MAGNESIUM COMPOUNDS

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Production of most magnesium compounds in 2004 was lower than that in 2003, reflecting the effects of the loss of a magnesium hydroxide producer and a dead-burned magnesia producer for the full year. Dead-burned magnesia consumption, however, increased as imports from China continued to supply most of the U.S. demand. For dead-burned magnesia, net imports (imports minus exports) supplied most of U.S. consumption. Caustic-calcined magnesia production fell by about 15% from that in 2003, but consumption was only about 6% lower. Net imports of caustic-calcined magnesia supplied about 53% of domestic demand.

About 51% 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 58% of the total consumption of magnesium compounds was for refractory applications. The remaining 42% was used in agricultural, chemical, environmental, and other applications. China remained the dominant supplier of imports for refractory and caustic-calcined magnesias with 82% and 61%, respectively, of the totals.

Production

With the exception of magnesium sulfate, production of all magnesium compounds in the United States declined from 2003 to 2004 (table 3). The drop in production reflected the effects of the first full year of closure of Dow Chemical Co.'s Ludington, MI, plant that produced magnesium hydroxide for refractory and environmental applications. In addition, Rohm and Haas Inc. stopped producing magnesium carbonate in 2003 and was shipping from stocks in 2004.

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, 88% responded, representing 76% of the magnesium compounds shipped and used, including some data not reportable in table 3. Data for the two nonrespondents were estimated on the basis of prior-year consumption levels and other factors.

The largest capacity magnesite production facilities in the world are in China, North Korea, and Russia. Together, these three countries account for two-thirds of the world's magnesite production capacity. Japan and the United States account for about one-half of the world's magnesium compounds production capacity from seawater or brines. Fused magnesia is produced in Australia, Brazil, Canada, China, Israel, Japan, the Republic of Korea, Mexico, Russia, the United Kingdom, and the United States. World production capacity is 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, 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.

Two companies in the United States produced olivine—Unimin Corp. and Olivine Corp. Unimin operated two mines, one in North Carolina and one in Washington, and processing plants in Indiana, North Carolina, and Washington. Olivine operated one mine and one processing plant in Washington.

In February, Reilly Industries Inc. agreed to sell its potash and brine business, which included its Wendover, UT, brine facility, to Intrepid Mining LLC. Reilly produced potash and magnesium chloride brine at the Wendover plant, and Intrepid Mining expected to continue production of these products. Intrepid installed a new deep brine well that would provide brine from an additional aquifer to augment production (Green Markets, 2004).

Martin Marietta Magnesia Specialties LLC announced that it would increase production capacity for high-surface-area magnesium oxide at its plant in Manistee, MI. After the expansion, total capacity would be about 1,100 t/yr. The high-surface-area product is used in flame-retardant applications (Industrial Minerals, 2004e). Martin Marietta also introduced its Cellguard™ magnesium hydroxide product for use in paper mills and licensed the rights to its Thioguard™ product for use in sewage systems in certain areas of the Midwest (Martin Marietta Materials Inc., 2005§[1]).

J.P. Morgan Partners LLC, the private equity arm of J.P. Morgan Chase & Co., announced that it would acquire the privately held PQ Corp., one of the leading U.S. producers of magnesium sulfate. The terms were not disclosed. The sale was subject to approval by PQ's shareholders, which included descendants of Joseph Elkinton, who started the company in 1831, and current and retired management. The transaction was expected to close in the first quarter of 2005 (Chemical Week Newswire, 2004§).

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

Consumption

In 2004, environmental applications (water treatment and stack gas scrubbing, in descending order) was the largest tonnage end use for caustic-calcined magnesia, with 41% of the total, and chemical intermediates was second with 35% 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), 20%; construction (primarily oxychloride and oxysulfate cements), 3%; manufacturing (rubber, fuel additives, and electrical), 1%; pharmaceuticals and nutrition (medicine and pharmaceuticals and cosmetics), less than 1%; and unspecified uses, less than 1%.

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

Foundry uses remained the leading application for olivine in the United States, accounting for 91% of consumption of domestically produced material. Sandblasting and other abrasive uses accounted for 5% of U.S. consumption, and refractory applications accounted for 4%.

Prices

Quoted prices for magnesium oxide and magnesium hydroxide increased slightly from those at yearend 2003, and other magnesium compounds prices remained at the same level (table 4). Press reports indicated that several U.S. producers raised prices during 2004 because of increased natural gas and freight costs. Martin Marietta Specialties Magnesia increased its prices for magnesium hydroxide by 6% at the beginning of 2004 and announced a 5% increase on its caustic-calcined magnesia products in July. Premier Chemicals LLC increased its magnesium oxide and magnesium hydroxide prices at the beginning of 2004 by 4%. Premier Chemicals also introduced freight and energy surcharges (O'Driscoll, 2004b).

Foreign Trade

Exports of dead-burned and caustic-calcined magnesia from the United States both fell from the level in 2003 (table 5). Dead-burned magnesia exports dropped by 47%. Canada (78%) was the principal destination. Caustic-calcined magnesia exports were 8% less than those in 2003. The Netherlands (36%) and France (35%) were the main destinations.

Imports of dead-burned magnesia increased by about 10% from those in 2003, with imports from China representing 82% of the total (table 7). Imports of caustic-calcined magnesia were about 5% higher than those in 2003. China (61%) and Canada (35%) 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 2004 were 1,710 metric tons (t), with 83% of the material shipped to Argentina. U.S. olivine imports totaled 95,200 t, a 56% decrease from the high level in 2003. Norway was the source of almost all (99.9%) U.S. olivine imports.

World Review

European Union.—The European Commission began an investigation into dumping of magnesia-carbon refractory bricks from China into the European Union (EU). The suit was filed by the European Refractory Producers Association, which represents 15 refractory producers with more than 50% of the EU's magnesite brick production. The suit alleged that imports of magnesia bricks from China have increased and have had an adverse impact on the quantities and prices of bricks sold by the EU producers. The investigation was expected to be completed by September 2005 (Industrial Minerals, 2004b).

Australia.—Australian Magnesium Corp. (AMC) sold its Queensland Magnesium Corp. (QMAG) subsidiary on December 1, 2004. QMAG and all remaining rights to magnesite deposits were sold to Resource Capital Fund III L.P. (RCF) for $5.8 million and assumption of the $42.5 million debt to ANZ Banking Group Ltd. In return for being released by ANZ as a guarantor of the facility, Newmont Mining Corp. will provide a loan of $21.8 million to RCF and forgive AMC's debts of $5.6 million. RCF was expected to invest in QMAG to increase production capacity to 100,000 t/yr and improve the efficiency at the company's Kunwarara mine beginning in 2005 (Industrial Minerals, 2004a).

China.—In February, another magnesite export syndicate was formed in China—the China Magnesite Self-Disciplined Association. This is the fifth version of a group that was established to regulate magnesite exports and prices since 2000. The new group represents five of the leading Chinese magnesite producers, and its goal was to maintain dead-burned magnesite prices in a range between $152 per metric ton for 90.0% magnesium oxide and $210 per ton for 97.3% magnesium oxide (Industrial Minerals, 2004f).

Because of increasing prices in China for fuel coke and increasing freight costs, magnesia prices rose substantially during the first part of 2004. In January, 94% magnesium oxide caustic-calcined magnesia prices were reported to be $108 to $110 per ton, but by July, this price range had increased to $165 to $185 per ton (O'Driscoll, 2004b).

Greenland.—Sweden's Minelco AB [a subsidiary of Luossavaara-Kiirunavaara Aktiebolag (LKAB)] continued to develop the Seqi olivine project. In June, the LKAB board of directors authorized Minelco to proceed with the commercial arrangements with the owner of the deposit, Crew Development Ltd., and to begin production. As a result, Seqi Olivine A/S was formed as an operating company that will be jointly owned by Minelco (51%) and Crew Development (49%). The company submitted an application to the Greenland authorities for sample testing, and based on the normal approval process time, the mine was expected to be operational by the second half of 2005. The mine was designed for all-year operation, with a production capacity of 1.7 Mt/yr (O'Driscoll, 2004a).

Jordan.—Jordan Magnesia Co. inaugurated the dead-burned magnesia section of its new 60,000-t/yr magnesia plant in March. Dead-burned magnesia capacity is 50,000 t/yr; the remaining capacity can produce caustic-calcined magnesium and magnesium hydroxide (Industrial Minerals, 2004d). In December, however, the plant stopped production for scheduled maintenance, and the company encountered some technical problems, so the plant remained closed at yearend. No startup date was announced (O'Driscoll, 2005).

Netherlands.—Greek magnesite producer Grecian Magnesite SA opened a new branch operation in Vlaardingen near Rotterdam to improve service to its Western European customers, which accounted for about 50% of its overall business. The 10,000-t/yr operation included importing, processing, and sales functions for crude magnesite, caustic-calcined magnesia, and dead-burned magnesia. In addition to supplying material from Grecian Magnesite's facilities in Greece, it could supply material from Grecian Magnesite's affiliated companies in Spain and Turkey (Industrial Minerals, 2004c).

Turkey.—Turkey's Siltaş Silis Kumlari Sanayi ve Ticaret A.Ş. acquired 100% of Olivin Mineral AS (a subsidiary of OlivinGroup). Olivin Mineral produced forsterite from deposits near the Marmara Sea but had been working at about 10% of capacity. By the end of June, the company installed additional flotation and hydrosizing capacity to increase the production capacity at the plant to 1,500 metric tons per hour and expected the plant to be at its full production capacity of 5 Mt/yr by September (O'Driscoll, 2004c).

Current Research and Technology

As part of U.S. Department of Energy-funded research, scientists at The Pennsylvania State University developed a method to modify serpentine to quickly remove carbon dioxide (CO_2) from flue gases generated by burning fossil fuels. Serpentine naturally sequesters CO_2 over geologic time; previous research on CO_2 sequestration used finely crushed serpentine, but it still took high temperatures to speed up the reaction. With the new process, the serpentine does not need to be crushed as finely, and the reaction gives off heat. In the new process, serpentine is dissolved in sulfuric acid, which converts the silicon in the mineral to silicon dioxide and the magnesium into magnesium sulfate. Treating some of this magnesium sulfate with sodium hydroxide also creates some magnesium hydroxide. The researchers were able to convert large quantities of the serpentine's magnesium to these chemicals, thereby providing large surface areas for reactions to take place in solution at room temperature. Passing the CO_2 gas stream through the magnesium sulfate-magnesium hydroxide solution produces magnesium carbonate (Pennsylvania State University, The, 2004§).

Outlook

According to the International Iron and Steel Institute (2005§), world steel production in 2004 increased by 8.8% from that in 2003, with China as the leading producer. Production in China increased by more than 23% and represented more than 25% of total world production. 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 U.S. 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. In its 2004 annual report, Martin Marietta reported that it had ramped up production sharply to support increased sales of magnesium hydroxide slurry for use in wastewater treatment and flue gas scrubbing at powerplants. Because of its superior properties, magnesium hydroxide is expected to continue to replace material such as lime and caustic soda in some environmental applications.

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TABLE 1
SALIENT MAGNESIUM COMPOUND STATISTICS[1]

(Thousand metric tons and thousand dollars)

	2000	2001	2002	2003	2004
United States:					
Caustic-calcined and specified magnesias:[2]					
Shipped by producers:[3]					
Quantity	172	136	127	154	132
Value	46,000	43,300	38,100	61,000	55,400
Exports[4]	12	4	6	4	4
Imports for consumption[4]	136	130	148	150	157
Refractory magnesia:					
Shipped by producers:[3]					
Quantity	196	213	123	84	W
Value	68,100	71,300	37,800	23,500	W
Exports	60	63	73	56	30
Imports for consumption	501	363	394	379	418
World, production of magnesite	12,700	11,100	13,600 r	14,000 r	14,500 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 2004[1]

(Metric tons of 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 Mining LLC	Wendover, UT	45,000	Magnesium chloride brines.
Well brines:			
Martin Marietta Magnesia Specialties LLC[2]	Manistee, MI	297,000	Caustic-calcined and dead-burned magnesia.
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.
SPI Pharma Inc.	Lewes, DE	5,000	Magnesium hydroxide.
Western Salt Co.	Chula Vista, CA	3,000	Magnesium chloride brines.
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]

	2003		2004	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Caustic-calcined and specified (USP and technical) magnesias[2]	154,000	$61,000	132,000	$55,400
Magnesium hydroxide [100% $Mg(OH)_2$][2]	217,000	101,000	113,000	60,700
Magnesium sulfate, anhydrous and hydrous	40,000	14,400	53,700	15,200
Precipitated magnesium carbonate[2]	1,470	3,500	105	475
Refractory magnesia	84,400	23,500	W	W

W Withheld to avoid disclosing company proprietary data.

[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		2003	2004
Magnesia, dead-burned	per short ton	$363-368	$365-375
Magnesia, synthetic, technical, 98% MgO	do.	488	490
Magnesium chloride, hydrous, 99%, flake	do.	290 [r]	290
Magnesium chloride, anhydrous, 92%, flake or pebble	per pound	0.1275-0.15 [r]	0.1275-0.15
Magnesium hydroxide, powder, technical	do.	0.45	0.45
Magnesium hydroxide slurry, technical, 100% $Mg(OH)_2$	do.	235-240	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

[r]Revised; prices for hydrous and anhydrous magnesium chloride in the 2003 Minerals Yearbook chapter were switched.

Sources: Chemical Market Reporter and Industrial Minerals.

TABLE 5

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

Material and country	2003 Quantity (metric tons)	2003 Value (thousands)	2004 Quantity (metric tons)	2004 Value (thousands)
Caustic-calcined magnesia:				
France	1,850	$1,060	1,300	$752
Germany	308	177	412	230
Netherlands	1,180	678	1,330	696
Other	727 r	417 r	674	517
Total	4,060	2,330	3,720	2,200
Dead-burned and fused magnesia:				
Brazil	1,010	1,320	286	294
Canada	48,900	15,200	23,500	8,020
France	1,130	736	445	270
Germany	314	202	462	278
Korea, Republic of	575	389	417	267
Mexico	622	366	574	573
Netherlands	1,120	759	814	561
Taiwan	693	378	618	359
United Kingdom	435	352	577	5,240
Venezuela	309	93	612	215
Other	1,400 r	1,120 r	1,650	1,200
Total	56,500	20,900	29,900	17,300
Other magnesia:				
Canada	7,060	2,480	6,320	3,090
Colombia	1,530	530	67	140
Germany	348	360	820	834
Hong Kong	656	800	393	426
Indonesia	1,200	665	1,240	734
Japan	5,310	4,320	3,020	2,530
Mexico	3,670	3,220	3,400	2,980
Taiwan	3,480	1,830	4,780	2,700
United Kingdom	433	544	834	1,010
Venezuela	996	349	34	65
Other	2,850 r	3,750 r	2,890	3,710
Total	27,500	18,800	23,800	18,200
Crude magnesite:				
Argentina	1,320	141	732	78
Australia	60	6	4,030	465
Canada	1,300	181	3,940	509
France	1,810	193	4,730	511
Germany	29	3	1,650	176
Mexico	1,020	109	598	63
United Kingdom	4,340	481	97	10
Venezuela	6,140	701	2,710	320
Other	1,930 r	219 r	964	113
Total	18,000	2,030	19,500	2,250

rRevised.

[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	2003 Quantity (metric tons)	2003 Value (thousands)	2004 Quantity (metric tons)	2004 Value (thousands)	Principal destinations, 2004
Magnesium chloride, anhydrous and other	8,150	$4,020	5,100	$3,390	Canada, 78%.
Magnesium hydroxide and peroxide	13,700	8,850	15,700	10,100	Canada, 61%; Germany, 11%.
Magnesium sulfate, natural kieserite and epsom salts	2,460	1,060	11,900	1,130	Canada, 99%.
Magnesium sulfate, other	6,970	3,080	8,450	3,520	Canada, 87%.

[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	2003 Quantity (metric tons)	2003 Value (thousands)	2004 Quantity (metric tons)	2004 Value (thousands)
Caustic-calcined magnesia:				
Australia	786	$383	1,670	$597
Brazil	--	--	3,000	296
Canada	44,100	7,550	55,500	9,300
China	92,700	9,550	96,400	11,300
Greece	11,000	2,870	--	--
Other	1,440 r	2,230 r	830	671
Total	150,000	22,600	157,000	22,200
Dead-burned and fused magnesia:				
Australia	23,000	5,440	10,800	3,270
Austria	15,600	7,630	27,700	14,600
Brazil	--	--	6,000	770
China	310,000	49,800	341,000	71,000
Greece	5,210	1,110	2,650	500
Hong Kong	6,160	1,330	5,300	992
Israel	2,500	5,540	2,760	5,120
Japan	1,610	2,680	3,390	5,340
Mexico	6,090	1,950	11,800	3,970
Netherlands	3,720	1,070	4,550	1,540
Other	5,370 r	1,970 r	2,120	1,600
Total	379,000	78,500	418,000	109,000
Other magnesia:				
Canada	1,690	346	1,900	428
China	9,660	1,970	3,160	1,480
Israel	680	1,110	859	1,430
Japan	2,010	3,210	1,760	3,090
Mexico	1,490	898	2,010	1,120
Slovakia	4,620	1,670	3,870	1,210
Other	890	1,090	2,100	2,050
Total	21,000	10,300	15,700	10,800
Crude magnesite:				
Brazil	--	--	541	200
Canada	2,460	169	6,180	404
China	7,590	566	6,100	618
Japan	2,370	531	2,320	500
Korea, Republic of	954	270	412	179
Other	956 r	207 r	353	78
Total	14,300	1,740	15,900	1,980

[r]Revised. -- 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]

	2003		2004		
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Principal sources, 2004
Magnesium chloride, anhydrous and other	60,400	$13,200	83,800	$15,200	Israel, 74%; Germany, 21%.
Magnesium hydroxide and peroxide	5,220	8,510	6,390	10,800	Netherlands, 29%; Israel, 22%; Austria, 18%.
Magnesium sulfate, natural epsom salts	555	153	1,040	289	China, 81%.
Magnesium sulfate, natural kieserite	13,100	653	10,800	558	Germany, 100%.
Magnesium sulfate, other	32,800	13,200	30,100	13,700	Germany, 45%; Canada, 33%; China, 19%.

[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, 2004[1, 2]

(Thousand metric tons of MgO equivalent)

	Raw material				
	Magnesite		Seawater or brines		
Country	Caustic-calcined	Dead-burned	Caustic-calcined	Dead-burned	Total
Australia	128	110	--	--	238
Austria	25	250	--	--	275
Brazil	80	291	--	--	371
Canada	150	--	--	--	150
China	200	2,500	--	10	2,710
France	--	--	30	--	30
Greece	120	100	--	--	220
India	28	267	--	--	295
Iran	--	30	--	--	30
Ireland	--	--	--	90	90
Israel	--	--	10	60	70
Italy	25	--	--	--	25
Japan	--	--	50	250	300
Jordan	--	--	10	50	60
Korea, North	--	1,150	--	--	1,150
Korea, Republic of	--	--	--	40	40
Mexico	--	--	15	95	110
Netherlands	--	--	10	150	160
Poland	--	10	--	--	10
Russia	100	2,670	--	--	2,770
Serbia and Montenegro	40	160	--	--	200
Slovakia	--	465	--	--	465
South Africa	12	--	--	--	12
Spain	160	70	--	--	230
Turkey	25	365	--	--	390
Ukraine	--	120	20	80	220
United Kingdom	--	--	70	--	70
United States	140	--	201	195	536
Zimbabwe	20	--	--	--	20
Total	1,250	8,560	416	1,020	11,200

-- 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	2000	2001	2002	2003	2004[e]
Australia	349,783	605,314	484,498	472,668	325,402 [3]
Austria, crude[e]	726,000 [3]	700,000	700,000	700,000	700,000
Brazil, beneficiated	279,876	265,749	269,222	269,000 [e]	269,000
Canada[e, 4]	180,000	180,000	180,000	180,000	180,000
China[e]	4,070,000	3,580,000	4,560,000 [r]	4,600,000 [r]	4,650,000
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]	365,080 [3]	370,000	380,000	380,000	370,000
Iran[5]	141,000 [e]	133,778	128,565 [r]	130,000 [e]	135,000
Korea, North[e]	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Mexico	335	250	--	-- [e]	--
Pakistan[e]	4,192 [3]	4,200	4,000	4,200	4,200
Poland, concentrate	26,100	22,200	22,100	22,000 [r]	22,000
Russia[e]	1,000,000	1,000,000	1,000,000	1,200,000	1,200,000
Serbia and Montenegro, crude	41,000	36,000	33,000 [e]	25,000 [r, e]	25,000
Slovakia, concentrate	1,000,000	961,000	929,630 [r]	993,900 [r]	995,000
South Africa	63,000	36,500	87,200 [r]	86,100 [r]	85,000
Spain, calcined[e]	266,000 [3]	260,000	250,000	250,000	250,000
Turkey, run-of-mine	2,672,089	1,450,031	3,044,440	3,224,278 [r]	3,800,000
United States	W	W	W	W	W
Zimbabwe	4,029	2,439	2,366	1,333 [r]	749 [3]
Total	12,700,000	11,100,000	13,600,000 [r]	14,000,000 [r]	14,500,000

[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 13, 2005.

[3]Reported figure.

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

[5]Year beginning March 21 of that stated.