

MOLYBDENUM

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Molybdenum is a refractory metallic element used principally as an alloying agent in steel, cast iron, and superalloys to enhance hardenability, strength, toughness, and wear and corrosion resistance. To achieve desired metallurgical properties, molybdenum, primarily in the form of molybdenic oxide or ferromolybdenum, is frequently used in combination with or added to chromium, columbium, manganese, nickel, tungsten, or other alloy metals. The versatility of molybdenum in enhancing a variety of alloy properties has ensured it a significant role in contemporary industrial technology, which increasingly requires materials that are serviceable under high stress, expanded temperature ranges, and highly corrosive environments. Moreover, molybdenum finds significant usage as a refractory metal in numerous chemical applications, including catalysts, lubricants, and pigments. The variety of uses for molybdenum materials, few of which afford acceptable substitution, has resulted in demand that is expected to grow at a greater rate than that of most other alloying metals.

Distribution of molybdenum reserves and productive capacity was concentrated in a few countries of the world. World mine output was estimated to be 129,000 metric tons (t) (molybdenum contained in concentrate), of which, in descending order of production, the United States, Chile, China, Peru, Mexico, and Canada provided 92%. These countries also possessed about 90% of the estimated 12 million metric tons of molybdenum in the world reserve base. [All units are metric tons of contained molybdenum unless otherwise noted.]

Production

Domestic production data for molybdenum were derived by the U.S. Geological Survey by means of three separate voluntary surveys. These surveys are Molybdenum Ore and Concentrate (annual), Molybdenum Concentrate (monthly), and

Molybdenum Products and Molybdenum Concentrates (monthly). Surveys are sent to all operations that produce molybdenum ore and products. All eight operations to which surveys were sent responded, representing 100% of the U.S. production shown in table 1.

In 2000, U.S. mine production of molybdenum concentrate was 41,100 t, a decrease from 42,400 t in 1999. World mine production of molybdenum concentrate increased to 129,000 t in 2000 from 128,000 t in 1999. U.S. share of world production was 31% in 2000, 33% in 1999. Net production of molybdenum products increased by 500 t in 2000. (See tables 1, 2, 7-8.)

Thompson Creek Mining Company announced in January 2001, that it would curtail operations at the Thompson Creek mine near Challis, ID (Thompson Creek Mining Company, 2001). This reduction in mining activity was necessitated by near-record-low prices in the molybdenum industry, reduction in demand due to a slowing U.S. economy, and the continuing export by China of increasing quantities of molybdenum products into the world market, according to Thompson Creek Mining.

The mine planned to produce 2.7 million kilograms in 2001, which was about one-half of its production rate in 2000 and less than one-third of its capacity. Thompson Creek said it would continue to supply long-term customers and will emphasize sales of value-added products.

The new mine plan reportedly was to entail the elimination of 65 jobs out of a work force of 125. Severed employees were to continue to receive salary and benefits through March 17, 2001.

Thompson Creek Mining Company is a subsidiary of Thompson Creek Metals Co. The company also operates the Endako molybdenum mine in Canada as well as the Langeloth metallurgical processing facility in Pennsylvania.

Molybdenum in the 20th Century

At the beginning of the 20th century, there was little demand for molybdenum minerals, except for limited use in the manufacture of chemical reagents. One pound of contained metallic molybdenum in molybdenite ore was worth about \$0.10. Most bonanza ores were exhausted by 1900, and molybdenum mining's future rested squarely on its ability to mass mine large deposits of low-grade ores and to concentrate them economically. Flotation separation technology enabled this to be done. Average annual U.S. molybdenum production during the first decade of the century was about 40 metric tons per year; however, production was reported only for 1901-1903.

By 1910, the price of molybdenum was nudging \$2.20 per kilogram, as the molybdenum market was slowly coming to

life. As World War I raged in Europe in 1914, German, British, French, and Russian armament manufacturers competed to buy all available molybdenum from the only European source, Kven Mine and mill at Knaben, Norway. U.S. production and price of molybdenum peaked at 391 tons in 1918 with the end of World War I. New uses in the steel and chemical industry grew with expanding population. The U.S. production of molybdenum reached a peak of 68,400 tons in 1980. The lowest U.S. production since 1980 was 15,200 tons in 1993. At the end of the 20th century, U.S. production was trending downward. Molybdenum was being used in many more applications, such as stainless steel, catalysts and lubricants, with reported consumption exceeding 20,000 tons per year in the last decade of the century.

Consumption

In 2000, consumption of molybdenum concentrate was 33,800 t, a decrease of 700 t compared with that of 1999. Domestic mine production of molybdenum concentrate was roasted, exported for conversion, or purified to lubrication-grade molybdenum disulfide. Technical-grade molybdic oxide consumption decreased by about 3% in 2000 compared with that of 1999. Oxide was the chief form of molybdenum used by industry, particularly in stainless and alloy steel, cast iron, and superalloys. However, ferromolybdenum comprised 67% of the molybdenum-bearing forms used to make steel, a 1% decrease from that of 1999. Some of the oxide was, however, converted to other molybdenum products, such as ferromolybdenum, high-purity oxide, ammonium and sodium molybdate, and metal powder. (See tables 1, 3.)

Stocks

In 2000, producer plus consumer industry stocks were 11,400 t, a decrease of 600 t compared with those of 1999. Inventories of molybdenum in concentrate at mine and plant decreased by about 550 t. Producer stocks of molybdenum in products, such as oxide, ferromolybdenum, molybdate, metal powders, and other types, increased by about 20 t. Consumer stocks of molybdenum contained in various materials decreased by 40 t compared with those of 1999. Stocks of 11,400 t represented about a 35-week supply. Supply is calculated as reported stocks (table 1) divided by annual consumption (table 3).

Prices

Prices are from Platt's Metals Week (2000) and are in U.S. dollars per kilogram of contained molybdenum. At the beginning of 2000, the prices were molybdenum molybdic oxide (MoX), \$5.534 and ferromolybdenum (FeMo), \$7.716. At the beginning of the second quarter, the prices were MoX, \$5.567 and FeMo, \$7.606. At the start of the third quarter, the prices were MoX, \$6.228 and FeMo, \$7.937. At the start of the fourth quarter, the prices were MoX, \$5.578 and FeMo, \$7.606. At the end of the fourth quarter, the prices were MoX, \$4.806 and FeMo, \$6.779. The annual average prices were MoX, \$5.638 and FeMo, \$7.625.

Foreign Trade

Exports of molybdenum in concentrate and in molybdic oxide were about 15% lower than those of 1999; molybdenum concentrate exports were about 58% of domestic mine production. About 90% of reported exports of concentrates went to Belgium, Canada, Japan, the Netherlands, and the United Kingdom. In 2000, molybdenum exports collectively contained about 27,600 t of molybdenum and were valued at \$159 million, a 15% decrease from \$186 million in 1999.

The United States imported about 13,600 t of molybdenum contained in various materials, which was about 700 t more than those imported in 1999. Total value of all forms of molybdenum imported increased from \$104 million in 1999 to \$111 million in 2000. In terms of value, the major form imported was ferromolybdenum. Major import sources, in descending order of quantity imported, were United Kingdom,

Chile, and China. (See tables 4, 5, 6.)

World Review

Capacity.—As of December 31, U.S. rated capacity for mines and mills was estimated to be 70,000 metric tons per year of contained metal. Rated capacity is defined as the maximum quantity of product that can be produced in a period of time on a normally sustainable long-term operating rate based on the physical equipment of the plant and given acceptable routine operating procedures involving labor, energy, materials, and maintenance. Capacity included operating plants and plants temporarily closed that, in the judgment of the author, can be brought into production within a short period of time with minimum capital expenditure.

Reserves.—With a reserve base of molybdenum estimated to be 5.4 Mt, the United States had 45% of the world molybdenum reserve base. About 90% of U.S. reserves was in large porphyry or disseminated deposits mined or anticipated to be mined primarily for molybdenum; these deposits were in Alaska, Colorado, Idaho, Nevada, New Mexico, and Utah. Other molybdenum sources contribute insignificantly to U.S. reserves.

Most Canadian reserves of molybdenum are in British Columbia. Other Canadian reserves were associated with molybdenum and copper-molybdenum porphyry deposits in British Columbia and with minor sources in New Brunswick and Quebec.

Molybdenum reserves in Central America and South America were associated mainly with large copper porphyry deposits. Of several such deposits in Chile, the Chuquicamata and El Teniente deposits were among the world's largest and accounted for 85% of molybdenum reserves in Chile. Mexico and Peru had substantial reserves. La Caridad deposit in Mexico was a large producer. Numerous other copper porphyries that may contain recoverable quantities of molybdenum have been identified in Central America and South America. Many of these deposits were being actively explored and evaluated and could substantially add to reserves in the future.

Reserves of molybdenum in China and the Commonwealth of Independent States were estimated to be substantial, but definitive information about the current sources of supply or prospects for future development in these two areas was lacking.

Outlook

Because of abundant resources and adequate production capacity in China, Chile, the United States and other countries, the future requirement for molybdenum should be readily met by the world producers. The principal use for molybdenum will continue to be in chemicals/catalysts and as an additive in steel manufacturing in general, most importantly alloy and stainless steel. Strong growth in production of stainless steel and superalloys can be expected in the near term with generally healthy economic conditions over the next few years.

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TABLE 1
SALIENT MOLYBDENUM STATISTICS 1/

(Metric tons, of contained molybdenum, unless otherwise specified)

	1996	1997	1998	1999	2000
United States:					
Concentrate:					
Production	56,000 r/	60,100 r/	53,300	42,400 r/	41,100
Shipments	35,800 r/	32,100 r/	52,100	42,800 r/	35,600
Value, shipments thousands	\$456,000	\$406,000	\$200,000	\$251,000 r/	\$232,000
Reported consumption	24,500	24,300	35,900	34,500	33,800
Imports for consumption	5,480	6,330	6,570	6,390	6,120
Stocks, December 31:					
Concentrate, mine and plant	2,470	3,660	6,270	4,580	4,030
Product producers 2/	5,780	6,500	7,780	5,340	5,360
Consumers, by end use	1,650	1,150	2,170	2,130	2,040
Total	9,900	11,300	16,200	12,000	11,400
Primary products:					
Production	46,300	48,000	57,200	39,800	42,900
Shipments	24,100	25,900	38,000	39,000	34,600
Reported consumption, by end use	20,900	20,000	18,800	18,700 r/	18,600
World, mine production	127,000 r/	138,000 r/	135,000	128,000 r/	129,000 e/

e/ Estimated. r/ Revised.

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

2/ Includes technical and purified molybdc oxide, briquets, ferromolybdenum, phosphomolybdc acid, molybdenum disulfide, molybdc acid, ammonium molybdate, sodium molybdate, calcium molybdate, molybdenum metal, pellets, molybdenum pentachloride, and molybdenum hexacarbonyl.

TABLE 2
PRODUCTION, SHIPMENTS, AND STOCKS OF MOLYBDENUM PRODUCTS IN THE UNITED STATES 1/

(Metric tons of contained molybdenum)

	Metal powder		Other 2/		Total	
	1999	2000	1999	2000	1999	2000
Received from other producers	--	2	19,100	16,100	19,100	16,100
Gross production during year	4,090	5,180	35,700	37,700	39,800	42,900
Molybdenum products used to make other products	2,200	3,000	18,300	20,200	20,500	23,200
Net production	1,880	2,190	17,400	17,500	19,200	19,700
Shipments	580	730	38,500	33,900	39,000	34,600
Producer stocks, December 31	158	259	5,180	5,100	5,340	5,360

-- Zero.

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

2/ Includes ferromolybdenum, molybdc oxides, phosphomolybdc acid, molybdenum disulfide, molybdc acid, ammonium molybdate, calcium molybdate, sodium molybdate, molybdenum metal, pellets, molybdenum pentachloride, and molybdenum hexacarbonyl.

TABLE 3
U.S. REPORTED CONSUMPTION, BY END USES, AND CONSUMER STOCKS OF MOLYBDENUM MATERIALS 1/

(Kilograms, contained molybdenum)

End use	Molybdc oxides	Ferro- molyb- denum 2/	Ammonium and sodium molybdate	Molyb- denum scrap	Other	Total
1999:						
Steel:						
Carbon	434,000 r/	335,000 r/	--	--	68,500	838,000 r/
High-strength low-alloy	455,000 r/	133,000 r/	--	--	--	588,000 r/
Stainless and heat-resisting	3,440,000 r/	694,000 r/	--	--	55,400 r/	4,190,000 r/
Full alloy	1,750,000 r/	2,110,000 r/	--	--	27,900	3,890,000 r/
Tool	900,000 r/	93,400 r/	--	--	17,800	1,010,000 r/
Total	6,980,000 r/	3,360,000 r/	--	--	170,000 r/	10,500,000 r/
Cast irons (gray, malleable, ductile iron)	177,000 r/	830,000 r/	--	--	179,000 r/	1,190,000 r/
Superalloys	994,000	W	--	(3/)	984,000 r/	1,980,000 r/
Alloys (other than steels, cast irons, superalloys):						
Welding materials (structural and hard-facing)	--	37,900 r/	--	--	928 r/	38,900 r/
Other alloys	--	74,500 r/	--	--	77,900 r/	152,000 r/
Mill products made from metal powder 4/	--	--	--	--	2,400,000 r/	2,400,000 r/
Cemented carbides and related products 5/	--	--	--	--	80 r/	80 r/
Chemical and ceramic uses:						
Pigments	--	--	W	--	W	W
Catalysts	974,000	--	W	--	W	974,000
Other	W	--	--	--	17,400	17,400
Miscellaneous and unspecified uses:						
Lubricants	--	--	--	--	234,000 r/	234,000 r/
Other	13,100 r/	48,400	1,130,000 r/	--	53,400 r/	1,250,000 r/
Grand total	9,140,000 r/	4,350,000 r/	1,130,000 r/	--	4,120,000 r/	18,700,000 r/
Stocks, December 31, 1999	991,000 r/	224,000 r/	36,500 r/	19,200 r/	856,000 r/	2,130,000 r/
2000:						
Steel:						
Carbon	425,000	347,000	--	--	21,800	794,000
High-strength low-alloy	989,000	135,000	--	--	303,000	1,430,000
Stainless and heat-resisting	3,070,000	485,000	--	--	104,000	3,660,000
Full alloy	1,380,000	2,220,000	--	--	47,500	3,650,000
Tool	1,020,000	398,000	--	--	55,400	1,470,000
Total	6,880,000	3,590,000	--	--	532,000	11,000,000
Cast irons (gray, malleable, ductile iron)	W	523,000	--	--	27,000	550,000
Superalloys	865,000	W	--	(3/)	1,020,000	1,880,000
Alloys (other than steels, cast irons, superalloys):						
Welding materials (structural and hard-facing)	--	41,500	--	--	916	42,400
Other alloys	W	63,300	--	--	94,000	157,000
Mill products made from metal powder 4/	W	--	--	--	2,190,000	2,190,000
Cemented carbides and related products 5/	--	--	--	--	154	154
Chemical and ceramic uses:						
Pigments	W	--	241,000	--	W	241,000
Catalysts	985,000	--	W	--	W	985,000
Other	W	--	--	--	W	W
Miscellaneous and unspecified uses:						
Lubricants	--	--	--	--	263,000	263,000
Other	147,000	51,100	1,080,000	--	21,600	1,300,000
Grand total	8,880,000	4,270,000	1,330,000	--	4,150,000	18,600,000
Stocks, December 31, 2000	928,000	197,000	39,700	19,900	855,000	2,040,000

r/ Revised. W Withheld to avoid disclosing company proprietary data; included with "Miscellaneous and unspecified uses: Other." -- Zero.

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

2/ Includes calcium molybdate.

3/ Included with "Other" of "Superalloys" category.

4/ Includes construction, mining, oil and gas, and metal working machinery.

5/ Includes ingot, wire, rod, and sheet.

TABLE 4
U.S. EXPORTS OF MOLYBDENUM PRODUCTS, BY PRODUCT AND COUNTRY 1/

Product and country	HTS No.	1999		2000	
		Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Oxides and hydroxides, gross weight:	2825.70.0000				
Belgium		91	\$688	37	\$206
Brazil		10	105	2	21
Canada		546	4,920	711	4,940
Germany		2	33	--	--
Japan		153	1,260	188	1,880
Mexico		294	1,250	191	1,040
United Kingdom		1	8	1	8
Other		28	246	55	473
Total		1,130	8,510	1,190	8,560
Molybdates all, contained weight:	2841.70.0000				
Australia		4	42	5	64
Brazil		1	4	2	45
Canada		497	2,090	475	2,240
China		(2/)	6	(2/)	12
Colombia		2	11	2	17
Honduras		2	22	2	22
Japan		287	1,940	202	1,850
Korea, Republic of		94	927	44	324
Mexico		47	287	30	1,380
Netherlands		319	1,260	251	1,080
Singapore		37	335	17	91
Taiwan		2	32	16	106
Thailand		2	31	1	19
Venezuela		--	--	8	49
Other		10	72	22	225
Total		1,300	7,050	1,080	7,530
Ferromolybdenum, contained weight: 3/	7202.70.0000				
Australia		2 r/	20 r/	1	16
Canada		935 r/	5,020 r/	920	4,980
China		336 r/	3,270 r/	--	--
Japan		83 r/	3,230	95	3,420
Korea, Republic of		18 r/	167	4	37
Mexico		132 r/	653 r/	214	1,470
Venezuela		(2/)	8	--	--
Other		--	--	(2/)	12
Total		1,510 r/	12,400	1,230	9,940
Powder, gross weight:	8102.10.0000				
Brazil		18	536	7	263
Canada		3	116	3	123
France		3	111	3	58
Germany		54	1,290	51	1,430
India		2	76	2	124
Italy		(2/)	3	10	294
Japan		11	332	31	612
Mexico		1	42	3	115
Spain		6	167	7	188
Sweden		50	765	40	919
Switzerland		6	123	(2/)	3
Taiwan		186	3,470	88	1,530
United Kingdom		(2/)	20	3	113
Other		22	491	52	1,170
Total		362	7,540	300	6,940

See footnotes at end of table.

TABLE 4--CONTINUED
U.S. EXPORTS OF MOLYBDENUM PRODUCTS, BY PRODUCT AND COUNTRY 1/

Product and country	HTS No.	1999		2000	
		Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Molybdenum unwrought, gross weight:	8102.91.0000				
Australia		2	\$51	--	--
Brazil		(2/)	2	--	--
Canada		16	411	19	\$364
China		(2/)	7	39	616
France		9	147	1	30
Germany		3	58	35	408
Japan		44	675	4	57
Korea, Republic of		3	123	7	263
Mexico		(2/)	26	6	108
Netherlands		1	50	16	253
Sweden		(2/)	23	1	26
United Kingdom		39	407	68	1,030
Other		50	445	32	392
Total		167	2,430	228	3,550
Molybdenum wrought, gross weight:	8102.92.0000				
Brazil		(2/)	33	1	42
Canada		34	961	23	713
France		2	359	2	210
Germany		6	588	7	361
India		(2/)	36	1	99
Italy		(2/)	3	(2/)	10
Japan		30	2,020	63	3,820
Korea, Republic of		2	229	2	180
Mexico		1	120	1	90
Netherlands		5	125	(2/)	11
United Kingdom		49	2,490	76	3,440
Other		18	1,090	9	636
Total		147	8,050	185	9,610
Wire, gross weight:	8102.93.0000				
Argentina		(2/)	17	(2/)	23
Belgium		3	3,760	9	355
Brazil		38	1,440	13	645
Canada		2	180	3	249
France		5	323	7	368
Germany		25	1,600	15	850
Hungary		53	2,980	44	3,710
India		29	1,320	22	1,010
Indonesia		1	92	10	427
Italy		2	109	2	89
Japan		2	179	5	318
Korea, Republic of		17	810	8	406
Mexico		2	282	1	136
South Africa		(2/)	58	(2/)	17
Spain		3	125	1	52
Sweden		7	282	2	73
Taiwan		(2/)	19	(2/)	8
United Kingdom		(2/)	81	1	83
Other		11	278	7	478
Total		200	13,900	150	9,300

r/ Revised. -- Zero.

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

2/ Less than 1/2 unit.

3/ Ferromolybdenum contains about 60% to 65% molybdenum.

Source: U.S. Census Bureau.

TABLE 5
U.S. EXPORTS OF MOLYBDENUM ORE AND CONCENTRATES (INCLUDING
ROASTED AND OTHER CONCENTRATES), BY COUNTRY 1/

Country	1999		2000	
	Quantity (metric tons, contained molybdenum)	Value (thousands)	Quantity (metric tons, contained molybdenum)	Value (thousands)
Australia	41	\$422	31	\$374
Belgium	4,740	18,800	5,120	21,100
Brazil	66	723	31	386
Canada	1,350	6,720	1,420	6,240
Chile	2,420	6,910	35	263
China	1,190	2,070	795	1,540
Germany	122	629	672	3,080
India	102	511	1	10
Italy	264	1,580	90	754
Japan	2,320	14,300	3,100	16,800
Korea, Republic of	109	720	16	243
Mexico	129	718	62	238
Netherlands	8,620	44,500	8,780	37,700
Sweden	613	3,450	454	2,720
United Kingdom	5,530	25,900	2,910	11,400
Other	231	1,250	100	774
Total	27,900	129,000	23,600	104,000

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 MOLYBDENUM 1/

Item	HTS No.	1999			2000		
		Gross weight (metric tons)	Contained molybdenum	Value (thousands)	Gross weight (metric tons)	Contained molybdenum	Value (thousands)
Molybdenum ore and concentrates, roasted	2613.10.0000	9,020	5,710	\$33,200	6,900	4,340	\$25,800
Molybdenum ore and concentrates, other	2613.90.0000	1,310	680	2,450	3,440	1,780	9,660
Molybdenum oxides and hydroxides	2825.70.0000	746	NA	5,100	1,210	NA	7,400
Molybdates of ammonium	2841.70.0000	1,240	730	6,650	2,270	1,310	12,200
Molybdates all others	2841.70.5000	181	83	727	332	236	1,170
Molybdenum orange	3206.20.0000	1,550	NA	6,720	1,620	NA	7,320
Ferromolybdenum	7202.70.0000	8,350	5,160	37,300	8,310	5,310	35,600
Molybdenum powders	8102.10.0000	114	106	3,240	137	125	3,770
Molybdenum unwrought	8102.91.1000	14	13	542	16	16	328
Molybdenum waste and scrap	8102.91.5000	470	463	6,130	475	466	5,670
Molybdenum wire	8102.93.0000	8	NA	638	17	NA	894
Molybdenum other	8102.99.0000	11	NA	1,690	7	NA	1,600
Total		23,000	12,900	104,000	24,700	13,600	111,000

NA Not available.

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

Source: U.S. Census Bureau.

TABLE 7
MOLYBDENUM-PRODUCING MINES IN THE UNITED STATES IN 2000

State and mine	County	Operator	Source of molybdenum
Arizona:			
Bagdad	Yavapai	Phelps Dodge Corp.	Copper-molybdenum ore, concentrated.
Sierrita	Pima	do.	Do.
Colorado:			
Henderson	Clear Creek	do.	Molybdenum ore, concentrated.
Idaho:			
Thompson Creek	Custer	Thompson Creek Metals Co.	Do.
Montana:			
Continental	Silver Bow	Montana Resources Inc.	Copper-molybdenum ore, concentrated.
New Mexico:			
Chino	Grant	Phelps Dodge Corp.	Do.
Questa	Taos	Unocal Corp	Molybdenum ore, concentrated.
Utah:			
Bingham Canyon	Salt Lake	Kennecott Utah Copper Corp.	Copper-molybdenum ore, concentrated.

TABLE 8
MOLYBDENUM: WORLD MINE PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons of contained molybdenum)

Country 3/	1996	1997	1998	1999	2000 e/
Armenia e/	1,800 4/	1,800	2,500	2,500	2,700
Canada	8,789	7,612	7,991	6,250 r/	6,833 p/ 4/
Chile	17,415	21,339	25,298	27,270 r/	29,100
China e/	29,600	33,300	30,000	29,700 r/	28,900
Iran e/	560	600	1,400 r/	1,600 r/	1,600
Kazakhstan e/	100	100	100	110	600
Kyrgyzstan	NA	NA	225 e/	250	250
Mexico	4,210	4,842	5,949	7,961 r/	6,886 p/ 4/
Mongolia	2,201	1,992	1,993	1,953	1,336 4/
Peru	3,711	3,835	4,344	5,470 r/	7,193 4/
Russia e/	2,000	2,000	2,000	2,400	2,400
United States	56,000 r/	60,100 r/	53,300	42,400 r/	41,100
Uzbekistan e/	500	500	350 r/	350 r/	350
Total	127,000 r/	138,000 r/	135,000	128,000 r/	129,000

e/ Estimated. p/ Preliminary. r/ Revised. NA Not available.

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

2/ Table includes data available through July 11, 2001.

3/ In addition to the countries listed, North Korea, Romania, and Turkey are believed to produce molybdenum, but output is not reported quantitatively, and available general information is inadequate to make reliable estimates of output levels.

4/ Reported figure.