

MAGNESIUM

By Deborah A. Kramer

Supplies of magnesium in the United States remained tight throughout most of 1995. As a result of the tight supplies, prices of magnesium escalated to their highest level since magnesium was first manufactured commercially in the United States in 1915. A full year of antidumping duties assessed on primary magnesium imported from China, Russia, and Ukraine reduced the quantity of primary magnesium imported into the United States. Capacity utilization for the U.S. producers was at 98%. As a result of the high magnesium prices, some U.S. auto manufacturers were taking a second look at their plans to incorporate more magnesium alloy diecastings into automobiles, although most of the previously planned programs remained in place. Several U.S. firms planned to construct new secondary magnesium recovery facilities to process the additional scrap that would be generated by the automotive diecasting sector.

Internationally, new plant construction continued in Israel, with a 27,500-metric-ton-per-year primary magnesium plant scheduled to open in 1996. Plans to erect new magnesium plants in Australia, Canada, and Iceland would add 143,000 tons of annual capacity by the turn of the century. New plant construction also was in the early planning stages in China and Russia.

Legislation and Government Programs

On April 26, the International Trade Commission (ITC) announced its determinations in the final antidumping investigations of magnesium imports from China, Russia, and Ukraine. The ITC determined that the United States magnesium industry was injured by imports of pure magnesium from these three countries, but it was not injured by imports of alloy magnesium. This decision confirms final duties announced by the International Trade Administration (ITA) in March setting cash deposit rates as follows: for China, 108.26%; for Russia, 0% to 100.25%, depending on the importer and the producer; and for Ukraine, 79.87% to 104.27%, depending on the importer.¹

The ITA amended its final determination on pure magnesium from the Russian Federation to omit Amalgamet from its list of companies excluded from an antidumping order. ITA also specified that the exclusion applicable to the companies listed was limited to instances where the companies source the magnesium from the same producer as they sourced during the period of investigation.² The ITA also amended its antidumping duty order regarding Interlink Metals' importation of magnesium from Russia. Interlink had an amended dumping margin of 0% when importing from either of the Russian producers. The amendment was issued following the

investigation of a complaint of a ministerial error.³

As requested, the ITA conducted administrative reviews on antidumping duties for pure magnesium from Canada for the period August 1, 1993 to July 31, 1994. Because there were no shipments of the subject merchandise during the review period, the ITA assigned Norsk Hydro Canada Inc. the 21% cash deposit rate established in 1993.⁴ ITA also was conducting administrative reviews on antidumping and countervailing duties established for pure and alloy magnesium from Canada for the period August 1, 1994 to July 31, 1995. The final review for this period was expected to be completed by August 31, 1996.⁵

Production

U.S. primary magnesium production in 1995 was about 10% higher than that in 1994 and was about 98% of the rated production capacity. (See tables 1 and 2.)

Consumption

Diemakers planned to build a new magnesium diecasting plant in Hannibal, MO. Initially the plant will operate two 1,200-ton cold chamber diecasting machines, but Diemakers may triple the plant's capacity within 3 to 5 years.⁶

Rosborough Manufacturing Co. opened a new magnesium granule plant in Walkerton, IN, at the end of June. The new plant replaced two older plants in two other Indiana cities. Production capacity for magnesium granules from secondary magnesium remained essentially unchanged at 5,400 tons per year, but capacity for preblended desulfurization reagent doubled to 43,500 tons per year.⁷ Rosborough also announced that it started up its 50-50 joint partnership with Nippon Magnetic Dressing Co. of Japan to produce and market magnesium desulfurization reagents in Japan. The plant, which has the capacity to produce 1,800 tons per year of desulfurization reagents, opened in May.⁸

Elkem Metals Co. developed an ultrafine calcium carbide desulfurization reagent that it claimed would reduce the quantity of magnesium required in steel desulfurization. Elkem contracted Rosborough to market the new calcium carbide desulfurizer. Rosborough planned to replace lime and some of the magnesium used in its reagents. It also planned to tailor the reagent's specifications to individual customer needs.⁹

General Motors Corp. (GM) sent mixed signals about its commitment to magnesium diecastings with two separate announcements. The company canceled plans to install magnesium seat frames into three high-volume vehicle lines due

out in 1998. Johnson Controls, the manufacturer of the magnesium part for GM, canceled the application because of high price quotations from potential magnesium parts suppliers. The seat frame will be manufactured from steel instead. This application would have been the largest individual application of magnesium diecastings, requiring about 14,000 tons annually.¹⁰ GM also finalized plans to use magnesium steering column support brackets in some of its 1998 model sport utility vehicles. The magnesium bracket, which weighs between 2.3 and 2.7 kilograms each, will replace steel in these applications. GM stated that cost considerations were not sufficient to discourage or prevent the support bracket applications.¹¹

Chrysler Corp. planned to begin using magnesium die-cast support brackets in the 1997 Jeep Cherokee models. Each vehicle will use one 2.3- to 2.7-kilogram bracket, and the total annual requirement was expected to be between 800 and 900 tons of magnesium alloy AM60. Lunt Manufacturing Co. Inc. in Illinois will manufacture the one-piece castings. This single casting will replace an assembly of steel stampings that weighs about 6.4 kilograms.¹²

Sand castings, made from magnesium alloy WE43A, would be featured in the Pratt & Whitney engines for the Advanced Tactical Fighter, the F-22. The castings were to be used in engine gear box components, replacing aluminum at a weight savings of 12 kilograms per engine. Haley Industries, Ontario, Canada, was expected to manufacture the gear box components.¹³

Magnesium Services Inc. tripled the projected capacity for magnesium scrap refining at its new plant in northwest Indiana to 32,000 tons per year. The plant was originally designed for a 10,000-ton-per-year capacity when it was announced in late 1994. Construction of the facility was slated to begin in early 1996, with initial start-up in late 1997. A total of 24,000 tons of capacity will be dedicated to high-purity secondary ingot, and 8,000 tons will be for magnesium chips for desulfurization.¹⁴

SW International Recycling Corp. announced that a new plant for processing magnesium turnings was expected to open on December 1 in Clinton, MI. The 5,000-square-foot facility will focus on cleaning magnesium turnings, primarily for the desulfurization market. Several large diecasting firms have committed to supplying SW International with turnings.¹⁵ (*See tables 3 and 4.*)

Data for magnesium metal are collected from two voluntary surveys of U.S. operations. Of the 99 companies canvassed for magnesium consumption data, 65% responded, representing 39% of the primary magnesium consumption shown in tables 1 and 3. Data for the 35 nonrespondents were estimated based on prior-year consumption levels and other factors.

Stocks

Producer stocks of primary magnesium at yearend 1995 were 12,100 tons, a 4% increase from those at yearend 1994. Primary metal and alloy stocks held by consumers at yearend 1995 were 8,480 tons, a slight increase from the yearend 1994 level of 8,000 tons (revised). Consumer stocks of secondary

magnesium also increased to 613 tons from 428 tons (revised), the level at yearend 1994.

Prices

Free market prices for magnesium soared during 1995. The average Platt's Metals Week free market price began the year at \$3,150 per ton and climbed steadily until it reached a high of \$4,450 per ton in mid-August. This price slowly began dropping in October to end the year at \$4,200 per ton. Prices quoted in other trade publication followed the same trend. The Metal Bulletin free market average price was \$3,125 per ton at the beginning of the year, rose through September, and ended the year at \$4,238 per ton.

The U.S. spot dealer import price, quoted in Platt's Metals Week, rose from \$1.59 per pound at the beginning of 1995 to \$2.20 per pound by yearend. The U.S. spot Western price, the most closely related to U.S. producer list price, increased from \$1.63 per pound to \$2.09 per pound during 1995.

U.S. producers, Dow Magnesium and Magnesium Corp. of America (MagCorp), announced price hikes for their list prices for primary magnesium in February. Dow reportedly raised its list price from \$1.63 per pound to \$1.73 per pound, effective February 15, and MagCorp matched this increase about 1 week later. Producer price quotations increased in June by \$0.10 per pound to \$1.83. In September, MagCorp increased primary list prices further to \$1.93 per pound.

Diecasting alloy prices, however, remained stable through most of 1995 at \$1.54 to \$1.62 per pound. Dow announced a price increase to \$1.70 per pound in November, which was not expected to affect customers until 1996.

Foreign Trade

Despite the imposition of antidumping duties, Russia remained the principal U.S. import source for primary magnesium, with more than 65% of the total. Total imports of primary magnesium, however, declined significantly from 1994 to 1995 because of a full year of assessed duties. Increases in imports of alloys and scrap from Canada led to an overall 19% increase in U.S. magnesium imports. (*See tables 5 and 6.*)

World Review

According to figures released by the International Magnesium Association, world magnesium inventories at the end of 1995 were 22,800 tons, a slight decline from the 1994 level. (*See tables 7, 8, and 9.*)

The antidumping duty investigation by the European Commission on imports of magnesium from Russia and Ukraine continued during 1995. A decision in the suit, which was initiated in 1994, was expected in early 1996.

Australia.—According to a report from Queensland Metals Corp. (QMC), the next phase in developing a 60,000-ton-per-year magnesium metal plant was to construct and operate a large-scale demonstration plant as part of a detailed feasibility

study. Detailed engineering on the plant was scheduled to begin by the end of 1995, with construction to begin by mid-to-late 1996. QMC also planned some corporate restructuring and would require an additional financial partner before full-scale plant construction could begin.

Brazil.—The Secretary of Foreign Trade in Brazil began an antidumping investigation of magnesium imports from Russia, Ukraine, and the United States after a complaint was filed by Brazil's sole magnesium producer, Brasmag. The complaint alleged dumping margins of 36% for imports from Russia and Ukraine and 25% for imports from the United States. The investigation, which was opened in early December 1994, covered the period from January 1993 to June 1994.¹⁶

Canada.—The Magnola project announced that it would construct a C\$33 million demonstration plant at the Noranda Technology Center in Pointe Claire, Quebec, to start operation by early 1996. If the demonstration plant proves successful, Magnola planned to start construction of a 58,000-ton-per-year plant in 1997, with the first commercial metal production early in 2000. Magnola planned to recover magnesium from asbestos tailings using a combination of leaching, dehydration, and electrolysis.¹⁷

Alberta Natural Gas Co. Ltd. (ANG), the owner of the closed Magnesium Co. of Canada (MagCan) plant in Alberta was the winning bidder in an auction for the plant facilities. The 12,500-ton-per-year MagCan plant near High River, Alberta, has been closed since the spring of 1991, and ANG reportedly was spending C\$1 million per month in mothball expenses and interest charges for the facility since its closure. The winning bid for the plant, with an original construction cost of C\$200 million, was C\$4.8 million.¹⁸

China.—Japan's Ube Industries Ltd. planned to form a joint venture with two Japanese trading companies and Chinese interests to produce magnesium in Nanjing, China. The joint venture, called Nanjing Ube Magnesium Co., planned to construct a 3,300-ton-per-year magnesium plant at a cost of \$14.6 million. Part of Ube's equipment in Japan from its magnesium plant that closed in September 1994 was planned to be transferred to the new operation in China. Production was expected to begin in fall 1995 at an annual rate of 4,000 tons per year; an existing 700-ton-per-year facility operated by the Chinese joint-venture partner was expected to be transferred to the new joint venture.¹⁹

The State Planning Commission of China announced ambitious plans to more than double its production in the next 2 years. In addition to the joint venture with Japan, the Minhe magnesium smelter in Qinghai Province was expected to double its capacity to about 6,500 tons per year by the end of 1995. China's Jilin Province planned to construct four magnesium plants with a total production capacity of 8,200 tons per year. The new plants were scheduled to start up in 1996. The Linjiang Government also planned two plants with a total capacity of 6,000 tons per year. Several other city and provincial governments were seeking foreign investment to build new magnesium facilities.²⁰

According to China Nonferrous Metals Industry Corp.

(CNNC) statistics, Chinese magnesium production increased to 25,300 tons in 1994, with 15,000 tons of exports during the year. CNNC estimated that 200 magnesium plants were being constructed, mostly in the Shanxi and Henan Provinces. Most of these plants were believed to have a capacity less than 200 tons per year.²¹

Iceland.—The Sudurnes Regional Heating Corp. announced that it had completed a prefeasibility study to construct a 25,000-ton-per-year primary magnesium plant in Iceland. The final feasibility study, which was scheduled to be completed in September, will reflect the company's design to use inexpensive local geothermal energy for the plant. Cost of the plant was estimated at \$250 million, and construction would take 2 to 3 years.²²

Israel.—Dead Sea Works announced that it would sign a contract with Volkswagen AG to set up a joint venture between the two companies; a Memorandum of Understanding was signed earlier in 1995. As a result of the agreement, Volkswagen will have a 38% stake in the new company, Dead Sea Magnesium Ltd., whose new 27,500-ton-per-year primary magnesium plant was scheduled to open at the end of 1996.²³

Italy.—Italian nonferrous powder producer Pometon S.A. began building a 300-ton-per-year magnesium-aluminum powder plant in San Giorgio di Nogaro in July. The company was awaiting final emissions permits from the local authorities. Pometon currently operates a 2,400-ton-per-year magnesium granule and powder production facility at the site, which primarily serves the desulfurization market.²⁴

Norway.—Norsk Hydro A/S announced that it would increase magnesium production at both its plants in Norway and Canada so that they would be running at full capacity by the second half of 1995.²⁵ Norsk Hydro also announced plans to increase primary magnesium production by 8,000 tons per year at its Porsgrunn, Norway, plant by 1997. Modernization and debottlenecking portions of the plant that were already operating will provide the additional capacity. Once the output is increased, Norsk Hydro will have 80,000 tons of annual capacity in Canada and Norway.²⁶ The company also announced that construction of its 10,000-ton-per-year magnesium recycling facility was proceeding on schedule, and the official opening would be January 20, 1996.²⁷ Norsk Hydro also planned a joint venture with the Italian company Speedline to develop the magnesium wheel market. The joint-venture firm will be called HY-speed and will manage the casting and fabrication of magnesium wheels for both companies. HY-speed will be sited in northern Italy.²⁸

Russia.—The Russian Government reportedly issued a state order to the magnesium producers to replenish their stockpiles. Russian demand by construction firms in particular has increased, and the two producers, Avisma (formerly Berezniki) and Solikamsk Magnesium Works (SMW), sold out for the first quarter of 1995. In addition to increasing domestic demand, exports to Japan were expected to increase because the Japanese Government eliminated the duty on magnesium imports from Russia beginning April 1.²⁹

SMW reportedly was completing a feasibility study on the

construction of a new magnesium plant with a combined annual capacity of 25,000 tons of primary and alloy magnesium. The plant would be constructed at the company's plant site in Russia. Although technical plans have been reviewed, SMW was uncertain about the timetable for plant construction because this depends on securing investment for the project.³⁰

Avisma announced that its 1995 production will be about 25,000 tons, a 7,000- to 8,000-ton increase from 1994 production. The company was not selling any magnesium on the free market and instead was concentrating on building up long-term contracts. SMW also stated that it was making up for lost production earlier in the year caused by raw material problems. The company planned to produce 16,000 tons of primary magnesium and 3,000 tons of magnesium alloy in 1995.³¹

SMW planned to form a joint venture with a Western company to construct a magnesium granule plant to supply material to the desulfurization market. Initial production was scheduled for 1996 at an annual capacity of 2,000 tons. If Russian demand increases, the plant's capacity would increase to 6,000 tons per year. Calcium carbide was the primary desulfurization reagent used in Russia, but the industry was looking for a more effective reagent.

United Kingdom.—GM announced preliminary plans to manufacture magnesium seat frames for its European operations. The frames would be introduced in the 1999 models of a number of cars and vans produced by GM's Adam Opel AG and Vauxhall Motors Ltd., sited in Germany and the United Kingdom, respectively. Details for the seat program were expected to be finalized in 1996.³²

Outlook

U.S. demand for magnesium was expected to continue to grow, primarily in the diecasting sector. New vehicle platforms and substitutions in current vehicles were expected to continue to provide opportunities for increased use of magnesium diecastings. Industry estimates indicated that the magnesium diecasting content of a typical U.S. family vehicle increased from 1.4 kilograms in the 1990 model year to 2.5 kilograms in the 1996 model year. Although future growth may not be at this accelerated rate, growth was expected to continue nonetheless, especially in the wake of declining magnesium prices.

World magnesium supplies were expected to loosen somewhat when the Israeli plant commences operation in 1996. Approximately 38% of the plant's production was earmarked for Volkswagen, but some production should be available to U.S. consumers by 1997.

¹Federal Register. Notice of Final Determination of Sales at Less Than Fair Value: Pure Magnesium From Ukraine. (Int. Trade Admin., Dep. Commerce). V. 60, No. 61, Mar. 30, 1995, pp. 16432-16437.

_____. Notice of Final Determination of Sales at Less Than Fair Value: Pure Magnesium and Alloy Magnesium From the People's Republic of China. (Int. Trade Admin., Dep. Commerce). V. 60, No.

61, Mar. 30, 1995, pp. 16437-16440.

_____. Notice of Final Determination of Sales at Less Than Fair Value: Pure Magnesium and Alloy Magnesium From the Russian Federation. (Int. Trade Admin., Dep. Commerce). V. 60, No. 61, Mar. 30, 1995, pp. 16440-16450.

²_____. Notice of Antidumping Duty Orders: Pure Magnesium From the People's Republic of China, the Russian Federation, and Ukraine; Notice of Amended Final Determination of Sales at Less Than Fair Value: Antidumping Duty Investigation of Pure Magnesium From the Russian Federation. (Int. Trade Admin., Dep. Commerce). V. 60, No. 92, May 12, 1995, pp. 25691-25692

³_____. Notice of Amended Antidumping Duty Order: Pure Magnesium From the Russian Federation; Notice of Amended Final Determination of Sales at Less Than Fair Value: Antidumping Duty Investigation of Pure Magnesium From the Russian Federation. (Int. Trade Admin., Dep. Commerce). V. 60, No. 244, Dec. 20, 1995, p. 65636.

⁴_____. Pure Magnesium From Canada, Final Results of Antidumping Duty Administrative Review. (Int. Trade Admin., Dep. Commerce). V. 60, No. 184, Sept. 22, 1995, pp. 49258-49259.

⁵_____. Initiation of Antidumping and Countervailing Duty Administrative Reviews. (Int. Trade Admin., Dep. Commerce). V. 60, No. 179, Sept. 15, 1995, pp. 47931-47932.

⁶Platt's Metals Week. Diemakers To Build New Magnesium Plant. V. 66, No. 30, July 24, 1995, p. 10.

⁷_____. Rossborough Expands Mg Grinding; Considers Substituting. V. 66, No. 27, July 3, 1995, pp. 6-7.

⁸Metal Bulletin. Rossborough Expands Into Japan. No. 7895, June 5, 1995, p. 11.

⁹_____. Elkem Reagent To Speed Mg Substitution? No. 8005, Aug. 17, 1995, p. 9.

¹⁰Wrigley, A. GM Steering Clear of Magnesium Part. Am. Met. Mark., v. 103, No. 129, July 7, 1995, pp. 1, 12.

¹¹_____. GM Selects Magnesium, Steers Around Steel. Am. Met. Mark., v. 103, No. 140, July 24, 1995, p. 20.

¹²_____. Chrysler Ups Magnesium Use. Am. Met. Mark., v. 103, No. 233, Dec. 5, 1995, p. 18.

¹³American Metal Market. Haley Magnesium To Take Flight. V. 103, No. 237, Dec. 11, 1995, p. 6.

¹⁴Platt's Metals Week. MSI Triples Secondary Magnesium Capacity Plans. V. 66, No. 32, Aug. 7, 1995, p. 2.

¹⁵_____. SW To Open Magnesium Scrap Rehabilitation Plant. V. 66, No. 41, Oct. 9, 1995, p. 3.

¹⁶_____. Brazil Investigating Mg Dumping by Russia, Ukraine, US. V. 66, No. 5, Jan. 30, 1995, pp. 7-8.

¹⁷_____. Magnola To Construct Magnesium Pilot Plant. V. 66, No. 11, Mar. 13, 1995, p. 9.

¹⁸Regan, B. Alberta Laughs Last on Magnesium Mill. Am. Met. Mark., v. 103, No. 89, May 9, 1995, p. 2.

¹⁹Furukawa, T. Ube Industries Forms Magnesium Venture in China. Am. Met. Mark., v. 103, No. 65, Apr. 5, 1995, p. 6.

²⁰Platt's Metals Week. China Encourages Magnesium Producers To Increase Output. V. 66, No. 25, June 19, 1995, p. 8.

²¹Metal Bulletin. Solikamsk To Construct Mg Granules Plant. No. 8021, Oct. 16, 1995, p. 13.

²²_____. Iceland Mg Project Awaits Feasibility Study. No. 7995, July 10, 1995, p. 9.

²³_____. DSW To Sign Mg Deal Within Six Months. No. 8040, Dec. 21, 1995, p. 11.

²⁴_____. Powmeton To Build New Mg/Al Powder Line. No. 7989, June 19, 1995, p. 10.

²⁵Regan, B. Norsk Hydro Boosting Magnesium Production. Am.

Met. Mark., v. 103, No. 52, Mar. 17, 1995, p. 2.

²⁶Metal Bulletin. Norsk Hydro To Increase Magnesium Output. No. 8011, Sept. 11, 1995, p. 20.

²⁷———. Hydro Magnesium Plant on Schedule, Scrap Tight. No. 8012, Sept. 14, 1995, p. 14.

²⁸Platt's Metals Week. Hydro, Speedline in Magnesium Wheel Joint Venture. V. 66, No. 39, Sept. 25, 1995, p. 9.

²⁹Metal Bulletin. Russia Orders Its Magnesium Producer To Rebuild Stocks. No. 7944, Jan. 9, 1995, p. 7.

³⁰———. Solikamsk Plans New Magnesium Plant. No. 7973, Apr. 24, 1995, p. 15.

³¹———. Avisma To Increase Magnesium Output. No. 8001, July 31, 1995, p. 9.

³²American Metal Market. V. 103, No. 176, Sept. 12, 1995, p. 16.

Magnesium. Reported quarterly in Mineral Industry Surveys. Bodenlos, A. J. and T. P. Thayer. Magnesian Refractories. Ch. in United States Mineral Resources, USGS Professional Paper 820, ed. by D.A. Brobst and W. P. Pratt, 1973, pp. 379-384.

Other Sources

American Metal Market (daily newspaper).

International Magnesium Association. Magnesium, monthly.

Metal Bulletin (London), biweekly.

Platt's Metals Week.

Roskill Information Services Ltd. Magnesium Metal 1991, 6th ed.

OTHER SOURCES OF INFORMATION

U.S. Geological Survey Publications

Magnesium. Ch. in Mineral Commodity Summaries, annual.

TABLE 1
SALIENT MAGNESIUM STATISTICS 1/

(Metric tons unless otherwise specified)

	1991	1992	1993	1994	1995
United States:					
Production:					
Primary magnesium	131,000	137,000	132,000	128,000	142,000
Secondary magnesium	50,500	57,000	58,900	62,100	65,100
Exports	55,200	52,000	38,800	45,200	38,300
Imports for consumption	31,900	11,800	37,200	29,100	34,800
Consumption, primary	91,900	93,800	101,000	112,000	109,000
Price per pound	\$1.43	\$1.46-\$1.53	\$1.43-\$1.46 2/	\$1.63 2/	\$1.93-\$2.25 2/
World: Primary production	342,000	295,000 r/	269,000 r/	284,000 r/	339,000 e/

e/ Estimated. r/ Revised.

1/ Data are rounded to three significant digits, except prices.

2/ Yearend Platt's Metals Week U.S. spot western price.

TABLE 2
U.S. MAGNESIUM METAL PRODUCERS, BY LOCATION, RAW MATERIAL,
AND PRODUCTION CAPACITY IN 1995

Company	Plant location	Raw material	Annual capacity (metric tons)
The Dow Chemical Co.	Freeport, TX	Seawater	65,000
Magnesium Corp. of America	Rowley, UT	Lake brines	40,000
Northwest Alloys Inc.	Addy, WA	Dolomite	40,000
Total			145,000

TABLE 3
MAGNESIUM RECOVERED FROM SCRAP PROCESSED IN THE UNITED
STATES, BY KIND OF SCRAP AND FORM OF RECOVERY 1/

(Metric tons)

	1994	1995
KIND OF SCRAP		
New scrap:		
Magnesium-base	2,790	3,590
Aluminum-base	29,700	31,800
Total	32,500	35,400
Old scrap:		
Magnesium-base	4,330	4,330
Aluminum-base	25,300	25,400
Total	29,600	29,800
Grand total	62,100	65,100
FORM OF RECOVERY		
Magnesium alloy ingot 2/	W	W
Magnesium alloy castings	924	2,250
Magnesium alloy shapes	476	320
Aluminum alloys	55,200	58,000
Zinc and other alloys	12	10
Other 3/	5,510	4,570
Total	62,100	65,100

W Withheld to avoid disclosing company proprietary data; included in "Other."

1/ Data are rounded to 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 and cathodic protection, as well as data indicated by symbol W.

TABLE 4
U.S. CONSUMPTION OF PRIMARY MAGNESIUM, BY USE 1/

(Metric tons)

Use	1994	1995
For structural products:		
Castings:		
Die	14,200 r/	13,400
Permanent mold	911	1,230
Sand	565	601
Wrought products:		
Extrusions	5,630	5,900
Other 2/	2,060	2,620
Total	23,300 r/	23,800
For distributive or sacrificial purposes:		
Aluminum alloys	61,100	60,200
Cathodic protection (anodes)	2,670	5,970
Chemicals	492	470
Iron and steel desulfurization	13,500	13,500
Reducing agent for titanium, zirconium, hafnium, uranium, and beryllium	7,230	1,750
Other 3/	3,990	3,460
Total	89,000	85,300
Grand total	112,000	109,000

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes sheet and plate and forgings.

3/ Includes nodular iron, scavenger, deoxidizer, and powder.

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

Country	Waste and scrap		Metal		Alloys (gross weight)		Powder, sheets, tubing, ribbons, wire, other forms (gross weight)	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
1994:								
Australia	--	--	3,110	\$5,930	--	--	103	\$380
Belgium	--	--	8,060	22,400	263	\$619	2,700	7,040
Canada	1,760	\$4,060	2,490	6,810	4,600	12,000	838	2,690
Japan	--	--	6,290	16,100	290	1,310	468	2,880
Korea, Republic of	--	--	398	1,050	198	994	7,090	2,220
Mexico	4	10	269	837	65	369	293	1,140
Netherlands	--	--	4,030	6,920	4	49	33	128
Other r/	77	203	988	5,690	216	1,580	542	4,520
Total	1,840	4,280	25,600	65,700	5,630	16,900	12,100	21,000
1995:								
Australia	--	--	3,000	8,530	4	19	19	125
Belgium	--	--	7,950	17,400	1,540	3,580	2,500	5,820
Canada	3,480	8,160	221	789	4,000	10,400	921	4,410
Japan	--	--	6,720	20,900	146	785	569	3,610
Korea, Republic of	--	--	111	389	54	556	1,080	1,380
Mexico	--	--	165	597	37	259	1,670	1,040
Netherlands	--	--	2,590	6,090	70	239	38	122
Other	51	194	707	4,540	223	2,490	406	4,000
Total	3,540	8,350	21,500	59,300	6,080	18,400	7,200	20,500

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

Source: Bureau of the Census.

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)
1994:								
Canada	442	\$794	309	\$972	8,070	\$27,900	886	\$3,150
China	213	307	780	1,460	37	103	--	--
Mexico	514	766	975	2,600	--	--	17	48
Russia	293	421	11,700	26,400	104	230	70	193
Ukraine	--	--	1,280	3,000	--	--	--	--
United Kingdom	358	526	(2/)	2	430	2,380	4	79
Other	1,100	1,370	716	1,770	906	3,170	4	37
Total	2,920	4,190	15,700	36,200	9,540	33,800	981	3,510
1995:								
Canada	8,570	19,300	471	1,740	13,300	44,700	858	4,190
China	281	528	384	517	51	88	--	--
Mexico	690	1,190	609	1,470	173	369	3	36
Russia	292	787	4,250	16,100	1,300	3,710	--	--
United Kingdom	318	779	--	--	405	3,050	4	147
Other	1,390	3,420	769	3,200	661	3,140	1	28
Total	11,500	26,000	6,480	23,000	15,900	55,100	867	4,410

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 7
WORLD ANNUAL PRIMARY MAGNESIUM
PRODUCTION CAPACITY, 1/ DECEMBER 31, 1995,
BY CONTINENT AND COUNTRY 2/

(Metric tons)

Continent and country	Capacity
North America:	
Canada	49,000
United States	145,000
Total	194,000
South America: Brazil	10,600
Europe:	
France	17,000
Kazakstan 3/	65,000
Norway	35,000
Russia 3/	95,000
Ukraine 3/	54,000
Total	266,000
Asia:	
China	26,000
India	900
Total	26,900
World total	497,500

1/ Includes capacity at operating plants as well as at plants on standby basis.

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Includes magnesium production capacity that is used exclusively for titanium production as follows: Kazakstan, 40,000 metric tons; Russia, 35,000 metric tons; and Ukraine, 15,000 metric tons.

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

(Metric tons)

Country	1991	1992	1993	1994	1995 e/
Brazil e/	7,800	7,300	9,700	9,700	9,700
Canada e/	35,500 3/	25,800	23,000	28,900	48,100
China e/	8,600	10,600	11,800	24,000 r/	40,000
France	14,050 r/	13,660	10,982 r/	12,280 r/	12,000
Italy	3,919	1,211	-- e/	-- e/	--
Japan	11,559	7,119	7,471	3,412	-- 3/
Kazakstan e/	XX	3,000 r/	2,000 r/	-- r/	--
Norway	44,322	30,404	27,300	27,635	35,000
Russia e/ 3/	XX	40,000	30,000	35,400 r/	37,500
Serbia and Montenegro 4/	XX	4,055	-- e/	2,000 e/	2,000
Ukraine e/	XX	15,000 r/	14,900 r/	12,000 r/	13,000
U.S.S.R. e/ 5/	80,000	XX	XX	XX	XX
United States	131,000	137,000	132,000	128,000	142,000 3/
Yugoslavia 4/ 6/	5,360	XX	XX	XX	XX
Total	342,000	295,000 r/	269,000 r/	284,000 r/	339,000

e/ Estimated. r/ Revised. XX Not applicable.

1/ World totals, U.S. data, and estimated data are rounded to three significant digits; may not add to totals shown.

2/ Table includes data available through Aug. 15, 1996.

3/ Reported figure.

4/ Includes secondary.

5/ All production in Yugoslavia for 1991 came from Serbia and Montenegro.

6/ Dissolved in Dec. 1991.

7/ Dissolved in Apr. 1992.

TABLE 9
MAGNESIUM: WORLD SECONDARY PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country	1991	1992	1993	1994	1995 e/
Brazil e/	1,600	1,600	1,600	1,600	1,600
Japan	17,158	12,978	13,215	19,009	16,760 3/
U.S.S.R. e/ 4/	7,000	6,500	6,000	5,000	6,000
United Kingdom e/ 5/	800	800	1,000 r/	1,000 r/	1,000
United States	50,500	57,000	58,900	62,100	65,000 3/
Total	77,100	78,900	80,700 r/	88,700 r/	90,000

e/ Estimated. r/ Revised.

1/ World totals, U.S. data, and estimated data are rounded to three significant digits; may not add to totals shown.

2/ Table includes data available through Aug. 15, 1996.

3/ Reported figure.

4/ Dissolved in Dec. 1991; however, information is inadequate to formulate reliable estimates for individual countries.

5/ Includes alloys.