

MAGNESIUM METAL¹

(Data in thousand metric tons, unless otherwise noted)

Domestic Production and Use: In 2003, magnesium was produced by one company in Utah by an electrolytic process that recovered magnesium from brines from the Great Salt Lake. The largest use for magnesium, which accounted for 47% of apparent consumption, was as a constituent of aluminum-base alloys that were used for packaging, transportation, and other applications. Structural uses of magnesium (castings and wrought products) accounted for 30% of domestic metal use. Desulfurization of iron and steel accounted for 13% of U.S. consumption of primary metal, and other uses were 10%.

Salient Statistics—United States:	1999	2000	2001	2002	2003^e
Production:					
Primary	W	W	W	W	W
Secondary (new and old scrap)	86	82	66	74	75
Imports for consumption	91	91	69	88	80
Exports	29	24	20	25	22
Consumption:					
Reported, primary	131	104	96	96	100
Apparent	179	² 160	² 120	² 110	² 120
Price, yearend:					
Metals Week, U.S. spot Western, dollars per pound, average	1.48	1.27	1.25	1.16	1.10
Metal Bulletin, European free market, dollars per metric ton, average	2,500	2,000	1,825	1,930	1,900
Stocks, producer and consumer, yearend	W	W	W	W	W
Employment, number ^e	700	700	375	375	375
Net import reliance ³ as a percentage of apparent consumption	38	43	44	55	47

Recycling: In 2003, about 26,000 tons of the secondary production was recovered from old scrap.

Import Sources (1999-2002): Canada, 43%; China, 18%; Russia, 17%; Israel, 11%; and other, 11%.

Tariff:	Item	Number	Normal Trade Relations 12/31/03
	Unwrought metal	8104.11.0000	8.0% ad val.
	Unwrought alloys	8104.19.0000	6.5% ad val.
	Wrought metal	8104.90.0000	14.8¢/kg on Mg content + 3.5% ad val.

Depletion Allowance: Dolomite, 14% (Domestic and foreign); magnesium chloride (from brine wells), 5% (Domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: A magnesium producer in Canada indefinitely closed its 58,000-ton-per-year primary magnesium plant in Quebec in April. Competition from imports from China and technical problems at the plant were cited as the principal reasons for the closure. The sole U.S. magnesium producer continued to install new electrolytic cells at its plant in Utah. These cells are larger, more energy efficient, and generate fewer emissions. Installation of these cells would increase the plant's capacity to 60,000 tons per year from its current level of 45,000 tons per year; no timetable was set for completion.

Construction of a 97,000-ton-per-year magnesium plant in Queensland, Australia, was stopped in June when its owner could not secure additional funding necessary to complete the plant. The company wrote off \$525 million for the project. When completed, this plant had been expected to supply a U.S. auto manufacturer with 45,000 tons per year of magnesium for 10 years, worth an estimated \$1.3 billion; the supply agreement between the two firms was dissolved. Another company that was planning to construct an 84,000-ton-per-year magnesium plant in South Australia did not raise enough through a stock offering to fund the initial phase of construction of 41,000 tons per year.

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Despite the difficulties faced by some proposed magnesium projects, other firms continued to plan new magnesium plants. One firm raised enough equity to fund a feasibility study for a 100,000-ton-per-year plant in La Trobe Valley, Victoria, Australia, that would recover magnesium from coal fly ash. The study was scheduled to be completed by 2005. In Canada, a company that plans to construct a 120,000-ton-per-year magnesium extraction plant completed its feasibility study and raised additional capital through a stock offering. The \$1.24 billion project near Hope, British Columbia, would recover magnesium from a body of ultramafic rocks containing about 25% magnesium. Also, development of a 60,000-ton-per-year magnesium plant in Congo (Brazzaville) continued with the company raising capital through a stock offering and signing an offtake agreement with a German metals firm. Initial production at the plant is scheduled for 2007, and magnesium would be recovered from a deposit of magnesium salts.

Several magnesium producers in China planned production capacity increases within the next 2 years for metal and/or alloy. In addition to the country's role as a magnesium supplier to the United States, China is becoming a significant supplier to Europe. With the closure of nearly all of Europe's primary magnesium production facilities by the end of 2002 and the removal of the European Commission's antidumping duty on magnesium from China in April 2003, Europe has become an attractive market for magnesium from China. By midyear, increasing coal prices in China led to an increase in magnesium production costs and a subsequent increase in China free market prices. Prices increased from about \$1,400 per metric ton at the beginning of 2003 to about \$1,650 per metric ton near the end of the year.

Some U.S. magnesium consumers had financial difficulties in 2003. A large desulfurization reagent producer filed for Chapter 11 bankruptcy in June. Much of the company's production is sold to steel producers, and the recent bankruptcy filings of many U.S. steel producers cost the company more than \$5.5 million over the past 3 years. One of the largest U.S. producers of magnesium wrought products filed for Chapter 11 bankruptcy protection in January; this company's Madison, IL, plant was purchased by a United Kingdom-based magnesium scrap processor.

For the 2004 model year, the average North American-produced family vehicle contained about 4.5 kilograms (10 pounds) of magnesium castings. This quantity has been increasing each year and has doubled in 10 years. Auto manufacturers continued to broaden the use of existing magnesium diecastings by installing them in new models. In addition, magnesium producers are investigating new magnesium-base alloys with enhanced properties that could increase magnesium's use in automotive applications.

World Primary Production, Reserves, and Reserve Base:

	Primary production		Reserves and reserve base ⁴
	2002	2003 ^e	
United States	W	W	Magnesium metal is derived from seawater, natural brines, dolomite, and other minerals. The reserves and reserve base for this metal are sufficient to supply current and future requirements. To a limited degree, the existing natural brines may be considered to be a renewable resource wherein any magnesium removed by humans may be renewed by nature in a short span of time.
Brazil	6	6	
Canada	80	50	
China	^e 230	300	
Israel	34	30	
Kazakhstan	18	14	
Norway	10	—	
Russia	^e 50	45	
Serbia and Montenegro	<u>1</u>	<u>2</u>	
World total ⁵	429	447	

World Resources: Resources from which magnesium may be recovered range from large to virtually unlimited and are globally widespread. Resources of dolomite and magnesium-bearing evaporite minerals are enormous. Magnesium-bearing brines are estimated to constitute a resource in the billions of tons, and magnesium can be recovered from seawater at places along world coastlines.

Substitutes: Aluminum and zinc may substitute for magnesium in castings and wrought products. For iron and steel desulfurization, calcium carbide may be used instead of magnesium.

^eEstimated. W Withheld to avoid disclosing company proprietary data. — Zero.

¹See also Magnesium Compounds.

²Rounded to two significant digits to protect proprietary data.

³Defined as imports – exports + adjustments for Government and industry stock changes.

⁴See Appendix C for definitions.

⁵Excludes the United States.