USGS
science for a changing world

2005 Minerals Yearbook

MAGNESIUM COMPOUNDS

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

June 2006

MAGNESIUM COMPOUNDS

By Deborah A. Kramer

Domestic survey data and tables were prepared by Elena M. Lita, statistical assistant, and the world production table was prepared by Glenn J. Wallace, international data coordinator.

Domestic production of caustic-calcined magnesia and dead-burned magnesia in 2005 increased from those 2004, but imports continued to supply most of the U.S. demand for magnesia. Consumption of refractory magnesia increased by about 16% from that in 2004, with imports supplying a significant portion of the total. Caustic-calcined magnesia consumption increased slightly, with imports supplying about 50% of total U.S. demand. Production of magnesium hydroxide increased; much of the increase was in response to increased consumption of magnesium hydroxide in environmental applications.

About 52% of U.S. magnesium compounds production came from seawater and well and lake brines. The remainder was recovered from brucite, dolomite, magnesite, and olivine. About 60% of the total consumption of magnesium compounds was for refractory applications. The remaining 40% was used in agricultural, chemical, environmental, and other applications. China remained the dominant supplier of imports for refractory (dead-burned and fused) and caustic-calcined magnesias with 82% and 63%, respectively, of the totals.

Legislation and Government Programs

On September 7, 2 United States companies sued a group of 17 Chinese magnesite producers and exporters under Federal antitrust law in New Jersey District Court. The suit claimed that the Chinese companies had conspired to manipulate the price of magnesite and related exports to the United States and other countries, which violated fair trade laws of the United States (Doudou and Yi, 2005§[1]).

Production

Shipments of caustic-calcined magnesia, refractory magnesia, and magnesium hydroxide increased, and production of magnesium carbonate and magnesium sulfate fell (table 3). Increased use of magnesium hydroxide in environmental applications was partially responsible for the 28% increase in production of magnesium hydroxide.

Data for magnesium compounds were collected by the U.S. Geological Survey from one voluntary survey of U.S. operations. Of the 16 operations canvassed, 69% responded, representing 92% of the magnesium compounds shipped and used, including data for some compounds that were not reportable in table 3. Data for the five nonrespondents were estimated on the basis of prior-year consumption levels.

The largest capacity magnesite production facilities in the world are in China, North Korea, and Russia. Together, these three countries accounted for two-thirds of the world magnesite production capacity. Japan and the United States accounted for about one-half of the world's magnesium compounds production capacity from seawater or brines. Fused magnesia was produced in Australia, Brazil, Canada, China, Israel, Japan, the Republic of Korea, Mexico, Russia, the United Kingdom, and the United States. World production capacity was estimated to be about 650,000 metric tons per year (t/yr), including about 500,000 t/yr of capacity in China.

Fused magnesia was produced by two companies in the United States—Newminco Inc. with a plant in Midway, TN, and UCM Group PLC of the United Kingdom, which operated a plant in Cherokee, AL, through its Muscle Shoals Minerals Inc. subsidiary.

Norway is the world's principal producer and supplier of olivine. Other producers include Australia, Austria, Brazil, China, Denmark (Greenland), Italy, Japan, the Republic of Korea, Mexico, Spain, Taiwan, Turkey, and the United States. Rudi (2001) estimated that total world production of olivine averaged about 4 million metric tons per year (Mt/yr), with about 3.3 Mt/yr consumed in Europe. An additional 4 Mt/yr of dunite and serpentinite that is often commercially called olivine is produced. One company in the United States produced olivine—Olivine Corp., which operated one mine and processing plant in Washington.

In August, Great Salt Lake Minerals Corp. announced plans to increase its liquid magnesium chloride capacity in Utah by 70% and double its capacity to produce solid magnesium chloride by mid-2006. The company expected to invest $12 million during the next 2 years to expand its magnesium chloride evaporation ponds at Great Salt Lake, upgrade its production facility, and add rail infrastructure (Compass Minerals International, Inc., 2005§).

Consumption

In 2005, chemical intermediates were the largest tonnage end use for caustic-calcined magnesia, with 39% of the total. Environmental applications (water treatment and stack gas scrubbing, in descending order) was the second largest end use, with 28% of the total. The following categories, with the individual components in descending order of consumption in parentheses, were the other end-use sectors for caustic-calcined magnesia: agriculture (animal feed and fertilizers), 15%; construction (primarily oxychloride and oxysulfate cements), 8%; manufacturing (fluxes, rubber, and electrical), 6%; pharmaceuticals and nutrition, less than 1%; and unspecified uses, 4%.

Magnesium hydroxide was used mainly for water treatment, as a chemical intermediate, and in medicines and pharmaceuticals (uses are given in descending order of quantity). Smaller applications for magnesium hydroxide were in the construction industry, in rubber processing, and in pharmaceuticals. Magnesium sulfate was used mostly for chemical, fertilizer, pulp and paper, pharmaceutical, rubber, water treatment, construction, and cosmetics applications (in descending order of quantity).

[1]References that include a section mark (§) are found in the Internet References Cited section.

Magnesium chloride was used mainly for ice control. Magnesium chloride brines were used for road dust and ice control.

Prices

Prices published in Chemical Market Reporter and Industrial Minerals at yearend 2005 for magnesium compounds and olivine did not change from those published at yearend 2004 (table 4).

Foreign Trade

Dead-burned magnesia exports in 2005 were 17% less than those in 2004 (table 5). Canada (83%) was the principal destination. Caustic-calcined magnesia exports increased by 32% from those in 2004. Venezuela (45%) and France (29%) were the main destinations.

Imports of dead-burned magnesia increased by about 14% from those in 2004, with imports from China representing 82% of the total (table 7). Imports of caustic-calcined magnesia were about 3% less than those in 2004. China (63%) and Canada (27%) were the primary sources.

Trade data for olivine are not available separately from the U.S. Census Bureau. The Journal of Commerce Port Import/Export Reporting Service (PIERS), however, provides data on material that travels by ship. U.S. exports of olivine in 2005 were 3,090 metric tons (t). Argentina (59%) and Mexico (35%) were the principal destinations. U.S. olivine imports were 147,000 t, 54% higher than those in 2004. Norway was the source of almost all (99.4%) United States olivine imports.

World Review

European Union.—On October 6, the European Commission (EC) imposed antidumping duties on imports of magnesia refractory bricks from China. The antidumping duties ranged from 8.1% to 39.9%, applicable to the net free-at-Community-frontier price, depending upon the exporting company. The duty affects bricks that contain at least 80% magnesium oxide. During the investigation period, the EC found that import quantities from China into the European Union had increased by about 150% and the import values had declined by 22% (Industrial Minerals, 2005c).

Australia.—Queensland Magnesia Pty. Ltd. (QMag) planned to spend about $4.9 million upgrading its Kunwarara magnesite mine near Marlborough in central Queensland. The initial expansion would create about 50 jobs; this announcement was the first stage of an overall planned expansion that could generate an additional 150 jobs. No details on the size of the expansion were available. QMag had the capacity to produce 110,000 t/yr each of caustic-calcined magnesia and dead-burned magnesia and 25,000 t/yr of fused magnesia (ABC News Online, 2005§).

Austria.—To meet growing global demand for high-purity magnesium hydroxide flame retardants, MAGNIFIN Magnesiaprodukte GmbH & Co. KG (the Albemarle Corp. and RHI Group joint-venture company) announced that it would double its 10,000-t/yr capacity at its Breitenau site in two stages. Completion was scheduled for 2006 (Albemarle Corp., 2005§).

Canada.—Baymag Inc. mothballed Plant 1 at its Exshaw, Alberta, magnesia operation in mid-2005, citing rising energy costs and increased maintenance as the principal reasons for the closure. Plant 1 included a 100,000-t/yr natural-gas-fired rotary kiln that was leased from Lafarge Group and had been operating since 1982. Baymag expected to continue to operate Plant 2, which includes a 50,000-t/yr vertical shaft kiln that was installed in 1997, to produce caustic-calcined magnesia. The company also had the capacity to produce 14,000 t/yr of fused magnesia from Plant 2 (Industrial Minerals, 2005a).

China.—The Chinese magnesite export syndicate that was formed in February 2004 fell apart less than 1 year after its formation. The syndicate was the fifth in a series of associations established to control pricing and export quantities of magnesite. Two of the reasons cited for the failure to establish an export syndicate were that the prices set by the association were too high and, as a result, too much of the export quota was left for sale at the end of the year (O'Driscoll, 2005).

China's Ministry of Commerce announced the export quota for calcined magnesia for 2006. The total was 1.36 million metric tons (Mt), a slight decrease from the 1.4 Mt offered in 2005.

Greenland.—The Seqi olivine mine was officially opened on August 11, and in December, the first shipment of 43,000 t of olivine arrived in Amsterdam, Netherlands, for processing and subsequent sale to the European market. Production capacity for the new mine was expected to reach 1.1 Mt/yr in 2006. Beginning in August 2006, olivine processing for steel applications was scheduled to take place in Greenland, and processing for refractory and foundry applications would take place in Europe. Minelco AB (the project owner) purchased Crew Development Corp.'s portion of the project in July, and the company planned to supply the North American market with olivine for trials beginning in January 2006. Minelco's captive consumption of olivine was estimated to be 300,000 t/yr, and the new mine will have enough capacity to supply the company as well as provide olivine for export (Industrial Minerals, 2006).

Jordan.—Because of technical problems with some plant equipment, the Jordan Magnesia Co. Ltd. (Jormag) magnesia plant remained closed throughout 2005. The plant had closed in December 2004 for scheduled maintenance, but did not reopen. In addition, the company's exclusive sales agent, Possehl S.A., withdrew from its agreement to represent Jormag for the sale of their products (Industrial Minerals, 2005h).

Russia.—Russian Mining Chemical Co. LLC announced that it would increase production capacity for brucite from its mine in the Jewish Autonomous Region to 80,000 to 100,000 t/yr in 2006 from 50,000 t/yr. This mine is the only producer of brucite in Russia and has supplied the country's needs for brucite as a flux component for metallurgy and for refractories. The company planned to upgrade its facilities to increase production of ground brucite for environmental and flame-retardant applications (Industrial Minerals, 2005e).

Serbia and Montenegro.—The Kosovo Trust Agency, which was established in 2002 to privatize dormant public companies, announced in September that the area's two magnesite mines, XIM Strezoc Magnesite Mine and Goleshi Magnesite Mine, were available for sale. The Strezoc Mine was estimated to contain between 4.5 and 5.5 Mt of magnesite, which included higher grade ore reserves of 1.5 to 1.7 Mt. The reserves at the Goleshi Mine were estimated to be 2.4 Mt of medium- to high-grade

magnesite. Although both operations produced dead-burned and caustic-calcined magnesia prior to the Balkan conflict in the early 1990s, neither had been producing since the early 2000s. The first bids for the operations were due on January 18, 2006 (Industrial Minerals, 2005b; Kosovo Trust Agency, 2005§).

Turkey.—ŞETAT Madencilik Gıda Sanayi ve Ticaret A.Ş. (Setat Mining) began processing and test production at its new olivine mine in Orhaneli in September 2004, and commercial production began in 2005. The company's total production capacity at the mine was 400,000 t/yr, and the company produced products for slag conditioning and ballast (120,000 t/yr), steelmaking (100,000 t/yr), abrasives (85,000 t/yr), foundry sand (75,000 t/yr), and refractory (20,000 t/yr) applications for domestic and European markets. Setat Mining also planned to invest in an olivine pilot plant in the Isparta-Eğridir region where it has 2,000 hectares of mining concessions (Industrial Minerals, 2005g; ŞETAT Madencilik Gıda Sanayi ve Ticaret A.Ş., undated§).

In December 2004, Akdeniz Mineral Kaynaklari A.Ş acquired Comag Continental Madencilik Sanayii Tic. A.Ô.'s magnesite calcination and beneficiation plant in Kumbet and a beneficiation plant and a concession of 2,230 hectares in Erenkoy. During 2005, Akdeniz Mineral (a subsidiary of Grecian Magnesite S.A.) completed repairs to the Kumbet facility, which was expected to reopen in 2006 with a production capacity of 12,000 t/yr of caustic-calcined magnesia (Industrial Minerals, 2005f).

United Kingdom.—After nearly 70 years of production, CJC Chemicals & Magnesia Ltd., the sole magnesia producer in the United Kingdom, closed in June. It had the capacity to produce 7,000 t/yr of caustic-calcined magnesia and 20,000 t/yr of magnesium hydroxide from seawater. The plant had produced dead-burned magnesia from its startup in 1937 until 2002 (Industrial Minerals, 2005d).

Outlook

According to the International Iron and Steel Institute (2006§), world steel production in 2005 increased by 5.9% from that in 2004, with China as the leading producer. Production in China increased by almost 25% and represented nearly 31% of total world production. Because Chinese production was outstripping demand and the market was oversupplied, China's Government intended to close inefficient and uneconomic capacities and concentrate a greater share of output under the control of several large companies. Even if some operations are closed, China was expected to remain the world's dominant steel producer. Increased iron and steel production in China could lead to more internal consumption of refractories, which would mean that less material would be available for export. Because the United States has lost much of its refractory magnesia production capacity in recent years and China is the principal United States supplier, a shortage of supply in the United States is possible. China, however, has vast resources of magnesite, and could increase magnesite production capacity to meet its internal and export needs.

Caustic-calcined magnesia markets are fairly mature, but use of magnesium hydroxide for environmental applications is growing. Because of its superior properties, magnesium hydroxide is expected to continue to replace such material as lime and caustic soda in some environmental applications.

References Cited

Industrial Minerals, 2005a, Baymag magnesia supply update: Industrial Minerals, no. 455, August, p. 7.

Industrial Minerals, 2005b, Bids sought for Kosovo magnesite ops: Industrial Minerals, no. 458, November, p. 9.

Industrial Minerals, 2005c, Chinese MgO bricks face definitive EU duties: Industrial Minerals, no. 458, November, p. 26.

Industrial Minerals, 2005d, CJC Chemicals closes: Industrial Minerals, no. 454, July, p. 9.

Industrial Minerals, 2005e, Far East brucite: Industrial Minerals, no. 459, December, p. 54.

Industrial Minerals, 2005f, New lease of life for Turkish caustic mag: Industrial Minerals, no. 458, November, p. 10.

Industrial Minerals, 2005g, Olivine from Turkey: Industrial Minerals, no. 455, August, p. 58-59

Industrial Minerals, 2005h, Possehl SA withdraws from Jormag: Industrial Minerals, no. 456, September, p. 16.

Industrial Minerals, 2006, Olivine sunrise: Industrial Minerals, no. 460, January, p. 69.

O'Driscoll, Mike, 2005, Magnesia—On the high road again: Industrial Minerals, no. 451, April, p. 37-45.

Rudi, Fred, 2001, Olivine—A Norwegian forte: Industrial Minerals, no. 410, November, p. 45-49.

Internet References Cited

ABC News Online, 2005 (August 22), QMag announces expansion plans, accessed March 27, 2006, at URL http://www.abc.net.au/news/australia/qld/capricornia/200508/s1442872.htm.

Albemarle Corp., 2005 (June 2), Albemarle to expand production of mineral flame retardants, accessed June 3, 2005, at URL http://www.albemarle.com/News_and_events/index.asp?news=text&releaseID=716596.

Compass Minerals International, Inc., 2005 (August 10), Compass Minerals International, Inc. to expand its magnesium chloride capacity, accessed March 24, 2006, at URL http://phx.corporate-ir.net/phoenix.zhtml?c=148615&p=irol-newsArticle_print&ID=741782&highlight=.

Doudou, Ye, and Yi, Lou, 2005 (November 14), Chinese companies face antitrust suits, Cajing Magazine, accessed April 3, 2006, at URL http://caijing.hexun.com/english/detail.aspx?issue=146&sl=2486&id=1412028.

International Iron and Steel Institute, 2006 (January 18), 2005 (full year) crude steel production, accessed April 25, 2006, at URL http://www.worldsteel.org/?action=newsdetail&id=143.

Kosovo Trust Agency, 2005 (September 5), Kosovo Trust Agency announces two major mines now available for purchase, accessed March 29, 2006, at URL http://kta-kosovo.org/ktapress/2005/eng/xim-gol-eng.pdf.

ŞETAT Madencilik Gıda Sanayi ve Ticaret A.Ş., [undated], Facilities, accessed March 24, 2006, at URL http://setatmaden.com.tr/english/uretim.html.

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Historical Statistics for Mineral Commodities in the United States. Data Series 140.

Magnesian Refractories. Ch. in United States Mineral Resources, Professional Paper 820, 1973.

Magnesium, its Alloys and Compounds. Open-File Report 01-341, 2001.

Magnesium Compounds. Ch. in Mineral Commodity Summaries, annual.

Other

Chemical Market Reporter, weekly.

Industrial Minerals, monthly.

Magnesium Minerals and Compounds. Ch. in Industrial

Minerals and Rocks (7th ed.), Society for Mining, Metallurgy, and Exploration, Inc., 2006.
Magnesium. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.
Magnesium and Magnesite in the CIS in 1996. Roskill Information Services Ltd., 1996.
Magnesium Compounds and Chemicals (9th ed.). Roskill Information Services Ltd., 2001.
Olivine (2d ed.). Roskill Information Services Ltd., 1990.

TABLE 1
SALIENT MAGNESIUM COMPOUND STATISTICS[1]

(Thousand metric tons and thousand dollars)

	2001	2002	2003	2004	2005
United States:					
Caustic-calcined and specified magnesias:[2]					
Shipped by producers:[3]					
Quantity	136	127	154	132	137
Value	43,300	38,100	61,000	55,400	60,300
Exports[4]	4	6	4	4	5
Imports for consumption[4]	130	148	150	157	152
Refractory magnesia:					
Shipped by producers:[3]					
Quantity	213	123	84	W	W
Value	71,300	37,800	23,500	W	W
Exports	63	73	56	30	25
Imports for consumption	363	394	379	418	478
World, production of magnesite	11,100	13,600	14,000	14,700 r	14,300 e

eEstimated. rRevised. W Withheld to avoid disclosing company proprietary data.
[1]Data are rounded to no more than three significant digits.
[2]Excludes caustic-calcined magnesia used in the production of refractory magnesia.
[3]Includes magnesia used by producers.
[4]Caustic-calcined magnesia only.

TABLE 2
U.S. MAGNESIUM COMPOUND PRODUCERS, BY RAW MATERIAL SOURCE, LOCATION, AND PRODUCTION CAPACITY, IN 2005[1]

(Metric tons, MgO equivalent)

Raw material source and producing company	Location	Capacity	Products
Brucite, Applied Chemical Magnesias Corp.	Van Horn, TX, and Bullhead City, AZ	25,000	Magnesium hydroxide.
Magnesite, Premier Chemicals LLC	Gabbs, NV	140,000	Caustic-calcined magnesia.
Lake brines:			
Great Salt Lake Minerals Corp.	Ogden, UT	106,000	Magnesium chloride and magnesium chloride brines.
Intrepid Wendover-Potash LLC	Wendover, UT	45,000	Magnesium chloride brines.
Well brines:			
Martin Marietta Magnesia Specialties LLC[2]	Manistee, MI	297,000	Caustic-calcined magnesia, dead-burned magnesia, and magnesium hydroxide.
Rohm and Haas Co.	do.	25,000	Magnesium hydroxide and caustic-calcined magnesia.
Seawater:			
Premier Chemicals LLC	Port St. Joe, FL	107,000	Caustic-calcined magnesia and magnesium hydroxide.
South Bay Salt Works	Chula Vista, CA	3,000	Magnesium chloride brines.
SPI Pharma Inc.	Lewes, DE	5,000	Magnesium hydroxide.
Total		753,000	

[1]Data are rounded to no more than three significant digits; may not add to total shown.
[2]In addition to its Michigan plant, Martin Marietta owned a 15,000-metric-ton-per-year-capacity magnesium hydroxide plant in Lenoir City, TN, which used imported magnesite as a raw material.

TABLE 3
U.S. MAGNESIUM COMPOUNDS SHIPPED AND USED[1]

	2004		2005	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Caustic-calcined and specified (USP and technical) magnesias[2]	132,000	$55,400	137,000	$60,300
Magnesium hydroxide [100% $Mg(OH)_2$][2]	113,000	60,700	145,000	70,700
Magnesium sulfate, anhydrous and hydrous	53,700	15,200	52,300	16,500
Precipitated magnesium carbonate[2]	105	475	--	--
Refractory magnesia	W	W	W	W

W Withheld to avoid disclosing company proprietary data. -- Zero.

[1]Data are rounded to no more than three significant digits.

[2]Excludes material produced as an intermediate step in the manufacture of other magnesium compounds.

TABLE 4
YEAREND MAGNESIUM COMPOUND PRICES

Material		2004	2005
Magnesia, dead-burned	per short ton	$365-375	$365-375
Magnesia, synthetic, technical, 98% MgO	do.	490	490
Magnesium chloride, hydrous, 99%, flake	do.	290	290
Magnesium chloride, anhydrous, 92%, flake or pebble	per pound	0.1275-0.15	0.1275-0.15
Magnesium hydroxide, powder, technical	do.	0.45	0.45
Magnesium hydroxide slurry, technical, 100% $Mg(OH)_2$	do.	238-250	238-250
Magnesium sulfate, technical (epsom salts)	do.	0.18-0.215	0.18-0.215
Olivine, aggregate, free on board plant or mine	per metric ton	50-78	50-78
Olivine, foundry grade, free on board plant or mine	do.	62-109	62-109

Sources: Chemical Market Reporter and Industrial Minerals.

TABLE 5
U.S. EXPORTS OF CRUDE AND PROCESSED MAGNESITE, BY COUNTRY[1]

	2004		2005	
Material and country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Caustic-calcined magnesia:				
France	1,300	$752	1,430	$846
Germany	412	230	412	246
Netherlands	1,330	696	475	280
Venezuela	--	--	2,200	869
Other	674	517	406	257
Total	3,720	2,200	4,920	2,500
Dead-burned and fused magnesia:				
Brazil	286	294	205	193
Canada	23,500	8,020	20,800	7,850
France	445	270	41	38
Germany	462	278	550	509
Korea, Republic of	417	267	19	12
Mexico	574	573	497	642
Netherlands	814	561	333	196
Taiwan	618	359	237	168
United Kingdom	577	5,240	307	315
Venezuela	612	215	605	243
Other	1,650	1,200	1,400	1,220
Total	29,900	17,300	24,900	11,400

See footnotes at end of table.

TABLE 5—Continued

U.S. EXPORTS OF CRUDE AND PROCESSED MAGNESITE, BY COUNTRY[1]

Material and country	2004 Quantity (metric tons)	2004 Value (thousands)	2005 Quantity (metric tons)	2005 Value (thousands)
Other magnesia:				
Brazil	387	494	1,260	1,540
Canada	6,320	3,090	5,480	2,960
Germany	820	834	2,350	1,510
Hong Kong	393	426	496	456
Indonesia	1,240	734	142	92
Japan	3,020	2,530	247	372
Mexico	3,400	2,980	3,240	3,000
Taiwan	4,780	2,700	651	538
United Kingdom	834	1,010	766	757
Venezuela	34	65	878	278
Other	2,570 r	3,360 r	6,210	6,830
Total	23,400	17,700	21,700	18,300
Crude magnesite:				
Argentina	732	78	1,250	133
Australia	4,030	465	5,040	588
Canada	3,940	509	4,770	617
France	4,730	511	4,570	489
Germany	1,650	176	1,960	212
Mexico	598	63	474	53
Sweden	--	--	1,090	117
United Kingdom	97	10	1,120	120
Venezuela	2,710	320	--	--
Other	964	113	1,550	165
Total	19,500	2,250	21,800	2,490

rRevised. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 6

U.S. EXPORTS OF MAGNESIUM COMPOUNDS[1]

Material	2004 Quantity (metric tons)	2004 Value (thousands)	2005 Quantity (metric tons)	2005 Value (thousands)	Principal destinations, 2005
Magnesium chloride, anhydrous and other	5,100	$3,390	6,060	$3,750	Canada, 83%.
Magnesium hydroxide and peroxide	15,700	10,100	13,500	11,100	Canada, 57%; United Kingdom, 12%.
Magnesium sulfate, natural kieserite and epsom salts	11,900	1,130	2,780	483	Canada, 100%.
Magnesium sulfate, other	8,450	3,520	10,300	4,190	Canada, 91%.

[1]Data are rounded to no more than three significant digits.

Source: U.S. Census Bureau.

TABLE 7

U.S. IMPORTS FOR CONSUMPTION OF CRUDE AND PROCESSED MAGNESITE, BY COUNTRY[1]

Material and country	2004 Quantity (metric tons)	2004 Value (thousands)	2005 Quantity (metric tons)	2005 Value (thousands)
Caustic-calcined magnesia:				
Australia	1,670	$597	160	$57
Brazil	3,000	296	5,800	638
Canada	55,500	9,300	40,900	7,390
China	96,400	11,300	96,300	13,700
Greece	--	--	3,000	759
Korea, Republic of	--	--	5,270	916
Other	830	671	677	439
Total	157,000	22,200	152,000	23,900
Dead-burned and fused magnesia:				
Australia	10,800	3,270	13,300	6,910
Austria	27,700	14,600	28,000	14,200
Brazil	6,000	770	--	--
China	341,000	71,000	390,000	82,900
Greece	2,650	500	6,050	1,290
Hong Kong	5,300	992	20,900	4,310
Israel	2,760	5,120	2,010	4,160
Japan	3,390	5,340	3,830	5,520
Korea, Republic of	2	10	6,200	1,380
Mexico	11,800	3,970	5,680	2,270
Netherlands	4,550	1,540	--	--
Other	2,120	1,590 r	1,860	909
Total	418,000	109,000	478,000	124,000
Other magnesia:				
Canada	1,900	428	1,100	297
China	3,160	1,480	2,690	1,690
Israel	859	1,430	442	648
Japan	1,760	3,090	1,300	2,430
Mexico	2,010	1,120	8,120	3,150
Netherlands	18	38	1,490	1,230
Slovakia	3,870	1,210	1,890	654
Other	2,080 r	2,010 r	1,260	1,230
Total	15,700	10,800	18,300	11,300
Crude magnesite:				
Brazil	541	200	920	241
Canada	6,180	404	238	15
China	6,100	618	5,310	297
Israel	81	24	2,360	450
Japan	2,320	500	4,330	887
Korea, Republic of	412	179	--	--
Other	272 r	54 r	1,840	373
Total	15,900	1,980	15,000	2,260

rRevised. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF MAGNESIUM COMPOUNDS[1]

	2004		2005		
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Principal sources, 2005
Magnesium chloride, anhydrous and other	83,800	$15,200	72,900	$15,100	Israel, 86%; Netherlands, 12%.
Magnesium hydroxide and peroxide	6,390	10,800	6,240	12,100	Israel, 29%; Japan, 21%; Netherlands, 18%.
Magnesium sulfate, natural epsom salts	1,040	289	1,310	349	India, 66%; China, 24%.
Magnesium sulfate, natural kieserite	10,800	558	13,900	1,030	Germany, 100%.
Magnesium sulfate, other	30,100	13,700	24,500	6,140	Germany, 61%; Canada, 29%.

[1]Data are rounded to no more than three significant digits.

Source: U.S. Census Bureau.

TABLE 9
WORLD MAGNESIUM COMPOUNDS ANNUAL PRODUCTION CAPACITY, DECEMBER 31, 2005[1, 2]

(Thousand metric tons, MgO equivalent)

	Raw material				
	Magnesite		Seawater or brines		
Country	Caustic-calcined	Dead-burned	Caustic-calcined	Dead-burned	Total
Australia	82	108	--	--	190
Austria	197	268	--	--	465
Brazil	58	276	--	--	334
Canada	150	--	--	--	150
China	275	2,940	--	10	3,230
France	--	--	30	--	30
Greece	120	100	--	--	220
India	20	296	--	--	316
Iran	--	30	--	--	30
Ireland	--	--	--	90	90
Israel	--	--	10	60	70
Italy	25	--	--	--	25
Japan	--	--	50	250	300
Jordan	--	--	10	50	60
Korea, North	--	1,100	--	--	1,100
Korea, Republic of	--	--	--	40	40
Mexico	--	--	15	95	110
Netherlands	--	--	10	150	160
Poland	--	10	--	--	10
Russia	100	2,400	--	--	2,500
Serbia and Montenegro	40	160	--	--	200
Slovakia	--	465	--	--	465
South Africa	12	--	--	--	12
Spain	145	60	--	--	205
Turkey	15	404	--	--	419
Ukraine	--	120	20	80	220
United Kingdom	--	--	7	--	7
United States	140	--	201	195	536
Total	1,380	8,740	353	1,020	11,500

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes capacity at operating plants, as well as at plants on standby basis.

TABLE 10
MAGNESITE: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Metric tons)

Country	2001	2002	2003	2004	2005[e]
Australia	605,314	484,498	472,668	325,402	335,000
Austria, crude[e]	700,000	700,000	700,000	700,000	700,000
Brazil, beneficiated	265,749	302,230 [r]	306,444 [r]	366,174 [r]	370,000
Canada[e, 3]	180,000	180,000	180,000	180,000	180,000
China[e]	3,580,000	4,560,000	4,600,000	4,650,000	4,700,000
Colombia[e]	10,500	10,500	10,500	10,500	10,500
Greece, crude[e]	500,000	500,000	500,000	500,000	500,000
India[e]	370,000	380,000	380,000	370,000	360,000
Iran[4]	133,778	128,565	87,795 [r]	88,194 [r]	88,000
Korea, North[e]	1,000,000	1,000,000	1,000,000	1,200,000 [r]	1,200,000
Mexico	250	--	-- [e]	-- [e]	--
Pakistan[e]	4,200	4,000	4,200	4,200	4,400
Poland, concentrate	22,200	22,100	22,000	22,000 [e]	20,000
Russia[e]	1,000,000	1,000,000	1,200,000	1,200,000	1,100,000
Serbia and Montenegro, crude[e]	36,000 [5]	33,000	25,000	25,000	25,000
Slovakia, concentrate	961,000	929,630	993,900	995,000 [e]	1,000,000
South Africa	36,500	87,200	86,100	65,900 [r]	66,000
Spain, calcined[e]	260,000	250,000	250,000	250,000	250,000
Turkey, run-of-mine	1,450,031	3,044,440	3,224,278	3,732,952 [r]	3,400,000
United States	W	W	W	W	W
Zimbabwe	2,439	2,366	1,333	749	893 [5]
Total	11,100,000	13,600,000	14,000,000	14,700,000 [r]	14,300,000

[e]Estimated. [r]Revised. W Withheld to avoid disclosing company proprietary data; not included in "Total." -- Zero.

[1]World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Figures represent crude salable magnesite. In addition to the countries listed, Bulgaria produced magnesite, but output is not reported quantitatively and available information is inadequate for formulation of reliable estimates of output levels. Table includes data available through May 15, 2006.

[3]Magnesitic dolomite and brucite. Figures are estimated on the basis of reported tonnage dollar value.

[4]Year beginning March 21 of that stated.

[5]Reported figure.