



2009 Minerals Yearbook

MAGNESIUM COMPOUNDS

MAGNESIUM COMPOUNDS

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U.S. production of caustic-calcined magnesia and dead-burned (refractory) magnesia decreased from the levels in 2008. Imports continued to account for more than one-half of U.S. consumption of magnesia. Consumption of refractory magnesia was less than one-half the level in 2008, reflecting the decline in steel production. Caustic-calcined (and other) magnesia consumption decreased by about 19%, with imports of caustic-calcined (and other) magnesia accounting for about 45% of total U.S. consumption.

About 53% of U.S. magnesium compounds production came from seawater and well and lake brines. The remainder was recovered from dolomite, magnesite, and olivine. About 60% of the total consumption of magnesium compounds was used in agricultural, chemical, environmental, and other applications. The remaining 40% was for refractory applications. China remained the dominant supplier of imports for caustic-calcined and refractory (dead-burned and fused) magnesias, with 63% and 64%, respectively, of the totals.

Legislation and Government Programs

In August, the U.S. Department of Commerce, International Trade Administration (ITA), began an antidumping duty investigation of imports of magnesia-carbon bricks from China and Mexico and a countervailing duty investigation of imports of magnesia-carbon bricks from China. Although the preliminary antidumping duty decision was scheduled to be completed by September 14, it was postponed until February 24, 2010, as a result of requests by the petitioner, Resco Products Inc. (U.S. Department of Commerce, International Trade Administration, 2009a, c, d). In December, the ITA made a preliminary determination that subsidies were not being provided to producers and exporters of magnesia-carbon bricks from China, so no duties would be assessed (U.S. Department of Commerce, International Trade Administration, 2009b).

Production

U.S. shipments of caustic-calcined magnesia were 14% lower than those in 2008, and refractory magnesia shipments decreased significantly (table 3). Magnesium hydroxide shipments were about 5% lower than those in 2008. The decrease in magnesium compounds consumption was mainly a result of the economic downturn that had begun at the end of 2008.

Data for magnesium compounds were collected by the U.S. Geological Survey (USGS) from one voluntary survey of U.S. operations. Of the 12 operations canvassed, 92% responded, representing 99% of the magnesium compounds shipped and used, including data for some compounds that were not

reportable in table 3. Data for the one nonrespondent were estimated on the basis of prior-year production levels.

The largest capacity magnesite processing facilities in the world are in China and Russia. Together with the United States, these countries accounted for about 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, China, Israel, Japan, the Republic of Korea, Mexico, Russia, the United Kingdom, and the United States. World production capacity for fused magnesia was estimated to be about 560,000 metric tons per year (t/yr), including about 372,000 t/yr of capacity in China (Schroeder, 2006). Fused magnesia was produced by one company in the United States, UCM Group PLC of the United Kingdom, which operated a plant in Cherokee, AL, through its Muscle Shoals Minerals Inc. subsidiary.

Norway has been traditionally the world's principal producer and supplier of olivine, but since 2004, when a new olivine mine was opened in Greenland, Norway's share of world production has dropped to about 30% from about 66%. Other producers include Australia, Austria, Brazil, China, Greece, Italy, Japan, the Republic of Korea, Mexico, Spain, Taiwan, Turkey, and the United States. Roberts (2008) estimated that total world production of olivine in 2008 was 8.4 million metric tons (Mt). Two companies in the United States produced olivine—Unimin Corp. and Olivine Corp. Unimin operated a mine in North Carolina and processing plants in Indiana and North Carolina. Olivine operated one mine and one processing plant in Washington.

In May, Great Salt Lake Minerals Corp. withdrew and refiled a permit application with the U.S. Army Corps of Engineers to build new solar evaporation ponds on the Great Salt Lake. The withdrawn application originally was filed in 2007 to develop 13,400 hectares (ha) on the lake. The new application includes 12,600 ha of the earlier permit application, a separate 2,430-ha legacy lease on the west side of the lake, and 15,400 ha on the northwest arm of the lake that the State of Utah agreed to lease to the company in January in exchange for the company relinquishing undeveloped leases it has held since 1967 on 12,100 ha around Promontory Point. The plan to build new solar evaporation ponds was scheduled to undergo Federal environmental review with the Army Corps of Engineers as the lead agency (Great Salt Lake Minerals Corp., 2009).

Consumption

In 2009, chemical intermediates was the largest tonnage end use for caustic-calcined magnesia, with 40% 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: environmental applications (water treatment and stack-gas scrubbing), 35%, and agriculture (animal feed and fertilizers), 25%. The remaining categories each had less than 1% of the total use—manufacturing (rubber and electrical) and construction (primarily oxychloride and oxysulfate cements).

Magnesium hydroxide was used for water treatment, in medicines and pharmaceuticals, as a chemical intermediate, and in fertilizer (uses are given in descending order of quantity). Magnesium sulfate was used mostly for chemicals, fertilizers, pulp and paper, rubber, pharmaceuticals, and water treatment (in descending order of quantity). Magnesium chloride was used mainly for ice control. Magnesium chloride brines were used for road dust and ice control.

Scientists at the U.S. Department of Energy's (DOE) Berkeley Laboratories created nanocrystals of magnesium oxide that glow blue when exposed to ultraviolet light. The researchers discovered a fundamentally new, unconventional mechanism to control the size of these nanocrystals, unlike traditional growth methods that leave the nanocrystals attached to a substrate. The nanocrystals could be used in applications such as bioimaging or solid-state lighting, but the DOE scientists planned to use them to study mechanisms for carbon sequestration. The minerals that fix magnesium into a stable carbonate are compositionally complex, but the nanocrystals were expected to provide a simple model to mimic this process (Science Daily, 2009).

Foreign Trade

In 2009, exports of magnesite and magnesia were well below those in 2008. Dead-burned magnesia exports were 62% lower than those in 2008, with Canada (67%) as the principal destination. Caustic-calcined magnesia exports were 43% lower than those in 2008. Thailand (70%) was the main destination (table 4).

Imports of caustic-calcined magnesia were 25% lower than those in 2008, and imports of dead-burned magnesia were 61% lower than those in 2008. For both types of magnesia, China was the principal source country (table 6). Although China was the leading import source for dead-burned magnesia, imports from China were 70% less than imports in 2008, probably reflecting the drop in steel production.

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. According to PIERS, U.S. exports of olivine in 2009 were 17 metric tons (t) to Taiwan. U.S. olivine imports were 114 t; 56% came from China and 43% came from India. These data are significantly less than the quantities traditionally reported. Because there is no Harmonized Tariff Schedule number specifically for olivine, some shipments may have been misclassified and cannot be positively identified.

World Review

Australia.—Queensland Magnesia Pty. Ltd. (QMAG) delayed the expansion of its 100,000-t/yr caustic-calcined magnesia plant in Parkhurst, Western Australia, until the second half of 2010. The expansion initially was planned in response to reduced exports from China, particularly to the European Union and the United States. As a result of a significant decline in demand from world steel and refractory markets, QMAG cut production at its Kunwarara Mine and Parkhurst processing plant in Rockhampton. These adjustments began in December 2008 and, as of February 2009, the Kunwarara Mine stopped contract mining activities and the Parkhurst processing plant operated at only 30% of capacity. Production was expected to remain at these levels until the middle of 2009 (Queensland Magnesia Pty. Ltd., 2009).

In October, Beacon Hill Resources Plc acquired Tasmania Magnesite NL, which owned magnesite deposits in northwest Tasmania with measured and inferred resources of 39 Mt of magnesite. In December, Beacon Hill Resources applied for a mining lease for one of the deposits—Arthur River—with a measured resource of 13.2 Mt of magnesite. The lease would be subject to the completion of studies, such as the Development Proposal and Environmental Management Plan, a public consultation process, and other approvals, which the company expected to complete by yearend 2010. If this process was completed on schedule, Beacon Hill Resources planned to begin mine construction in early 2011, with initial production scheduled by yearend 2011 (Regulatory News Service, 2009).

Brazil.—Buschle & Lepper SA, a small seawater magnesia producer, announced that it would double its production capacity to 12,000 t/yr by yearend 2010. The company planned to market its production at Joinville, Santa Catarina, for specialty chemical, cosmetics, food, and pharmaceutical applications (O'Driscoll, 2009b, p. 41).

China.—Because of reduced demand, China canceled its magnesite export licenses for the second half of 2009. The original license quotas were scheduled to be for a total of 1.1 Mt, with 720,000 t issued in the first half of the year; however, only 119,000 t of magnesite was exported in the first 6 months of 2009 (O'Driscoll, 2009b, p. 30).

Greece.—Grecian Magnesite S.A. began a \$10.3 million project in April, which was expected to extend the lifetime of the company's Yerakini magnesite mines by at least 20 years. The project, which would install a new processing line that would be capable of recovering fine fractions from mined ore and stockpiles, could beneficiate 220,000 t/yr of magnesite. The new line would enable Grecian Magnesite to use material that was sized at 18 millimeters or smaller from run-of-mine stockpiles that the company has maintained (O'Driscoll, 2009a).

Korea, North.—Swiss firm Quintermina AG reportedly established partnerships with two North Korean magnesite mining companies to export magnesia from their plants to world markets. One, Korea Magnesia Clinker Industry Group, produced mainly dead-burned magnesia from its two

mines in Daehung and Ryong Yang, feeding the 1.2-million-metric-ton-per-year calcining plants in Daehung and Tanchon. The second, Sungri Trading Co., produced caustic-calcined magnesia operations in Yanggango Province using feed from a magnesite mine in Baek Bae. Quintermina also planned to become a business partner with Korea Magnesia to refit rotary kilns to adapt them for caustic-calcined magnesia production (O'Driscoll, 2009b).

Norway.—In July, North Cape Minerals AS, the leading olivine producer in Norway, with a total mine capacity of 2.4 Mt/yr, announced that it was temporarily suspending operations at two of its three mines—Bryggja and Raubergvik—because of reduced demand for olivine from the steel industry; only the Åheim Mine would remain open. Steinsvik Olivin AS, another olivine producer in Norway, filed for bankruptcy in September, citing reduced sales for the company's product. The company produced olivine since 2004 at a 150,000-t/yr plant and had planned to expand capacity to 250,000 to 300,000 t/yr (Industrial Minerals, 2009b, c).

Saudi Arabia.—Despite sluggish global economic conditions, Saudi Arabian Mining Co. (Ma'aden) announced plans to build a 140,000-t/yr magnesite processing plant in Medina at a cost of \$25.3 million, although no timetable was determined. Ma'aden planned to source high-grade magnesite from its Zarghat deposit and produce dead-burned magnesia and other magnesite-based products for agriculture, construction, and fuel additives markets (Industrial Minerals, 2009a).

Turkey.—Trabzon Mining and Metal Corp. expected to have a 100,000-t/yr dead-burned magnesia plant onstream in Askale by the beginning of 2010. Magnesite from the plant would come from the company's nearby Refahiye Mine. Dead-burned magnesia from the plant was expected to be marketed primarily in Ukraine, although the company also targeted markets in Greece, Iran, Romania, and Turkey (O'Driscoll, 2009c).

Outlook

According to the World Steel Association (2010), world crude steel output was 1.22 billion metric tons in 2009, a decrease of 8.0% from that in 2008. Steel production declined in nearly all the major steel-producing regions; however, production in Asia, in particular China and India, showed positive growth in 2009. China's crude steel production in 2009 reached 568 Mt, an increase of 13.5% from that in 2008; China's share of world steel production increased to 47% of the world total in 2009. In contrast, steel production in the United States fell by more than 36% from that in 2008. A sustained increase in steel production in China could lead to more internal consumption of magnesia-based refractories, which could result in less magnesia available for the export market. China, however, has significant magnesite resources, particularly in Liaoning Province, and could continue to develop the magnesite deposits to satisfy domestic and export markets.

Planned closure in 2011 of Exelon Corp.'s coal-fired powerplants in Cromby and Eddyston, PA, was expected to have a significant effect on the consumption of magnesia for flue-gas desulfurization in the United States. These plants were the leading caustic-calcined magnesia-consuming powerplants in the United States, accounting for about 23,000 t/yr of

caustic-calcined magnesia supplied by Canadian and United States firms (O'Driscoll, 2010).

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TABLE 1
SALIENT MAGNESIUM COMPOUND STATISTICS¹

(Thousand metric tons and thousand dollars)

	2005	2006	2007	2008	2009
United States:					
Caustic-calcined and specified magnesias: ²					
Shipped by producers: ³					
Quantity	137	133	125	170	147
Value	60,300	60,300	41,100	52,700	42,200
Exports ⁴	5	6	4	1	1
Imports for consumption ⁴	152	163	134	167	126
Refractory magnesia:					
Shipped by producers: ³					
Quantity	W	W	W	W	W
Value	W	W	W	W	W
Exports	25	20	22	22	8
Imports for consumption	478	433	437	386	151
World, production of magnesite	15,600 ^r	15,600 ^r	16,700 ^r	18,400 ^r	19,000 ^e

^eEstimated. ^rRevised. W Withheld to avoid disclosing company proprietary data.

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

²Excludes caustic-calcined magnesia used in the production of refractory magnesia.

³Includes magnesia used by producers.

⁴Caustic-calcined magnesia only.

TABLE 2
U.S. MAGNESIUM COMPOUND PRODUCERS, BY RAW MATERIAL SOURCE, LOCATION, AND PRODUCTION CAPACITY, IN 2009¹

(Metric tons, MgO equivalent)

Raw material source and producing company	Location	Capacity	Products
Magnesite, Premier Chemicals LLC	Gabbs, NV	140,000	Caustic-calcined magnesia.
Lake brines:			
Great Salt Lake Minerals Corp.	Ogden, UT	185,000	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	314,000	Caustic-calcined magnesia, dead-burned magnesia, and magnesium hydroxide.
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		799,000	

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

²In 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 USED¹

	2008		2009	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Caustic-calcined and specified (USP and technical) magnesias ²	170,000	\$52,700	147,000	\$42,200
Magnesium hydroxide [100% Mg(OH) ₂] ²	180,000	89,800	170,000	104,000
Magnesium sulfate, anhydrous and hydrous	46,700	15,100	40,100	3,650
Refractory magnesia	W	W	W	W

W Withheld to avoid disclosing company proprietary data.

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

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

TABLE 4
U.S. EXPORTS OF CRUDE AND PROCESSED MAGNESITE, BY COUNTRY¹

Material and country	2008		2009	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Caustic-calcined magnesia:				
China	5	\$15	81	\$41
France	225	191	--	--
Mexico	144	166	57	29
Netherlands	234	169	--	--
Thailand	6	14	351	178
Other	276 ^r	224 ^r	14	48
Total	890	779	503	296
Dead-burned and fused magnesia:				
Canada	14,600	7,410	5,580	3,420
China	88	85	697	517
Germany	552	491	120	113
Hong Kong	376	259	140	114
India	858	475	226	214
Mexico	1,380	810	435	429
Saudi Arabia	210	122	269	149
Taiwan	370	311	40	36
United Kingdom	229	223	57	62
Venezuela	1,310	654	124	144
Other	2,140 ^r	2,240 ^r	701	760
Total	22,100	13,100	8,390	5,950
Other magnesia:				
Bahamas, The	1,060	1,020	61	17
Brazil	912	927	858	959
Canada	4,690	3,640	2,600	2,510
France	815	675	1,170	1,050
Germany	1,010	944	798	634
India	448	1,020	275	275
Korea, Republic of	1,620	1,340	1,770	1,420
Mexico	1,440	1,720	1,100	1,360
Netherlands	1,260	965	684	563
Taiwan	1,240	1,140	1,280	1,230
Turkey	670	904	136	178
Other	2,920 ^r	4,600 ^r	1,930	3,330
Total	18,100	18,900	12,700	13,500
Crude magnesite:				
Argentina	710	93	43	6
Canada	3,720	669	3,020	499
China	5,570	1,090	205	28
France	2,840	372	2,810	370
Germany	931	123	651	85
Italy	1,720	225	760	84
Netherlands	138	18	945	124
Sweden	1,080	177	--	--
Saudi Arabia	--	--	497	65
United Kingdom	856	115	679	89
Other	3,470 ^r	468 ^r	860	128
Total	21,000	3,350	10,500	1,480

^rRevised. -- Zero.

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

Source: U.S. Census Bureau.

TABLE 5
U.S. EXPORTS OF MAGNESIUM COMPOUNDS¹

Material	2008		2009		Principal destinations, 2009
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	
Magnesium chloride, anhydrous and other	8,180	\$8,050	7,780	\$5,480	Canada, 84%; Italy, 7%.
Magnesium hydroxide and peroxide	18,400	15,500	19,100	17,500	Canada, 59%; United Kingdom, 9%; Sweden, 8%.
Magnesium sulfate, natural kieserite and epsom salts	103	209	207	311	Mexico, 74%; Canada, 20%.
Magnesium sulfate, other	11,300	5,340	10,600	5,000	Canada, 92%; Mexico, 6%.

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

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF CRUDE AND PROCESSED MAGNESITE, BY COUNTRY¹

Material and country	2008		2009	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Caustic-calcined magnesia:				
Australia	--	--	5,070	\$1,490
Brazil	15,600	\$6,030	15,400	3,770
Canada	21,500	7,480	26,300	11,000
China	126,000	24,900	79,000	21,300
Greece	1,620	731	--	--
Israel	609	173	25	27
Turkey	2,010	1,090	--	--
United Kingdom	--	--	136	140
Total	167,000	40,400	126,000	37,700
Dead-burned and fused magnesia:				
Australia	7,280	9,480	650	250
Austria	31,200	17,600	21,200	12,300
Brazil	722	212	22,200	7,690
China	319,000	136,000	96,900	34,200
Greece	11,200	4,560	101	44
Israel	4,640	12,500	3,530	10,500
Japan	2,540	4,750	2,380	5,060
Mexico	2,310	1,310	1,160	690
Spain	5,780	2,130	2,000	644
Other	1,330 ^r	1,050 ^r	1,160	826
Total	386,000	190,000	151,000	72,200
Other magnesia:				
Brazil	689	821	179	272
Canada	542	187	552	326
China	1,060	2,320	467	760
Israel	569	1,080	374	802
Japan	1,220	3,010	569	1,430
Mexico	8,850	5,740	5,160	3,650
Slovakia	751	228	1,070	370
Other	258	647	361	1,140
Total	13,900	14,000	8,740	8,750
Crude magnesite:				
Brazil	133	148	209	221
China	13,900	3,770	3,330	472
France	32	44	208	184
Israel	1,000	849	1,690	1,580
Japan	426	740	472	1,130
United Kingdom	--	--	176	186
Other	351 ^r	170 ^r	184	59
Total	15,800	5,720	6,270	3,830

^rRevised. -- Zero.

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

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF MAGNESIUM COMPOUNDS¹

	2008		2009		Principal sources, 2009
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	
Magnesium chloride, anhydrous and other	71,400	\$15,900	88,000	\$21,500	Israel, 68%; Netherlands, 28%.
Magnesium hydroxide and peroxide	7,310	16,500 ^r	2,930	6,440	Israel, 35%; Netherlands, 13%; Japan, 11%.
Magnesium sulfate, natural epsom salts	528	202	1,740	378	China, 78%; India, 14%.
Magnesium sulfate, natural kieserite	51,100	1,100	25,800	574	Germany, 100%.
Magnesium sulfate, other	31,200	15,000	15,000	9,660	China, 34%; Germany, 31%; Mexico, 22%.

^rRevised.

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

Source: U.S. Census Bureau.

TABLE 8
WORLD MAGNESIUM COMPOUNDS ANNUAL PRODUCTION CAPACITY,
DECEMBER 31, 2009^{1,2}

(Thousand metric tons, MgO equivalent)

Country	Raw material				Total
	Magnesite		Seawater or brines		
	Caustic- calcined	Dead- burned	Caustic- calcined	Dead- burned	
Australia	78	120	--	--	198
Austria	70	405	--	--	475
Brazil	60	326	6	--	392
Canada	50	--	--	--	50
China	430	2,270	--	10	2,710
France	--	--	30	--	30
Greece	120	100	--	--	220
India	20	202	--	--	222
Iran	50	40	--	--	90
Ireland	--	--	--	90	90
Israel	--	--	10	60	70
Italy	25	--	--	--	25
Japan	--	--	55	200	255
Jordan	--	--	10	50	60
Korea, North	20	100	--	--	120
Korea, Republic of	--	--	--	40	40
Mexico	--	--	15	95	110
Netherlands	--	--	10	165	175
Norway	--	--	25	--	25
Poland	--	10	--	--	10
Russia	100	2,400	--	--	2,500
Serbia	--	40	--	--	40
Slovakia	--	465	--	--	465
South Africa	12	--	--	--	12
Spain	140	70	--	--	210
Turkey	20	404	--	--	424
Ukraine	--	120	20	80	220
United States	140	--	191	195	526
Total	1,340	7,070	372	985	9,760

-- Zero.

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

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

TABLE 9
MAGNESITE: WORLD PRODUCTION, BY COUNTRY^{1, 2}

(Metric tons)

Country	2005	2006	2007	2008	2009 ^c
Australia	474,000	446,000	447,000	126,000 ^r	200,000
Austria, crude	693,754	769,188	811,556	837,476 ^r	800,000
Brazil, beneficiated	386,759	382,718	399,314	399,320 ^r	400,000 ^p
Canada ^{e, 3}	180,000	180,000	180,000	180,000	180,000
China ^e	6,600,000	6,700,000	8,000,000	10,000,000	11,000,000
Colombia ^e	38,000	40,000	42,000	38,000 ^{r, e}	35,000
Greece, crude	475,670	463,277	351,414	361,165 ^r	325,000
Guatemala	5,636	1,084	7,612	11,758	17,247 ⁴
India ^e	380,000	370,000	360,000	350,000	340,000
Iran	114,708 ⁴	110,000	110,000	110,000	110,000
Korea, North ^e	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
Pakistan	3,029	1,884	1,400 ^e	1,600 ^e	1,700
Poland, concentrate	55,300 ^r	62,500 ^r	65,000	65,000 ^e	65,000
Russia ^e	1,100,000	1,200,000	1,200,000	1,200,000	1,000,000
Serbia, crude ^e	20,000 ⁵	20,000	20,000	20,000	20,000
Slovakia, concentrate	920,000 ^r	941,000 ^r	957,000 ^r	807,000 ^r	800,000
South Africa	54,800	73,300	80,700	83,900 ^r	80,000
Spain	556,129	539,239	461,901	460,000 ^e	460,000
Turkey, run-of-mine	2,372,206	2,088,033	1,984,908 ^r	2,143,047 ^r	2,000,000
United States	W	W	W	W	W
Zimbabwe	893	939	2,000 ^e	2,000 ^e	1,000
Total	15,600,000 ^r	15,600,000 ^r	16,700,000 ^r	18,400,000 ^r	19,000,000

^cEstimated. ^pPreliminary. ^rRevised. W Withheld to avoid disclosing company proprietary data; not included in "Total."

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

²Figures 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 formation of reliable estimates of output levels. Table includes data available through May 12, 2010.

³Magnesitic dolomite and brucite.

⁴Reported figure.

⁵Montenegro and Serbia formally declared independence in June 2006 from each other and dissolved their union.