ash
Sodium Sulfate
Stone
Strontium
Sulfur
Talc
Tantalum
Tellurium
Thallium
Thorium
Tin
Titanium
Tungsten
Vanadium
Vermiculite
Yttrium
Zinc
Zirconium

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LITHIUM

(Data in metric tons of lithium content unless otherwise noted)

Domestic Production and Use: Chile was the leading lithium chemical producer in the world; Argentina, China, and the United States also were major producers. Australia, Canada, Portugal, and Zimbabwe were major producers of lithium ore concentrates. The United States remained the leading consumer of lithium minerals and compounds and the leading producer of value-added lithium materials. Because only one company produced lithium compounds from domestic resources, reported production and value of production data cannot be published. Estimation of value for the lithium mineral compounds produced in the United States is extremely difficult because of the large number of compounds used in a wide variety of end uses and the great variability of the prices for the different compounds. Two companies produced a large array of downstream lithium compounds in the United States from domestic or South American lithium carbonate. A U.S. recycling company produced a small quantity of lithium carbonate from solutions recovered during the recycling of lithium batteries.

Although lithium markets vary by location, global end-use markets are estimated as follows: batteries, 25%; ceramics and glass, 18%; lubricating greases, 12%; pharmaceuticals and polymers, 7%; air conditioning, 6%; primary aluminum production, 4%; continuous casting, 3%; chemical processing 3%; and other uses, 22%. Lithium use in batteries expanded significantly in recent years because rechargeable lithium batteries were being used increasingly in portable electronic devices and electrical tools.

Salient Statistics—United States:	2004	2005	2006	2007	2008[e]
Production	W	W	W	W	W
Imports for consumption	2,910	3,580	3,260	3,140	3,000
Exports	1,690	1,720	1,500	1,760	1,900
Consumption:					
Apparent	W	W	W	W	W
Estimated	1,900	2,500	2,500	2,100	1,700
Employment, mine and mill, number	57	59	61	68	68
Net import reliance[1] as a percentage of apparent consumption	>50%	>50%	>50%	>50%	>50%

Recycling: Insignificant, but increasing through the recycling of lithium batteries.

Import Sources (2004-07): Chile, 61%; Argentina, 36%; and other, 3%.

Tariff: Item	Number	Normal Trade Relations 12-31-08
Other alkali metals	2805.19.9000	5.5% ad val.
Lithium oxide and hydroxide	2825.20.0000	3.7% ad val.
Lithium carbonate:		
U.S.P. grade	2836.91.0010	3.7% ad val.
Other	2836.91.0050	3.7% ad val.

Depletion Allowance: 22% (Domestic), 14% (Foreign).

Government Stockpile: None.

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LITHIUM

Events, Trends, and Issues: The only active lithium carbonate plant in the United States was a brine operation in Nevada. Subsurface brines have become the dominant raw material for lithium carbonate production worldwide because of lower production costs as compared with the mining and processing costs for hard-rock ores. Two brine operations in Chile dominate the world market; a facility at a brine deposit in Argentina produced lithium carbonate and lithium chloride. A second brine operation was under development in Argentina. Most of the lithium minerals mined in the world were used directly as ore concentrates in ceramics and glass applications rather than feedstock for lithium carbonate and other lithium compounds. Based on new information, lithium production was apparently discontinued in Russia during the early 1990s.

The market for lithium compounds with the largest potential for growth is batteries, especially rechargeable batteries. Demand for rechargeable lithium batteries continued to grow for use in cordless tools, portable computers and telephones, and video cameras. Several major automobile companies were pursuing the development of lithium batteries for hybrid electric vehicles—vehicles with an internal combustion engine and a battery-powered electric motor. Most commercially available hybrid vehicles use other types of batteries, although future generations of these vehicles may use lithium. Nonrechargeable lithium batteries were used in calculators, cameras, computers, electronic games, watches, and other devices.

World Mine Production, Reserves, and Reserve Base: Reserves and reserve base estimates for Australia have been revised based on new information.

	Mine production		Reserves[2]	Reserve base[2]
	2007	2008[e]		
United States	W	W	38,000	410,000
Argentina[e]	3,000	3,200	NA	NA
Australia[e]	6,910	6,900	170,000	220,000
Bolivia	—	—	—	5,400,000
Brazil	180	180	190,000	910,000
Canada	707	710	180,000	360,000
Chile	11,100	12,000	3,000,000	3,000,000
China	3,010	3,500	540,000	1,100,000
Portugal	570	570	NA	NA
Zimbabwe	300	300	23,000	27,000
World total (rounded)	[3]25,800	[3]27,400	4,100,000	11,000,000

World Resources: The identified lithium resources total 760,000 tons in the United States and more than 13 million tons in other countries.

Substitutes: Substitutes for lithium compounds are possible in batteries, ceramics, greases, and manufactured glass. Examples are calcium and aluminum soaps as substitutes for stearates in greases; calcium, magnesium, mercury, and zinc as anode material in primary batteries; and sodic and potassic fluxes in ceramics and glass manufacture. Lithium carbonate is not considered to be an essential ingredient in aluminum potlines. Substitutes for aluminum-lithium alloys as structural materials are composite materials consisting of boron, glass, or polymer fibers in engineering resins.

[e]Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data. — Zero.

[1]Defined as imports – exports + adjustments for Government and industry stock changes.

[2]See Appendix C for definitions.

[3]Excludes U.S. production.