USGS
science for a changing world

2007 Minerals Yearbook

MAGNESIUM [ADVANCE RELEASE]

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

November 2008

MAGNESIUM

By Deborah A. Kramer

Domestic survey data and tables were prepared by Paula R. Neely, statistical assistant, and the world production table was prepared by Glenn J. Wallace, international data coordinator.

Primary magnesium was produced by one company in the United States, and much of the U.S. consumption was met by imports. Canada, Israel, and Russia were the principal sources of imported magnesium. Aluminum alloying, diecasting, and iron and steel desulfurization, in descending order, were the principal end-use applications for magnesium in the United States in 2007. China continued to dominate world production of primary magnesium, accounting for 84% of the total (excluding the United States). Norsk Hydro ASA closed its 54,000-metric-ton-per-year (t/yr) primary magnesium plant in Canada in the first quarter of 2007.

Legislation and Government Programs

In its final results from the antidumping duty administrative review of pure magnesium imported from Russia, the U.S. Department of Commerce, International Trade Administration (ITA) determined that for October 4, 2004, through March 31, 2006, the antidumping duty for VSMPO-AVISMA Corp. (formerly JSC Avisma Titanium-Magnesium Works) would be a de minimus duty of 0.41% ad valorem, which was essentially equivalent to a 0% duty. For Solikamsk Magnesium Works, the ITA set a dumping rate of 3.77% ad valorem (U.S. Department of Commerce, International Trade Administration, 2007a).

The ITA also extended the deadline for completion of the antidumping duty administrative review on magnesium metal from Russia. The original deadline of December 31, 2007, was extended to April 29, 2008 (U.S. Department of Commerce, International Trade Administration, 2007b).

The ITA did not change its preliminary ruling on countervailing duties for imports of pure and alloy magnesium from Canada that was established in April. The duty remained at 0% ad valorem for Norsk Hydro Canada Inc. The period of review was January 1, 2005, through August 15, 2005 (U.S. Department of Commerce, International Trade Administration, 2007c).

Production

U.S. Magnesium LLC was the sole producer of primary magnesium in the United States. The company recovered magnesium electrolytically from brines from the Great Salt Lake at its 45,000-t/yr plant in Rowley, UT. U.S. Magnesium announced that it would expand primary magnesium capacity at its Rowley, plant to more than 50,000 t/yr from the current level of 43,000 t/yr. Increased output would begin in the fourth quarter 2007, and full production levels would be reached by mid-2008. The increased capacity would come from additional electrolytic cells and an upgrade of existing cells (McBeth, 2007b).

Environmental Issues

The cover gas sulfur hexafluoride (SF_6) that is used to protect molten magnesium from oxidation has been implicated as a potential factor in global warming. Although studies on its effect continue, its long atmospheric life (about 3,000 years) and high potential as a greenhouse gas (23,900 times the global warming potential of carbon dioxide) has resulted in a call for voluntary reductions in its emissions. In 1999, the U.S. magnesium industry, the International Magnesium Association, and the U.S. Environmental Protection Agency (EPA) began a voluntary partnership to understand and reduce emissions of SF_6. The major processes that require SF_6 melt protection are primary production; secondary production; die, permanent mold, and sand casting; wrought products; and anode production. According to the EPA, SF_6 emissions from primary magnesium production and magnesium casting in 2006 were 3% less than those in 2005 (U.S. Environmental Protection Agency, 2008, p. 4-47–4-50).

A Federal judge ruled that U.S. Magnesium's waste streams from its Utah operation should not be regulated under the Resource Conservation and Recovery Act (RCRA). In 2001, the EPA contended that the wastes were subject to regulation under RCRA. U.S. Magnesium's position was that Congress exempted its processing waste from that law. The judge's October 15 ruling noted in several places that if the EPA wanted to stop U.S. Magnesium from dumping the controversial wastes in outside ditches, it should have put a stop to the practice in the regulations developed nearly 20 years ago. The ruling did not completely settle the case because the judge did not rule on a part of the EPA's case that deals with polychlorinated biphenyls, which also have been found in the company's waste stream (Fahys, 2007).

The EPA added Halaco Engineering Co.'s Oxnard, CA, facility to its Superfund list in September. Halaco primarily recycled aluminum and magnesium at the facility from 1965 through 2004. Within the past year, the EPA and one of the site owners have completed two actions to stabilize the site—the owners removed drums and hazardous chemicals, and the EPA stabilized the waste pile (estimated to be more than 300,000 cubic meters in size) at the site to prevent the windborne movement of waste materials and erosion of wastes into the surrounding wetlands. The EPA also removed wastes from an adjacent wetland area and took steps to improve site security (Marley, 2007).

After being designated as a Superfund site in 2006, with a cleanup beginning in early 2007, EPA contractors removed more than 1,650 metric tons (t) of magnesium scrap from Remacor Inc.'s defunct magnesium recycling plant in West Pittsburg, PA. Although the company's processing equipment was destroyed

in a fire in August 2005, the company continued to accept magnesium scrap deliveries until June 2006. The EPA revised its original estimate of 1,720 t of scrap present at the site to nearly 2,270 t (Irwin, 2007).

Consumption

Data for magnesium metal are collected from two voluntary surveys of U.S. operations by the U.S. Geological Survey. Of the 73 companies canvassed for magnesium consumption data, 64% responded, representing 73% of the magnesium-based scrap consumption listed in table 2 and the primary magnesium consumption listed in table 3. Data for the 26 nonrespondents were estimated on the basis of prior-year consumption levels and other factors.

Reported primary magnesium consumption in 2007 was about 7% lower than that in 2006 (table 3). Consumption of primary magnesium for diecasting applications was 10% less than that in 2006, reflecting the decline in vehicle production in the United States as a result of slowing economic conditions. According to International Organization of Motor Vehicle Manufacturers (2007), U.S. vehicle production in 2007 decreased by 4.5% from that in 2006. Aluminum alloying was the principal use for primary magnesium, accounting for 41% of the total, followed by diecasting with 32% and iron and steel desulfurization with 13%.

In August, U.S. Magnesium announced that it had signed a contract with General Motors Corp. (GM) to supply the company with magnesium alloy for its North American operations, beginning January 1, 2008. Although a specific quantity was not announced, GM was thought to be seeking about 9,000 t/yr of the alloy. Norsk Hydro had been supplying GM with most of its magnesium requirements from its plant in Canada, but with the closure of the plant, GM had to look elsewhere for its magnesium needs (McDonell, 2007d).

SPX Corp. (Charlotte, NC) announced that it completed the sale of its Contech business unit to Marathon Automotive Group LLC (a company formed by Marathon Asset Management LLC) for approximately $146 million in cash. Contech was reported as a discontinued operation at the end of the third quarter of 2006. On March 7, 2007, SPX announced that it had entered a definitive agreement to sell Contech, which produces magnesium diecastings primarily for the automotive market (SPX Corp., 2007).

At the beginning of October, magnesium diecaster Lunt Manufacturing Inc., with plants in Schamburg and Hampshire, IL, sent a note to its creditors that it is seeking assignment for the benefit of its creditors, which, under Illinois law, was the equivalent of seeking bankruptcy protection. Lunt Manufacturing reportedly was dealing with lower sales volumes and increased raw materials costs and was attempting to sell the company's assets. Lunt Manufacturing produced more than 200 different components, primarily for the automotive industry (McBeth, 2007a). On January 11, 2008, the company closed its Illinois operations after 34 years in business citing foreign competition as the reason for the closure. The company had begun laying off workers in December 2007 (McCoppin, 2008).

Stocks

Producers' yearend 2007 stocks of primary magnesium decreased slightly from those at yearend 2006; producer stock data were withheld to avoid disclosing company proprietary data. Consumer stocks of primary and alloy magnesium were 5,690 t at yearend 2007, 8% higher than the yearend 2006 level of 5,250 t (revised). Secondary magnesium stocks of 2,130 t at yearend 2007 were about 11% less than those at yearend 2006 of 2,390 t.

Prices

Magnesium prices escalated during 2007 as a result of the closure of Norsk Hydro Canada's magnesium plant, antidumping duties on magnesium imported from China, and fewer imports from Russia. From the beginning of 2007, the average U.S. spot Western price increased from $1.40 per pound to $2.25 per pound, and averaged $1.71 per pound for the year.

U.S. magnesium consumers began committing to 2008 annual contracts earlier in 2007 than in the previous year, and contract prices were reported to be significantly higher—about $1.70 per pound for 2008 compared with 2007 contract prices of $1.20 to $1.30 per pound. Consumers feared that prices would increase even further. By the beginning of November, U.S. Magnesium and Dead Sea Magnesium Ltd. reportedly stopped signing contracts for 2008 because they had no magnesium left to sell (McDonell, 2007a, b).

Foreign Trade

Total magnesium exports for 2007 were about 20% higher than those in 2006 (table 5). Canada (65%), Mexico (17%), and Brazil (8%) were the principal destinations. Most of the increase was reflected in higher exports of magnesium alloys to Canada, presumably for conversion to diecastings for automotive applications.

Imports for consumption in 2007 were 5% lower than those in 2006. Of the total quantity of magnesium imported into the United States, Canada (36%), Israel (24%), and Russia (9%) were the principal sources in 2007. About 38% of the magnesium imported in 2007 was as pure metal, and about 31% was in the form of alloys. Canada supplied 60% of the magnesium alloy imports, and China, Israel, and Russia together provided 89% of the pure magnesium imports in 2007. Solikamsk did not report any shipments to the United States through July 2007 and did not expect shipments to begin until the second quarter of 2008. Solikamsk cited tight supplies under signed contracts in Russia and other countries as the reason for the lack of U.S. exports (Platts Metals Week, 2007c).

World Review

According to U.S. Magnesium, global magnesium demand was expected to increase at a 7.3% compound average annual growth rate from 2007 to 2012, which would result in consumption of more than 1 million metric tons in 2012 compared with 663,000 t in 2007. Of the 663,000 t of

consumption in 2007, U.S. Magnesium estimated that about 36% was for aluminum alloying uses; 32% for diecasting applications, primarily in the automotive industry; 16% for iron and steel desulfurization; and the remainder for other applications. Of the 7.3% compound annual growth, growth in the United States was estimated to be about 2% per year; in the rest of the Western world, 3.5% per year; and in China, 20% per year (McBeth, 2008).

Australia.—In October, Latrobe Magnesium Ltd. announced that because of recent price increases in magnesium, it would begin a review of the economics of a 5,000- to 10,000-t/yr magnesium plant in the Latrobe Valley, Victoria, that would recover magnesium from coal fly ash. Latrobe Magnesium planned to assess thermal reduction as an alternative to electrolysis in the review, which was expected to take 3 months to complete. A preliminary study indicated that the capital cost of a thermal reduction plant would be less than 50% of that of the same size electrolytic plant, but operating costs would be higher. The plant, which was smaller than the plant originally planned, would be sized to meet magnesium consumption in Australia and its nearby trading partners (Latrobe Magnesium Ltd., 2007). A larger plant had been under consideration since 2001.

Canada.—Two magnesium plants were scheduled to be demolished by yearend. Norsk Hydro planned to dismantle the Becancour, Quebec, magnesium plant because no purchase offer was received for the assets. Xstrata plc also planned to dismantle the Magnola plant in Danville, Quebec, that it acquired in the company's merger with Falconbridge Ltd. The Magnola plant, originally owned by Noranda Inc., had recovered magnesium from asbestos tailings but had not operated since 2003 (McDonell, 2007e; Reuters, 2007).

In July, Norsk Hydro announced that it entered into an agreement to sell its magnesium remelters in Bottrop, Germany, and Xi'an, China, to Varomet Holdings Ltd. (a subsidiary of the Australian mining company Straits Resources Ltd.). The operations acquired from Norsk Hydro were expected to be part of a larger magnesium operation that included GfE-MIR GmbH, a German subsidiary involved in global distribution and marketing of magnesium alloys. Varomet also had a strategic alliance with Thermo Magnesium SA, a French company operating a magnesium recycling plant in Marignac, France (formerly Pechiney's primary magnesium plant that had closed in 2002) (Sagafos, 2007).

Workers at Timminco Ltd.'s Haley magnesium plant in Renfrew, Ontario, signed a 3-year collective bargaining agreement in June. The new agreement, however, covers only about 20 workers because about 180 jobs at the plant had been cut because of restructuring. Although Timminco was still producing magnesium at the 9,000-t/yr plant, the company was producing at a reduced level and was meeting some of its sales commitments with lower cost, lower quality magnesium from China (McDonell, 2007c). Timminco also exited the magnesium photoengraving plate market in the second quarter of 2007.

China.—The Chinese Government announced that it would impose a 10% export tax on pure magnesium and magnesium alloy beginning on January 1, 2008. China had instituted a 10% export tax on magnesium scrap on June 1, 2007, and this tax was expected to remain at this level throughout 2008 (Platts Metals Week, 2007a).

Fushun Titanium Industry Co. Ltd. planned to build a new 5,000-t/yr magnesium production line in part to provide magnesium for a new 5,000-t/yr titanium sponge production line that it also planned to build. Construction was expected to begin sometime in 2007 (China Metal Market—Precious & Minor Metals Monthly, 2007).

Taiyuan Huangzhai Yiwei Magnesium expected to begin production of magnesium ingot at a new 6,000-t/yr plant in Shanxi Province at the end of September. The new plant was a joint venture between Taiyuan (51% share) and Alconix Corp. (Tokyo, Japan) (49% share). Alconix planned to export the magnesium to Japan to meet the growing demand in the electronics and aerospace industries (Magnesium.com, 2007).

In June, Taiyuan Yiwei, China Direct, Inc., and Shanxi Senrun Coal Chemistry Co. Ltd. began construction on a jointly owned magnesium facility in Shanxi Province. On May 30, China Direct announced that it would acquire a 52% stake in the joint magnesium facility—Shanxi Jinwei Magnesium Co. Ltd., Shanxi Senrun, and Taiyuan Yiwei hold the remaining 48%. Shanxi Senrun and Taiyuan Yiwei agreed to contribute their facilities that were under construction and their energy resources for production, and China Direct agreed to finance the joint venture. Jinwei has a design production capacity of 20,000 t/yr of magnesium. The first phase of production was expected to start in the fourth quarter of 2007, with an annual production capacity of 12,000 t/yr. The second phase of 8,000 t/yr was expected to be operational in 2008 (Blamey, 2007). China Direct also owned a majority interest in Chang Magnesium Co. Ltd., which completed construction of a 7,000-t/yr magnesium facility in Taiyuan, Shanxi Province, in January 2007 (China Direct, Inc., 2007b).

Shanxi Qizhen Magnesium Co. Ltd. announced that it would begin producing magnesium alloys by yearend 2007. The company planned to produce about 1,000 metric tons per month of alloy from ingot that it produced at its plant in Shanxi Province. The company planned to export the material to Europe (Platts Metals Week, 2007b).

Production at Shanxi Wenxi Hongfu Magnesium Co. Ltd. was temporarily halted in July in response to an environmental crackdown by the Chinese Government. The company has the capacity to produce 50,000 t/yr of magnesium and had planned to produce 30,000 t in 2007. Officials from the company did not state when the plant would reopen (Shair, 2007).

Guangling Jinghua Magnesium Co. Ltd. announced that it would construct a new primary magnesium plant with a capacity of 20,000 t/yr in Datong, Shanxi Province. Construction of the new plant was expected to begin by yearend and be completed by yearend 2008. The company already operated a 12,500-t/yr plant at the site. According to the company, the new plant was expected to use new technology that would reduce raw material consumption and pollution (China Magnesium Industry & Market Bulletin, 2007a).

Qinghai Qilian Magnesium Co. Ltd. announced that it began construction of a 15,000-t/yr magnesium metal plant in

late August; however, a completion date was not announced. Qinghai Saide Titanium Co. Ltd. reportedly invested $12 million to fund the plant construction (Metal-Pages, 2007a).

Ningxia Huayuan Magnesium Co. Ltd. was planning to expand its primary magnesium production capacity by 24,000 t/yr in two phases. In phase I, the company would build another 12,000 t/yr of new capacity, which was expected to come onstream before June 2008; the second phase of 12,000 t/yr was expected to be completed by yearend 2008. The two expansions would bring Ningxia Huayuan's total capacity to 52,000 t/yr at five plants in Ningxia Province (China Magnesium Industry & Market Bulletin, 2007b).

In December, China Direct entered into two letters of intent to create two new joint ventures in China to manufacture and distribute magnesium. The first joint venture, Baotou Xinjin Magnesium Co., Ltd., would be 51% owned by China Direct. Baotou Xinjin already had magnesium production capacity of approximately 7,000 to 8,000 t/yr. China Direct expected to invest $8.5 million to increase the production capacity to 20,000 t/yr by the third quarter of 2008. The second joint venture, Baotou Sanhe Magnesium Co., Ltd., also would be 51% owned by China Direct. China Direct planned to invest $7.5 million to construct a magnesium facility with a production capacity of 20,000 t/yr. China Direct planned to have 12,000 t/yr of this capacity operational by June 2008 and the remaining 8,000 t/yr operational by June 2009 (China Direct, Inc., 2007a).

Egypt.—After being unable to find financing for its proposed magnesium plant, Magnesium International Ltd. placed the Egyptian Magnesium Co. project on maintenance, closed its office in Egypt, and released the staff (Magnesium International Ltd., 2007). Instead of building a plant, the company was proposing to joint venture or license the processing technology, which was originally purchased from Dow Chemical Co.

Korea, Republic of.—POSCO Co. Ltd. opened its first magnesium sheet plant in July. POSCO invested $27.8 million in the project and expected to produce 3,000 t/yr of magnesium sheet from the plant in Suncheon (Reuters India, 2007).

Russia.—In Russia, the country's Federal Anti-Monopoly Service gave permission for Rusal Magnesium Ltd. to acquire 50% of the voting shares in Solikamsk. The Solikamsk plant reportedly exported about 60% of the magnesium and magnesium alloys it produced, and shipped 20,253 t of magnesium and alloys in 2006 (Metals Place, 2007).

A sinkhole at Berezniki threatened to engulf the rail tracks that are used to move carnallite produced by JSC Silvinit to VSMPO-AVISMA's magnesium-titanium complex, potentially affecting the company's raw material supply. The sinkhole was caused by flooding at Silvinit's mine in 2006, and had widened by 30 meters (m) during October 2007. On December 28, JSC Russian Railways completed a 6-kilometer (km) rail line that bypassed the sinkhole. The new rail line was expected to be used by shippers until a 53-km bypass is completed in 2010. The width of the sinkhole continued to increase by 17 m in December, but not in the direction of the bypass (Fertilizer Week, 2008).

At the end of October, construction reportedly began on a 70,000-t/yr magnesium production plant in Asbest. The new plant was expected to process tailings from Uralasbest, the world's leading manufacturer of chrysotile asbestos, estimated to account for about 60% of world supply. The project was set up as a joint venture between Uralasbest and trading company Minmet Financing Co. of Switzerland, former owner of Solikamsk. The plant was scheduled to be completed by the end of 2009 or 2010 (Metal-Pages, 2007b). This proposed plant had been under consideration since 2000.

Outlook

Tight magnesium supplies in the United States were expected to continue to result in escalating prices. With no primary magnesium production in Canada and limited availability of magnesium from Russia because of production problems, supplies are expected to be inadequate to meet projected consumption levels. As a result, magnesium prices that had begun to increase at the end of 2007 escalated rapidly in 2008 to reach more than $3.50 per pound; their highest level since 1916. Newly installed capacity at U.S. Magnesium's plant in Rowley was likely to be used by Allegheny Technologies Inc. to recycle magnesium chloride generated at its titanium sponge plant that is under construction nearby. The new plant was scheduled to be operational by yearend 2008 and would produce nearly 11,000 t/yr of titanium sponge. Although significant magnesium production capacity is expected to be constructed in China, little of this material is expected to be exported to the United States because of the dumping duties. Unless additional magnesium production capacity is opened outside China, supplies in the United States were expected to remain tight for the foreseeable future.

References Cited

Blamey, Andy, 2007, China Direct to buy 52% of Shanxi magnesium project: Platts Metals Week, v. 78, no. 23, June 4, p. 14.

China Direct, Inc., 2007a, China Direct, Inc. to acquire two magnesium companies—New joint ventures to add 40,000 metric tons of annual production capacity: Boca Raton, FL, China Direct, Inc. press release, December 19. (Accessed January 3, 2008, at http://www.cdii.net/IR-pressrelease.html.)

China Direct, Inc., 2007b, Form 10KSB: U.S. Securities and Exchange Commission, April 2. (Accessed August 20, 2007, at http://www.sec.gov/Archives/edgar/data/1088787/000116169707000363/0001161697-07-000363-index.htm.)

China Magnesium Industry & Market Bulletin, 2007a, Expansions under consideration for Guangling Jinghua: China Magnesium Industry & Market Bulletin, no. 16, October 26, p. 5-6.

China Magnesium Industry & Market Bulletin, 2007b, Ningxia Huayuan to expand its capacity in 2008: China Magnesium Industry & Market Bulletin, no. 21, November 30, p. 6.

China Metal Market—Precious & Minor Metals Monthly, 2007, Magnesium—Fushun Titanium sets up a new 5,000tpy Mg production line: China Metal Market—Precious & Minor Metals Monthly, no. 86, May, p. 6.

Fahys, Judy, 2007, USMag wins favorable fed judge ruling, but too early to claim victory: Salt Lake City, UT, Salt Lake Tribune, October 26. (Accessed October 26, 2007, at http://www.sltrib.com/ci_7288544.)

Fertilizer Week, 2008, Six kilometre bypass put into operation: Fertilizer Week, v. 21, no. 37, January 4, p. 4.

International Organization of Motor Vehicle Manufacturers, 2007, Production statistics: Paris, France, International Organization of Motor Vehicle Manufacturers. (Accessed October 7, 2008, at http://oica.net/category/production-statistics/.)

Irwin, Dan, 2007, EPA cleanup job much bigger than imagined: New Castle, PA, New Castle News, October 9. (Accessed October 10, 2007, at http://www.tribune-democrat.com/statenews/cnhinsall_story_282103645.html.)

Latrobe Magnesium Ltd., 2007, Re—Latrobe Magnesium update: Sydney, New South Wales, Australia, Latrobe Magnesium Ltd. news release, October 22, 1 p.
Magnesium.com, 2007, Chinese-Japanese joint venture starting magnesium production: Magnesium.com, August 7. (Accessed August 9, 2007, at http://www.magnesium.com/w3/news-room/news_open.php?news=3093.)
Magnesium International Ltd., 2007, Quarterly report—Period to 31 March 2007: Magnesium International Ltd. (Accessed May 16, 2007, via http://www.mgil.com.au/investor/announcements_2007.html.)
Marley, Michael, 2007, EPA adds Halaco Engineering smelting site to Superfund list: American Metal Market, v. 115, no. 38-3, September 26, p. 10.
McBeth, Karen, 2007a, Magnesium diecaster Lunt seeks company sale as going concern: Platts Metals Week, v. 78, no. 40, October 1, p. 6-7.
McBeth, Karen, 2007b, US Magnesium to expand Utah plant to over 50,000 mt: Platts Metals Week, v. 78, no. 40, October 1, p. 1, 6.
McBeth, Karen, 2008, US Magnesium may add 18,000 mt to meet rising demand: Platts Metals Week, v. 79, no. 4, January 28, p. 1, 5-6.
McCoppin, Robert, 2008, Suburban company shutting doors, ending a way of life for hundreds: Chicago, IL, Daily Herald, January 10. (Accessed February 6, 2008, at http://www.dailyherald.com/story/?id=109732.)
McDonell, Meghann, 2007a, Magnesium contracts met sooner and at higher rates: American Metal Market, v. 115, no. 25-4, June 28, p. 1-2.
McDonell, Meghann, 2007b, Magnesium suppliers cease inking '08 deals: American Metal Market, v. 115, no. 45-1, November 12, p. 1, 6.
McDonell, Meghann, 2007c, Timminco magnesium workers approve pact: American Metal Market, v. 115, no. 22-4, June 7, p. 7.
McDonell, Meghann, 2007d, US Mag supply deal with GM may lift output: American Metal Market, v. 115, no. 32-2, August 14, p. 1, 4.
McDonell, Meghann, 2007e, Xstrata set to tear down Magnola plant in Dec.: American Metal Market, v. 115, no. 35-3, September 6, p. 9.
Metal-Pages, 2007a, Qinghai Qilian Magnesium commences construction of Mg smelter: Metal-Pages, September 12. (Accessed November 6, 2007, via http://www.metal-pages.com/.)
Metal-Pages, 2007b, Russia starts building new Mg plant: Metal-Pages, October 31. (Accessed November 6, 2007, via http://www.metal-pages.com/.)
Metals Place, 2007, Market regulator clears way for Rusal Magnesium to acquire 50% of Solikamsk Magnesium Plant: Metals Place. (Accessed May 4, 2007, at http://metalsplace.com/news/?a=11472.)
Platts Metals Week, 2007a, China to tax magnesium January 1: Platts Metals Week, v. 78, no. 53, December 31, p. 7-8.
Platts Metals Week, 2007b, Qizhen to produce magnesium alloy: Platts Metals Week, v. 78, no. 29, July 16, p. 5.
Platts Metals Week, 2007c, US shipments won't resume yet—SMW: Platts Metals Week, v. 78, no. 36, September 3, p. 2.
Reuters, 2007, Norsk Hydro to dismantle Quebec magnesium plant: Reuters, September 28. (Accessed October 1, 2007, at http://uk.reuters.com/article/oilRpt/idUKN2835967720070928.)
Reuters India, 2007, S. Korea's POSCO opens magnesium sheet plant: Reuters India, July 27. (Accessed July 30, 2007, at http://in.reuters.com/article/businessNews/idINIndia-28680820070727.)
Sagafos, Ole Johan, 2007, Varomet acquires Hydro's magnesium remelters: Oslo, Norway, Norsk Hydro ASA press release, July 23, 1 p.
Shair, Wendy, 2007, Chinese magnesium prices steady; Wenxi Hongfu idled: Platts Metals Week, v. 78, no. 30, July 23, p. 15.
SPX Corp., 2007, SPX completes sale of Contech: Charlotte, NC, SPX Corp. news release, April 16, 1 p.
U.S. Department of Commerce, International Trade Administration, 2007a, Magnesium metal from the Russian Federation—Final results of antidumping duty administrative review: Federal Register, v. 72, no. 175, September 11, p. 51791-51792.
U.S. Department of Commerce, International Trade Administration, 2007b, Notice of extension of time limit for preliminary results of antidumping duty administrative review—Magnesium metal from the Russian Federation: Federal Register, v. 72, no. 242, December 18, p. 71620-71621.
U.S. Department of Commerce, International Trade Administration, 2007c, Pure magnesium and alloy magnesium from Canada—Final results of 2005 countervailing duty administrative reviews: Federal Register, v. 73, no. 132, July 11, p. 37729-37730.
U.S. Environmental Protection Agency, 2008, Inventory of U.S. greenhouse gas emissions and sinks—1990–2006: U.S. Environmental Protection Agency, USEPA #430-R-08-005, 473 p. (Accessed April 28, 2008, via http://epa.gov/climatechange/emissions/usinventoryreport.html.)

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Historical Statistics for Mineral and Material Commodities in the United States. Data Series 140.
Magnesian Refractories. Ch. in United States Mineral Resources, Professional Paper 820, 1973.
Magnesium. Ch. in Mineral Commodity Summaries, annual.
Magnesium. Mineral Industry Surveys, quarterly.
Magnesium. Ch. in Metal Prices in the United States Through 1998, 1999.
Magnesium, its Alloys and Compounds. Open-File Report 01-341, 2001.
Magnesium Recycling in the United States in 1998. Circular 1196-E, 2004.

Other

American Metal Market, daily.
Economics of Magnesium Metal, The, (8th ed.). Roskill Information Services Ltd., 2004.
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.
Metal Bulletin.
Platts Metals Week.

TABLE 1
SALIENT MAGNESIUM STATISTICS[1]

(Metric tons unless otherwise specified)

	2003	2004	2005	2006	2007
United States:					
Production:					
Primary magnesium	W	W	W	W	W
Secondary magnesium	70,100	72,000	73,300 r	82,200 r	84,000
Exports	20,400	11,800	9,650	12,300	14,800
Imports for consumption	83,400	98,600	84,700	75,300	71,800
Consumption, primary	103,000	101,000	82,100	77,600	72,300
Yearend stocks, producer	W	W	W	W	W
Price[2] dollars per pound	1.10-1.17	1.55-1.60	1.15-1.30	1.35-1.45	2.00-2.50
World, primary production[e]	509,000	595,000	622,000	675,000	748,000

[e]Estimated. [r]Revised. W Withheld to avoid disclosing company proprietary data.
[1]Data are rounded to no more than three significant digits.
[2]Source: Platts Metals Week.

TABLE 2
MAGNESIUM RECOVERED FROM SCRAP PROCESSED IN THE UNITED STATES, BY KIND OF SCRAP AND FORM OF RECOVERY[1]

(Metric tons)

	2006	2007
KIND OF SCRAP		
New scrap:		
Magnesium-base	16,100	16,600
Aluminum-base	44,400 r	43,600
Total	60,500 r	60,300
Old scrap:		
Magnesium-base	807	807
Aluminum-base	20,900 r	23,000
Total	21,700 r	23,800
Grand total	82,200 r	84,000
FORM OF RECOVERY		
Magnesium alloy ingot[2]	W	W
Magnesium alloy castings	1,270	484
Magnesium alloy shapes	364	262
Aluminum alloys	65,700 r	67,000
Other[3]	14,800	16,300
Total	82,100 r	84,000

[r]Revised. W Withheld to avoid disclosing company proprietary data; included in "Other."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes secondary magnesium content of both secondary and primary alloy ingot.
[3]Includes chemical and other dissipative uses, cathodic protection, and data indicated by symbol W.

TABLE 3
U.S. CONSUMPTION OF PRIMARY MAGNESIUM, BY USE[1]

(Metric tons)

Use	2006	2007
For structural products:		
Castings:		
Die	25,600	23,100
Permanent mold	50	29
Sand	357	2,800
Wrought products[2]	2,410	2,720
Total	28,400	28,700
For distributive or sacrificial purposes:		
Aluminum alloys	33,700	29,800
Cathodic protection (anodes)	3,000	916
Iron and steel desulfurization	7,570	9,290
Nodular iron	323	304
Reducing agent for titanium, zirconium, hafnium, uranium, beryllium	869	1,280
Other[3]	3,690	2,010
Total	49,100	43,600
Grand total	77,600	72,300

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes sheet and plate and forgings.
[3]Includes chemicals and scavenger, deoxidizer, and powder.

TABLE 4
YEAREND MAGNESIUM PRICES

Source		2006	2007
Platts Metals Week:			
U.S. spot Western	dollars per pound	1.35-1.45	2.00-2.50
U.S. spot dealer import	do.	1.35-1.42	1.80-2.30
European free market	dollars per metric ton	2,000-2,100	3,900-4,200
Metal Bulletin:			
European free market	do.	2,050-2,150	4,100-4,500
China free market	do.	2,020-2,080	4,200-4,900

do. Ditto.

TABLE 5
U.S. EXPORTS OF MAGNESIUM, BY COUNTRY[1]

Country	Waste and scrap		Metal		Alloys		Powder, sheets, tubing, ribbons, wire, other forms	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2006:								
Brazil	--	--	19	$41	1,230	$3,220	5	$161
Canada	3,450	$7,860	3,490	7,810	481	1,720	507	4,770
Mexico	207	502	498	1,150	74	249	978	5,800
United Kingdom	--	--	3	6	1	6	269	6,150
Other	17	44	168	504	505	3,000	422	8,640
Total	3,680	8,410	4,170	9,520	2,290	8,200	2,180	25,500
2007:								
Brazil	19	59	--	--	1,210	3,760	5	180
Canada	1,210	2,930	3,420	8,580	4,660	13,000	359	5,270
Mexico	423	722	825	1,630	1,160	3,770	140	1,350
United Kingdom	--	--	--	--	36	139	272	7,290
Other	143	290	38	83	512	2,920	394	8,700
Total	1,800	4,000	4,290	10,300	7,570	23,600	1,170	22,800

-- 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. IMPORTS FOR CONSUMPTION OF MAGNESIUM, BY COUNTRY[1]

Country	Waste and scrap		Metal		Alloys, magnesium content		Powder, sheets, tubing, ribbons, wire, other forms, magnesium content	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2006:								
Canada	11,500	$14,200	8,780	$21,500	18,800	$64,800	580	$5,200
China	216	353	1	7	335	730	243	1,430
Israel	--	--	7,920	22,000	2,610	8,410	--	--
Kazakhstan	--	--	1,300	2,850	--	--	--	--
Mexico	1,090	1,470	--	--	483	1,050	26	38
Russia	--	--	13,000	26,300	--	--	9	185
Other	4,390 [r]	7,710 [r]	912	2,340	2,940 [r]	13,300 [r]	69 [r]	3,240 [r]
Total	17,200	23,700	31,900	74,900	25,200	88,200	927	10,100
2007:								
Canada	11,100	17,100	1,070	3,950	13,100	48,600	805	3,090
China	334	628	3,450	9,940	64	187	625	4,560
Israel	--	--	14,500	41,500	2,420	7,560	--	6
Kazakhstan	--	--	974	2,570	--	--	--	--
Mexico	2,750	2,360	--	--	1,990	4,820	--	--
Russia	--	--	6,110	12,200	--	--	20	488
Other	7,050	14,400	1,010	3,380	4,360	18,400	37	1,510
Total	21,200	34,500	27,200	73,500	21,900	79,600	1,490	9,650

[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 7
WORLD ANNUAL PRIMARY MAGNESIUM
PRODUCTION CAPACITY, DECEMBER 31, 2007[1]

(Metric tons)

Country	Capacity
Brazil	18,000
Canada	9,000 [2]
China	873,000
India	900
Israel	27,500
Kazakhstan	10,000
Russia	80,000
Serbia and Montenegro	5,000
Ukraine	15,000
United States	45,000
Total	1,080,000

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

TABLE 8
MAGNESIUM: PRIMARY WORLD PRODUCTION, BY COUNTRY[1, 2]

(Metric tons)

Country	2003	2004	2005	2006	2007[e]
Brazil	6,000	6,000	6,000	6,000	18,000
Canada[3]	78,000	54,000	50,000	65,000	16,300
China	340,000	442,000	470,000	520,000 [r]	627,000
Israel	26,000	28,000	27,853 [4]	24,581 [r, 4]	25,000
Kazakhstan	14,000	18,000	20,000	21,000	21,000
Russia[3]	43,000	45,000	45,000	35,000 [r]	37,000
Serbia	1,600 [5]	1,600 [5]	1,500 [5]	1,500	1,500
Ukraine	3	3	2,000	2,200	2,500
United States	W	W	W	W	W
Total	509,000	595,000	622,000	675,000 [r]	748,000

[e]Estimated. [r]Revised. W Withheld to avoid disclosing company proprietary data; not included in "Total."
[1]World totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.
[2]Table includes data available through July 17, 2008.
[3]Includes secondary.
[4]Reported figure.
[5]Montenegro and Serbia formally declared independence in June 2006 from each other and dissolved their union.