MAGNESIUM

By Deborah A. Kramer

Tight U.S. magnesium supplies were the hallmark of 1994. Domestic production declined as one producer closed nearly one-third of its annual capacity; imports from China, Russia, and Ukraine essentially ceased by midyear as a result of antidumping determinations; and domestic demand increased for aluminum alloying and diecasting. As a result of the tight supply situation, average free market prices for primary metal rose by more than $1,000 per metric ton during the year, and producers' inventories declined by 35%. Demand was expected to continue to rise as U.S. auto manufacturers continued to introduce new magnesium components in 1996, 1997, and 1998 models. New and expanded diecasting facilities were scheduled to be constructed to handle the increased demand.

The tight supply situation that was affecting the United States was also prevalent throughout the rest of the world. Closure of Japan's last magnesium plant, along with an accompanying temporary shutdown in France exacerbated the tight supplies. New magnesium extraction facilities were being planned in Australia, Canada, and Israel, but the first of these plants to come on-stream (the Israeli plant) was not scheduled to begin operation until 1996. Production at the other two plants was not scheduled to begin until near the end of the 1990's.

Legislation and Government Programs

Because of the high import levels in 1993, Russia lost its duty-free status for magnesium under the Generalized System of Preferences (GSP), effective January 1, 1994. The U.S. Trade Representative revoked the status for magnesium because Russia had exceeded its competitive need limit on exports, which was not more than 50% of total U.S. imports. Kazakhstan and Ukraine were granted duty-free status under the GSP for exports of specific products, including magnesium. For Ukraine, GSP status took effect on March 23, and for Kazakhstan, GSP status became effective on March 4.[1]

On March 31, the International Trade Commission (ITC) began a preliminary investigation on assessing antidumping duties on pure and alloy magnesium from China, Russia, and Ukraine. The suit was initiated by Magnesium Corp. of America (MagCorp). Products covered by this investigation are classified under sections 8104.11.00, 8104.19.00, and 8104.20.00 of the Harmonized Tariff Schedule.[2] The first hearing on the petition was held on April 21, and the ITC was scheduled to vote on whether the U.S. industry was injured on May 11.

As a result of the May 11 vote, the ITC decided that the U.S. industry was not injured by alloy imports from Ukraine, but appeared to be injured by imports of pure magnesium from all three countries under investigation and by alloy imports from China and Russia. This decision was forwarded to the Department of Commerce on May 16.[3] At the end of June, Dow Chemical formally entered the antidumping suit filed by MagCorp.[4]

At the preliminary determination, held on October 27, the International Trade Administration (ITA), Department of Commerce, made a preliminary determination that imports of magnesium from China, Russia, and Ukraine were being sold in the United States at less than fair value. Preliminary dumping margins for primary magnesium from all three countries and for magnesium alloy from China and Russia were established, but unusually, these margins were directly linked to the importing company. For pure magnesium from Ukraine, the dumping margin range was 36.05% to 53.99%; for China the dumping margins were 108.26% for pure magnesium and 79.38% for magnesium alloy; and for Russia, the dumping margins were 0% to 64.12% for pure magnesium and 0% to 107.89% for magnesium alloy. Under the ruling, importers were required to post a bond or a cash deposit equivalent to the dumping margin when magnesium was imported into the United States. The final determination on this case was scheduled for March 1995.[5]

The U.S. magnesium industry reportedly objected to the Department of Commerce's preliminary antidumping determination for Russia and Ukraine by filing allegations of significant ministerial errors on November 14. The filings alleged that incorrect figures were used for valuing carnallite, transportation, and labor, and that Commerce erroneously deducted some materials costs.[6]

Production

U.S. primary magnesium production was about 3% less than that of 1993, and producers were operating at about 91% of rated yearend capacity. *(See tables 1 and 2).*

At the beginning of February 1994, MagCorp announced that it would make a significant reduction in magnesium production, but declined to give an actual percentage or tonnage figure for the cutback. Company officials said that the production cut was in response to a continuing increase in magnesium imports from the former U.S.S.R. and China. Industry analysts estimated that the total cutback was about 20% to 25% of MagCorp's total output. As a result of the decrease in the production rate, MagCorp reportedly laid off more than 50 of the 560 employees at the Rowley, UT, plant.

Debottlenecking the batch process at Northwest Alloys Inc.'s Addy, WA, plant reportedly will allow the company to increase its production by 15% to 20% in 1995, according to officials. Northwest Alloys has been operating five furnaces at its plant, with a sixth furnace as insurance in case of operational problems.

In early December, Dow Magnesium announced that it would permanently close the idled portion of the magnesium facility at its Freeport, TX, complex. Dow's plant B was originally idled in September 1993 and was estimated to have an annual capacity of 30,000 tons. The closure left Dow with 65,000 tons of annual capacity in Freeport.[7]

MagCorp announced that it completed labor negotiations with its union on November 23, 1994, and signed a new 3-year agreement retroactive to November 1. Contract terms were not disclosed. United Steelworkers of America union members had been working without a contract since the end of August.

Consumption

Increased domestic consumption of aluminum resulted in an accompanying increase in magnesium consumption in 1994. Also additional quantities of aluminum-base new scrap were generated, again with a similar increase in magnesium recovered from this source. Diecasting continued to grow and has

become the second-largest market for magnesium, after aluminum alloying. *(See tables 3 and 4).*

Ford Motor Co. announced that when the new Mustang Cobra models are introduced, they would contain a one-piece magnesium alloy diecasting for the frames in the driver's side seat cushions. This marked the first use of magnesium in an internal seat component in a North American-built car. The one-piece magnesium component, weighing 1.6 kilograms, would replace multipiece steel assemblies in this application. Although the number of Mustang Cobras to be built is limited to 5,000 to 6,000, industry analysts expected that this would be the first of more internal seat applications for magnesium.[8]

Chrysler Corp. announced that it approved Hydro Magnesium's recycled, refined AZ91D ingot per the company's material standard MS 2413. After conducting comprehensive tests on the recycled material, Chrysler determined that this magnesium was equivalent to conventional electrolytic material in quality.[9]

General Motors Corp. (GM) approved the use of magnesium alloy steering column supports in three redesigned car lines that were due out in 1996 and 1997. The new supports will weigh about 1.6 kilograms each.[10] Chrysler, however, postponed plans to put magnesium intake manifolds on its 6-cylinder, 4.0-liter Jeep engines in 1997. Chrysler finalized plans to install magnesium steering column brackets on the 1997 models of its Dodge Dakota pickup trucks. The brackets, weighing about 1.4 kilograms each, were expected to require about 300 tons of magnesium alloy annually.[11]

Meridian Technologies announced that it had won a contract to supply magnesium instrument panels for GM's 1998 series of light trucks. At 4.5 kilograms per part, the contract would amount to about 4,500 tons of magnesium per year.[12] In addition, Meridian announced that it received a letter of intent from New Venture Gear, Detroit, MI, to supply magnesium transfer cases for all of GM's light trucks, beginning with the 1997 models. The transfer cases will consume about 5,900 tons of magnesium annually. Because of the increased diecasting business, Meridian planned to construct a third North American diecasting plant. The new plant, which was estimated to be about the same size as the company's Eaton Rapids, MI, plant, would be constructed in either Michigan or Ontario, Canada. No timetable was set for plant construction.[13]

GM reportedly was completing plans for three new magnesium alloy automobile components that were projected to consume about 5,000 tons of magnesium alloys annually. The new components, instrument panel support beams in three different vehicle lines, were scheduled to be introduced over a 2-year period, beginning in late 1995. The largest of the support beams, to be installed in standard-size vans, would weigh 15 kilograms each, and would be the largest magnesium alloy component produced in high volumes in North America. Industry sources estimated that the new components will replace at least 17,000 tons of steel that was being used in these applications.

Chrysler selected Hayes-Albion Corp. to supply die-cast magnesium steering column brackets for its 1997 intermediate pickup truck models. The brackets, weighing 1.4 kilograms each, replaced steel components, weighing 4.5 kilograms each.[14] Ford planned to replace steel frames for the middle bench seats in one of its 1997 model minivans with magnesium components. The magnesium frames weigh about 6.8 to 8.2 kilograms, about one-third the total weight of the steel component. Total consumption of magnesium for this application was estimated to be about 3,000 tons per year.[15] Hayes-Albion also was selected as the supplier of the die-cast magnesium steering column support brackets for GM's next generation of compact cars. This application was expected to require about 2,500 tons of magnesium annually when full production levels are reached. The first production of the new compact models was scheduled for 1997, with a complete phase-in over a 2-year period.[16]

Toyota Motor Manufacturing U.S.A. Inc. specified die-cast magnesium valve covers for the V-6 engines in some of its sedans manufactured in the United States. Representing about 210 tons of annual magnesium consumption, the valve covers would be manufactured by Diemakers Inc., Monroe City, MO.[17]

In December, Spartan Aluminum Products broke ground on a magnesium diecasting plant in Mexico, MO, with the initial phase expected to be operational by mid-1996. Cost of the initial phase was $15 million and included four 1,200-ton and three 1,000-ton diecasting machines. The new plant was being constructed in response to increased demand from the automotive industry and would have the flexibility to double its initial size to provide capacity for programs under development. Spartan also was continuing an expansion of its existing plant in Sparta, IL.[18]

By installing new equipment, Magnesium Aluminum Corp. expected to increase its productivity and enhance the quality of its products. The magnesium diecaster was installing a new system for eliminating porosity, five electric melting furnaces, and a 600-ton cold-chamber diecasting machine. Magnesium Aluminum produced diecastings for the automotive, electronics, materials handling, and telecommunications markets.[19]

MSI-Magnesium Services announced plans to construct a 10,000-ton-per-year magnesium recycling plant in the midwestern United States. Although a specific location was not disclosed, the facility would be nearby many of the magnesium diecasters. Initial production at the secondary facility was scheduled for late 1996.[20]

Data for magnesium metal are collected from two voluntary surveys of U.S. operations. Of the 116 companies canvassed for magnesium consumption data, 82% responded, representing 49% of the primary magnesium consumption shown in tables 1 and 3. Data for the 21 nonrespondents were estimated based on prior-year consumption levels and other factors.

Stocks

Producer stocks of primary magnesium were 11,600 tons at yearend 1994, a decrease of 35% compared with yearend 1993 stocks of 17,800 tons. Stocks of metal and alloy held by consumers at yearend 1994 were essentially unchanged at 7,730 tons, compared with the yearend 1993 level of 7,770 tons. Consumer stocks of secondary magnesium increased to 700 tons at yearend 1994 from 388 tons at yearend 1993.

Prices

Primary magnesium prices quoted in trade journals increased significantly in 1994. The average Metal Bulletin free market price was $2,260 per ton at the beginning of the year and rose to $3,125 per ton by yearend. The Metals Week European average free market price rose from $2,350 per ton at the beginning of the year to $3,150 per ton by the end of 1994. The average U.S. spot dealer import price, quoted in Metals Week, increased from $1.19 per pound to $1.59 per pound by yearend. The average Metals Week U.S. spot Western price also increased from $1.45 per pound to $1.63 per pound in 1994.

Foreign Trade

With the suit brought by MagCorp in mid-1994, imports of primary magnesium from Russia and Ukraine, which had constituted much of the total imports in the first half of 1994, were essentially eliminated beginning in July. As a result, U.S. imports of primary magnesium were 35% lower than those in 1993. *(See tables 5 and 6).*

World Review

The International Magnesium Association reported that producers' yearend 1994 inventories were 23,300 tons, a 45% decrease from the yearend 1993 level of 42,400 tons.

In July, Norsk Hydro announced that it was increasing production at both its plants in Norway and Canada. Increased demand by the automotive market was responsible for the company's scheduled production increases.[21] To meet its sales requirements, Pechiney reportedly was purchasing magnesium from Russia, despite the antidumping investigation initiated by the European magnesium producers. Even though the European trade suit was initiated before that in the United States, producers expected that the European trade case will not be settled before the end of the year.[22]

Meridian Technologies, along with its joint-venture partner Teksid of Italy, planned to construct a 100,000-square-foot magnesium diecasting plant in Europe. The two companies planned to form a new European company called Meridian International. The new plant was planned to provide magnesium for a European automotive components manufacturer that would in turn supply components for four European automakers. *(See tables 7, 8, and 9).*

Australia.—The Australian Magnesium Research and Development Project (AMRDP) reportedly signed an agreement with Alcan Aluminium Ltd. to acquire electrolytic cell technology for its planned primary magnesium plant. On May 17, two of the original partners in the joint venture, Ube Industries and MIM Holdings, withdrew to concentrate on their respective core businesses. These two companies accounted for 49% of the total investment in the project. The remaining two partners, Queensland Metals Corp. and the Government research organization CSIRO, planned to enter in discussions with other parties to enter the joint venture. AMRDP has been operating a minipilot magnesium production plant since the beginning of 1992 and planned to construct a 60,000-ton-per-year plant in 1996. A prefeasibility study stated that the plant would be able to produce magnesium at an operating cost in the range of 38 to 62 cents per pound.

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.[23]

Canada.—The Alberta Government hired a marketing firm to try to sell the High River primary magnesium plant that closed in 1991. When the Government took over the plant in April 1991, it made good on a loan guarantee of C$102.75 million; since then the Government has written off about C$54 million of the debt. Government officials hoped to sell the plant by the end of 1994.[24]

Noranda Minerals announced that it would construct a 56,000-ton-per-year primary magnesium plant near Thetford Mines, Quebec, in two stages. Construction of the first stage of 28,000 tons per year was expected to begin in 1997, with completion scheduled for 1999, and construction of the second phase would begin directly after the first is completed. Total plant construction cost was estimated to be C$500 million; a C$25 million pilot plant to verify the novel technology began operating in fall 1994. The new plant would produce magnesium and magnesium alloys from asbestos tailings using patented technology.[25]

Israel.—Israel's Dead Sea Works (DSW) announced that the company was negotiating with Germany's Volkswagen to be a joint-venture partner in DSW's primary magnesium under construction in Sdom. After a visit by Volkswagen's president, the two companies agreed to set up a joint body of experts to study future cooperation ideas. DSW began construction of a 27,500-ton-per-year magnesium production plant in the summer of 1993, with completion scheduled for early 1996 at a cost of $250 million.[26]

Japan.—Ube Industries Ltd. planned to close its 8,500-ton-per-year primary magnesium plant in September. This was the third magnesium plant in Japan that closed within 6 years; Japan Metal and Chemicals closed its plant in 1992, and Furukawa Magnesium closed its plant in 1989. The closure of Ube Industries' plant left Japan with no primary magnesium production capacity. High production costs and the appreciation of the yen were cited as reasons for the closure.[27] In July, Ube Industries announced that it would import magnesium from Timminco of Canada and Norsk Hydro of Norway. Ube planned to market the metal under its brand name and will melt or cast some of the metal to the users' specifications. Total level of imports was estimated to be 7,000 tons per year, about the same level that Ube was producing before the shutdown.[28]

Norway.—Norsk Hydro reportedly received final approval for construction of a 10,000-ton-per-year magnesium recycling plant in Porsgrunn, which was scheduled to come on-stream by the end of 1995. The new recycling plant would be able to handle all types of scrap and produce material suitable as a prerequisite for diecasting as well as a source of high-purity magnesium alloys.[29]

Former U.S.S.R.—Production of magnesium in Kazakhstan, Russia, and Ukraine was estimated to have decreased in 1994. Price hikes that increased the electric power cost to about 4 cents per kilowatt-hour were assumed to be partially responsible for the drop in production. Ukraine producer Zaporzhye stopped magnesium production because it has not been able to pay for carnallite, its raw material source, for 8 months. The carnallite mine in the Urals has stopped supplying carnallite until the debts are paid. The other five plants in the aforementioned countries were all operating at reduced rates.[30]

United Kingdom.—Metal Casting reportedly was constructing a new magnesium diecasting plant in Wolverhampton, United Kingdom. The new plant would include a 700-ton, hot-chamber diecasting machine designed to produce 500,000 magnesium cam covers per year for the European market. Production was scheduled to begin in mid-1995.[31]

Outlook

If conditions continue as they have in the past few years, demand for magnesium is expected to continue to grow rapidly for automotive diecastings. Continued short supply for magnesium, however, could result in significant price escalation that may discourage auto manufacturers from specifying magnesium for any new components. If this happens, magnesium's penetration into this market could be severely retarded. Because this is the major growth area for magnesium, both currently and in future projections, overall demand for magnesium could remain stagnant or even decline.

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[3]Platt's Metals Week. V. 65, No. 20, May 16, 1994, p. 8.

[4]Regan, B. Dow Wades Into the Fight Over Magnesium Trade. Am. Met. Mark., v. 102, No. 123, June 28, 1994, pp. 2, 16.

[5]Federal Register. Preliminary Determination of Sales at Less Than Fair Value and Postponement of Final Determination: Pure Magnesium From Ukraine; Pure Magnesium and Alloy Magnesium

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[6]Platt's Metals Week. V. 65, No. 47, Nov. 21, 1994, p. 4.

[7]———. V. 65, No. 49, Dec. 5, 1994, p. 10.

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[12]Platt's Metals Week. V. 65, No. 34, Aug. 22, 1994, p. 6.

[13]———. V. 65, No. 42, Oct. 17, 1994, pp. 8-9.

[14]Wrigley, A. Chrysler Picks Hayes Albion. Am. Met. Mark., v. 102, No. 185, Sept. 26, 1994, p. 4

[15]———. Magnesium Set for Minivan Seats. Am. Met. Mark., v. 102, No. 191, Oct. 4, 1994, p. 16.

[16]———. Magnesium Part Supplier Picked. Am. Met. Mark., v. 102, No. 246, Dec. 22, 1994, p. 5.

[17]———. Toyota Chooses Magnesium for Valve Covers. Am. Met. Mark., v. 102, No. 194, Oct. 7, 1994, p. 2.

[18]Platt's Metals Week. V. 65, No. 50, Dec. 12, 1994, p. 9

[19]Wrigley, A. Magnesium Caster Expands. Am. Met. Mark., v. 102, No. 249, Dec. 28, 1994, p. 16.

[20]Platt's Metals Week. V. 65, No. 47, Nov. 21, 1994, pp. 1, 4.

[21]———. V. 65, No. 29, July 18, 1994, pp. 1, 8.

[22]Metal Bulletin. No. 7899, July 25, 1994, p. 10.

[23]Platt's Metals Week. V. 66, No. 5, Jan. 30, 1995, pp. 7-8.

[24]———. V. 65, No. 11, Mar. 14, 1994, p. 7.

[25]———. V. 65, No. 35, Aug. 29, 1994, pp. 1, 7.

[26]———. V. 65, No. 19, May 9, 1994, p. 3.

[27]———. V. 65, No. 25, June 20, 1994, p. 2.

[28]———. V. 65, No. 27, July 4, 1994, pp. 7-8.

[29]Metal Bulletin. Hydro Magnesium Gets Final Go-Ahead for Recycling Unit. No. 7926, Oct. 31, 1994, p. 11.

[30]Snee, A. CIS Magnesium Hit by Market Economics. Met. Bull., No. 7894, July 7, 1994, p. 9.

[31]Metal Bulletin. Metal Castings Moves Ahead With Magnesium Plant. No. 7893, July 4, 1994, p. 13.

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TABLE 1
SALIENT MAGNESIUM STATISTICS 1/

(Metric tons unless otherwise specified)

	1990	1991	1992	1993	1994
United States:					
Production:					
Primary magnesium	139,000	131,000	137,000	132,000	128,000
Secondary magnesium	54,800	50,500	57,000	58,900	62,100
Exports	51,800	55,200	52,000	38,800	45,200
Imports for consumption	26,800	31,900	11,800	37,200	29,100
Consumption, primary	96,100	91,900	93,800	101,000	112,000
Price per pound	$1.43-$1.63	$1.43	$1.46-$1.53	$1.43-$1.46 2/	$1.63 2/
World: Primary production	354,000 r/	342,000 r/	307,000 r/	281,000 r/	267,000 e/

e/ Estimated. r/ Revised.
1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines 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 1994

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	38,000
Northwest Alloys Inc.	Addy, WA	Dolomite	38,000
Total			141,000

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

(Metric tons)

	1993	1994
KIND OF SCRAP		
New scrap:		
Magnesium-base	3,220	2,790
Aluminum-base	25,100	29,700
Total	28,300	32,500
Old scrap:		
Magnesium-base	4,320	4,330
Aluminum-base	26,300	25,300
Total	30,600	29,600
Grand total	58,900	62,100
FORM OF RECOVERY		
Magnesium alloy ingot 2/	W	W
Magnesium alloy castings	1,090	924
Magnesium alloy shapes	413	476
Aluminum alloys	51,600	55,200
Zinc and other alloys	2	12
Other 3/	5,800	5,510
Total	58,900	62,100

W Withheld to avoid disclosing company proprietary data; included in "Other."
1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines 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	1993	1994
For structural products:		
Castings:		
Die	11,400 r/	13,600
Permanent mold	746	911
Sand	397	565
Wrought products:		
Extrusions	7,430	5,630
Other 2/	2,440	2,060
Total	22,400 r/	22,800
For distributive or sacrificial purposes:		
Aluminum alloys	46,500	61,100
Cathodic protection (anodes)	4,720	2,670
Chemicals	653	492
Iron and steel desulfurization	12,500	13,500
Reducing agent for titanium, zirconium, hafnium, uranium, beryllium	9,090	7,230
Other 3/	5,120 r/	3,980
Total	78,700 r/	89,000
Grand total	101,000	112,000

r/ Revised.
1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines 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)
1993:								
Australia	--	--	2,990	$5,660	22	$42	163	$708
Belgium	--	--	1,660	5,500	85	276	419	1,310
Canada	1,960	$4,480	5,510	15,400	1,140	3,530	726	3,340
Japan	--	--	7,450	19,300	188	1,120	331	2,410
Korea, Republic of	16	24	177	519	158	1,120	4,940	1,600
Netherlands	--	--	7,490	19,800	12	37	595	1,800
Other r/	35	128	1,230	5,690	348	2,100	1,160	7,620
Total	2,010	4,640	26,500	71,900	1,950	8,220	8,340	18,800
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
Netherlands	--	--	4,030	6,920	4	49	33	128
Other	81	213	1,260	6,520	281	1,950	835	5,660
Total	1,840	4,280	25,600	65,700	5,630	16,900	12,100	21,000

r/ Revised.
1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines 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)
1993:								
Canada	517	$742	802	$2,390	5,460	$19,000	102	$458
China	1	3	1,150	2,750	919	2,390	--	--
Mexico	1,080	1,380	--	--	--	--	1,330	3,940
Russia	272	463	16,600	35,800	773	1,640	1	6
Ukraine	--	--	4,220	8,580	17	40	--	--
United Kingdom	300	422	132	295	252	1,930	1	78
Other r/	1,290	1,520	1,290	3,260	664	2,580	37	143
Total	3,460	4,520	24,200	53,100	8,080	27,500	1,470	4,620
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

r/ Revised.
1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines 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, 1994,
BY CONTINENT AND COUNTRY 2/

(Metric tons)

Continent and country	Capacity
North America:	
Canada	49,000
United States	141,000
Total	190,000
South America: Brazil	10,600
Europe:	
France	17,000
Kazakhstan	65,000 3/
Norway	41,000
Russia	95,000 3/
Ukraine	54,000 3/
Total	272,000
Asia:	
China	26,000
India	900
Total	26,900
World total	500,000

1/ Includes capacity at operating plants as well as at plants on standby basis.
2/ Data rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.
3/ Includes magnesium production capacity that is used exclusively for titanium production as follows: Kazakhstan, 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	1990	1991	1992	1993	1994 e/
Brazil e/	8,700	7,800	7,300	9,700	9,700
Canada	25,300 r/	35,500	25,800 r/ e/	23,000 r/ e/	28,900
China e/	5,900	8,600	10,600 r/	11,800 r/	11,000
France	14,000 e/	14,000 e/	13,700	10,900 r/	8,800
Italy	5,730	3,920	1,210	-- e/	--
Japan	12,800	11,600	7,120	7,470 r/	3,410 3/
Kazakhstan e/	XX	XX	20,000	20,000	15,000
Norway	48,200	44,300	30,400	27,300	27,600 3/
Russia e/ 4/	XX	XX	40,000	30,000	25,000
Serbia and Montenegro 5/	XX	XX	4,060 r/	-- e/	2,000
Ukraine e/	XX	XX	10,000	9,000	7,000
U.S.S.R. e/ 6/	88,000	80,000	XX	XX	XX
United States	139,000	131,000	137,000	132,000	128,000 3/
Yugoslavia 5/ 7/	5,790	5,360 r/	XX	XX	XX
Total	354,000 r/	342,000 r/	307,000 r/	281,000 r/	267,000

e/ Estimated. r/ Revised. XX Not applicable.
1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.
2/ Table includes data available through July 12, 1995.
3/ Reported figure.
4/ Includes secondary.
5/ All production in Yugoslavia for 1990-91 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	1990	1991	1992	1993	1994 e/
Brazil e/	1,600	1,600	1,600	1,600	1,600
Japan	23,300	17,200	13,000	13,200	19,000 3/
U.S.S.R. e/ 4/	7,500	7,000	6,500	6,000	5,000
United Kingdom e/ 5/	900	800	800	500	500
United States	54,800	50,500	57,000	58,900	62,100 3/
Total	88,100	77,100	78,900	80,200	88,200

e/ Estimated.
1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.
2/ Table includes data available through July 12, 1995.
3/ Reported figure.
4/ Dissolved in Dec. 1991; however, information is inadequate to formulate reliable estimates for individual countries.
5/ Includes alloys.