TUNGSTEN

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Tungsten is a whitish-gray metal with many unique properties and a wide variety of uses (see Tungsten in the 20th Century section of this report). During 2000, U.S. demand for tungsten increased. Worldwide, the availability of tungsten raw materials from China was limited by export quotas, exports of stockpiled Russian tungsten materials decreased, and prices increased. The important U.S. and world tungsten statistics for 2000 and the previous 4 years are listed in table 1.

Most data in this report have been rounded to three significant digits. Totals and percentages were calculated from unrounded numbers. Unless otherwise specified, all statistics in this report are in metric tons of contained tungsten.

Tungsten prices and many tungsten statistics from other sources are quoted in units of tungsten trioxide (WO_3). The short ton unit, which is used in the United States, is 1% of a short ton (20 pounds), and WO_3 is 79.3% tungsten. A short ton unit of WO_3, therefore, equals 20 pounds of WO_3 and contains 7.19 kilograms (kg) (15.86 pounds) of tungsten. The metric ton unit, which is used in most other countries, is 1% of a metric ton (10 kg). A metric ton unit of WO_3, therefore, equals 10 kg of WO_3 and contains 7.93 kg (17.48 pounds) of tungsten.

Legislation and Government Programs

As a result of reviews conducted by the International Trade Administration, U.S. Department of Commerce, and the U.S. International Trade Commission during 1999, the 151% duty on imports of tungsten ore concentrates from China was revoked effective January 1, 2000 (International Trade Administration, 1999; U.S. International Trade Commission, 1999).

The Defense National Stockpile Center (DNSC), U.S. Department of Defense, continued its negotiated sales of tungsten materials from the National Defense Stockpile (NDS). Ten bid offerings were held during calendar year 2000—three for tungsten ores and concentrates and seven for ferrotungsten, tungsten carbide powder, and/or tungsten metal powder. As shown in table 2, 2,610 metric tons (t) of tungsten contained in ores and concentrates, ferrotungsten, tungsten metal powder, and tungsten carbide powder was sold during the calendar year. During fiscal year 2000 (October 1, 1999, through September 30, 2000), 2,320 t of contained tungsten was sold; this represented 94% of the maximum amount available for sale in the Annual Materials Plan (AMP). Of the tungsten materials sold prior to September 30, 2000, the following quantities, in metric tons of contained tungsten, had not been shipped by the end of the 2000 fiscal year: tungsten ores and concentrates, 1,560; tungsten carbide powder, 309; and ferrotungsten, 123 (U.S. Department of Defense, 2001, p. 48). The quantities of tungsten materials remaining in the stockpile at the end of the calendar year, including those committed for sale and pending shipment, are listed in tables 1 and 2.

The AMP for fiscal year 2001 (October 1, 2000, through September 30, 2001) maintained the maximum quantities of tungsten materials that could be sold, in metric tons of contained tungsten, at the following levels: tungsten ores and concentrates, 1,810; tungsten carbide powder, 454;

Tungsten in the 20th Century

In 1900, the main use of tungsten was to make ferrotungsten, which was used to produce steel. Lesser amounts of tungsten were used to make aluminum-tungsten alloys and tungsten-copper alloys, which were used to make propeller blades. Sodium tungstate was used to make fabric colorfast or flame resistant, and because of its ability to fluoresce, calcium tungstate was used to make screens for X-ray apparatus. Tungsten chemicals were also used as pigments for coloring glass. Although some tungsten was mined in the United States in 1900, most of the U.S. supply was imported. The leading producers of tungsten ores were Australia; Austria-Hungary, at the time a dual monarchy in Central Europe; England; Germany; and Saxony, an independent kingdom at the time that is now part of Germany. Few statistics on tungsten production and use are available for 1900. World production of tungsten concentrates was probably less than 1,500 metric tons contained tungsten. U.S. production was estimated to be approximately 20 tons contained tungsten.

In 2000, tungsten was used in many diverse commercial, industrial, and military applications. The largest use was as tungsten carbide in cemented carbides, which were wear-resistant materials used by the metalworking, mining, and construction industries. Tungsten metal wires, electrodes, and contacts were used in lighting, electronic, electrical, heating, and welding applications. Tungsten was also used to make heavy metal alloys for armaments, heat sinks, radiation shielding, and weights and counterweights; superalloys for turbine blades; tool steels; and wear-resistant alloy parts and coatings. Tungsten composites were used as a substitute for lead in bullets and shot. Tungsten chemicals were used in catalysts, inorganic pigments, high-temperature lubricants, and semiconductors. The U.S. apparent consumption of all tungsten materials was 14,300 tons in 2000. No tungsten was mined in the United States. U.S. tungsten supply comprised imports, tungsten-bearing scrap, releases from industry stocks, and sales of excess tungsten materials from the National Defense Stockpile. World production of tungsten concentrates was approximately 37,400 tons contained tungsten. More than three-fourths of this production was from China. Austria, Bolivia, Portugal, and Russia were also significant producers of tungsten concentrates.

ferrotungsten, 136; and tungsten metal powder, 68 (Defense National Stockpile Center, 2000a). In October, the DNSC proposed a change in its sales program for tungsten ores and concentrates. DNSC planned to sell ores and concentrates under long-term contracts. The entire AMP quantity would be offered at one time, with an option to purchase additional quantities during the next four fiscal years (Defense National Stockpile Center, 2000b).

In 2000 and early 2001, the U.S. Fish and Wildlife Service (FWS) granted final approval to two tungsten-based shot products for hunting waterfowl and coots—tungsten-matrix shot (95.9 parts tungsten to 4.1 parts polymer) and tungsten-nickel-iron shot (50% tungsten, 35% nickel, and 15% iron, by weight) (U.S. Fish and Wildlife Service, 2000, 2001). These approvals bring the number of tungtsen-based shot products approved for hunting waterfowl and coots to four. In 1999, FWS gave approval to tungsten-iron shot and tungsten-polymer shot.

The "Green Ammunition" program was part of a joint service effort chaired by the U.S. Army Armaments Research, Development and Engineering Center to eliminate the use of hazardous materials in the production of small caliber ammunition. One component of the program was to find an alternative for the lead-antimony cores in small-caliber ammunition projectiles. During the year, two candidate materials, tungsten-nylon and tungsten-tin composites, were tested to evaluate the following: their leaching characteristics in sand, soil, and water; the biological uptake of the materials by earthworms; and the recovery and recycling of tungsten and other metals following the use of bullets made from these materials (Middleton, 2000, p. 13-21).

Production

Domestic production statistics for tungsten are based on data collected by the U.S. Geological Survey (USGS) by means of two separate voluntary surveys. Statistics that result from these surveys are listed in tables 1 and 3.

The annual Tungsten Ore and Concentrate Survey covered the production, purchases, disposition, and stocks of tungsten ores and concentrates. No tungsten was mined in the United States in 2000. In early 2001, Avocet Mining plc sold the land and residual assets associated with the Pine Creek Mine in Bishop, CA (Avocet Mining plc, 2001).

The monthly Tungsten Concentrate and Tungsten Products Survey canvassed companies that produced tungsten carbide powder, tungsten chemicals, and/or tungsten metal powder from ammonium paratungstate, tungsten-bearing scrap, and tungsten concentrate. The USGS received responses from 11 of the 12 processing operations on the survey; estimates were made for the nonresponding operation.

Major U.S. processors of tungsten materials operating in 2000 included Allegheny Technologies Inc.'s Metalworking Products business, Huntsville, AL; General Electric Co., Euclid, OH; Kennametal Inc., Latrobe, PA, and Fallon, NV; OM Group, Inc. (OMG), Midland, MI, and St. George, UT; and Osram Sylvania Inc., Towanda, PA.

In 2000, U.S. processors consumed slightly less tungsten concentrate, approximately the same amount of tungsten-bearing scrap, and 20% more ammonium paratungstate than they did in 1999. Domestic production of ammonium paratungstate was higher than that of 1999. Total net production of all primary tungsten products (hydrogen-reduced metal powder, tungsten carbide powder, and tungsten chemicals) increased by 10% in 2000 compared with that of 1999.

During the year, Avocet Tungsten Inc. permanently closed its Bishop, CA, tungsten processing plant. According to the company, while the plant was competitive in some value added products such as ammonium metatungstate and pressed powders, the basic tungsten conversion business could not compete with other processing operations. Avocet Tungsten's last production of ammonium paratungstate from stockpiled ore concentrates was in March. The plant and associated equipment were sold at auction in July (Avocet Mining plc, 2000b; Ryan's Notes, 2000). With the closure of the Bishop plant, the United States had two remaining plants that processed tungsten concentrates—Kennametal's tungsten carbide plant in Fallon, NV, and Osram Sylvania's tungsten processing plant in Towanda, PA.

OMG reportedly planned to increase production of ammonium paratungstate at its processing plant in St. George, UT, late in the year. Some of the increased production was to be from reprocessing tungsten carbide powder purchased from the DNSC. The plant typically used hard and soft cemented carbide scrap as feed for its ammonium paratungstate production (Magdics, 1998, p. 22; Platt's Metals Week, 2000).

N.V. Union Minière S.A. of Brussels, Belgium, resolved the technical problems associated with the startup of its Nanodyne Inc. nanocrystalline powder plant in Laurinburg, NC. The plant was designed to have the capacity to produce 500 metric tons per year (t/yr) of composite metal powders, such as tungsten carbide-cobalt powders, by using a spray-conversion process. The Nanodyne plant is adjacent to Union Minière's Carolmet Cobalt Products plant, which produced cobalt metal powder and salts (American Metal Market, 1998; N.V. Union Minière S.A., 2001, p. 13).

In November, Praxair, Inc. and Advance Research Chemicals, Inc. announced that they had formed a strategic alliance to develop, manufacture, and market high-purity tungsten hexafluoride for the semiconductor industry. Production was to occur at a new plant in Catoosa, OK. The plant's capacity was approximately 4.5 t/yr, gross weight, of tungsten hexafluoride (Praxair, Inc., 2000).

Consumption

U.S. apparent consumption of all tungsten materials, as calculated from net imports, primary and secondary production, and changes in Government and industry stock levels, was 14,300 t in 2000, an increase of 11% from that of 1999. In 2000, a decrease in net imports was more than equaled by shipments of tungsten materials from the NDS and an increase in scrap consumption.

Statistics on consumption of tungsten in end-use applications by U.S. metal consumers were developed from the voluntary Consolidated Consumers Survey. For this survey, nearly 70 tungsten consumers were canvassed on a monthly or annual basis. Reported consumption and stocks data in tables 1 and 4 include estimates to account for nonrespondents. Total U.S. reported consumption of tungsten materials to make end-use products increased by 5% in 2000 compared with that of 1999. The increase was the result of increased consumption by producers of mill products for lighting and other industries, superalloys, and other alloys. As compared with 1999, in 2000,

U.S. industry consumed more tungsten metal powder and tungsten scrap, less ferrotungsten and tungsten chemicals, and approximately the same amount of tungsten carbide powder.

Weekly reports of the number of operating drilling rigs give an indication of the demand for cemented carbide components used by industry to explore for or produce oil and natural gas. During 2000, the trend in the number of rigs that operated in the United States continued the increase that began in April 1999. The lowest weekly count during 2000 was 755 in late January and the highest count was 1,114 in late December. In 2000, the average number of operating rigs in the United States increased 47% to 918, as compared with the 625 operating rigs in 1999 (Baker Hughes Inc., 2001, North American rig counts, accessed January 10, 2001, at URL http://www.bakerhughes.com/investor/rig/rig_na.htm).

In 2000, total consumption of tungsten scrap by U.S. processors and consumers was 5,120 t of contained tungsten, which was a 3% increase from the 4,980 t consumed in 1999.

Prices

Most published prices for ammonium paratungstate and tungsten concentrates significantly increased during the second half of 2000. The increase was the result of continued efforts by China, the world's largest tungsten supplier, to reform its industry (see China section of this report). Specifically, tighter control on exports of ammonium paratungstate was cited as the reason for increased prices (Metal Bulletin, 2000a, b, c). Ammonium paratungstate prices reported by Metal Bulletin began to increase in July. Metal Bulletin's annual average of high and low prices for ammonium paratungstate in the U.S. market was $66 per metric ton unit ($60 per short ton unit), 17% higher than that of 1999. Platt's Metals Week's U.S. price for ammonium paratungstate began to increase in September. Platt's annual average of high and low prices was $64 per metric ton unit ($59 per short ton unit), 13% higher than that of 1999. Annual average prices of ammonium paratungstate are listed in table 1.

The price of tungsten concentrates reported by Metal Bulletin began to increase in September. The average tungsten concentrate price reported by Metal Bulletin was $45 per metric ton unit, which was 12% higher than that of 1999. In contrast, the average of U.S. spot tungsten ore concentrate prices reported by Platt's Metals Week remained unchanged from that of 1999 at $47 per metric ton unit ($43 per short ton unit). Prices of tungsten concentrates are listed in tables 1 and 5.

Foreign Trade

The total tungsten content of U.S. exports was 2,870 t, approximately the same as the 2,880 t exported in 1999. As shown in tables 6 through 10, exports of tungsten carbide powder, tungsten ores and concentrates, tungsten wire, and other tungsten metal increased as compared with those of 1999, and exports of ammonium paratungstate, other tungstates, tungsten metal powders, tungsten waste and scrap, and wrought tungsten decreased.

The total tungsten content of U.S. imports was 8% lower than that of 1999. China, which continued to be the largest supplier of imported tungsten to the United States, provided 48% of all tungsten imports in 2000. The total tungsten content of imports from China decreased slightly in 2000 to 4,910 t, as compared with 5,000 t in 1999. Of the imports from China, 36% was ammonium paratungstate; 25%, tungsten oxides; 14%, concentrates; 8%, ferrotungsten; 5%, tungsten metal powders; 5%, tungsten waste and scrap; 3%, tungsten carbide powder; and the remainder, calcium tungstate, other tungstates, unwrought tungsten, and wrought tungsten.

Russia, which was the next largest supplier of imported tungsten materials to the United States, provided 17% of U.S. imports. In 2000, Russian imports were mainly tungsten oxide (49%), tungsten concentrates (23%), ammonium paratungstate (15%), tungsten waste and scrap (9%), ferrotungsten and tungsten metal powders (each 2%). Total imports from Russia decreased by 26% to 1,710 t of contained tungsten in 2000 compared with 2,300 t in 1999.

As shown in table 11, U.S. imports of tungsten ores and concentrates decreased by 17% in 2000 compared with those of 1999. Imports of concentrates originating from China resumed as a result of the termination of the 151% antidumping duty (see Legislation and Government Programs section of this report). In contrast, imports of ores and concentrates from Kazakhstan and Russia decreased significantly from those of 1999. In 2000, 95% of U.S. imports of ores and concentrates originated from six countries—China (29%), Portugal (21%), Bolivia (19%), Russia (17%), Peru (5%), and Rwanda (4%).

U.S. imports of ammonium paratungstate increased 18% as compared with those of 1999 (table 12). China continued to be the dominant supplier, providing 78% of U.S. ammonium paratungstate imports.

In 2000, imports of calcium tungstate, other tungsten chemicals, tungsten carbide powder, tungsten metal powders, unwrought tungsten, and wrought tungsten increased compared with those of 1999, but those of ferrotungsten, other tungstates, tungsten chlorides and tungsten waste and scrap decreased. Imports of tungsten oxides were at similar levels during the past 2 years (tables 13, 14).

Net import reliance as a percent of apparent consumption is used to measure the adequacy of current domestic production to meet U.S. demand. Net import reliance was defined as imports minus exports plus adjustments for Government and industry stock changes. Releases from stocks, including shipments from the NDS, were counted as part of import reliance, regardless of whether they were imported or produced in the United States. In 2000, net import reliance as a percent of apparent consumption was 63%. Because there was no U.S. mine production in 2000, this indicates that 63% of U.S. tungsten supply was from imports and stock releases and 37% was from scrap materials generated in the United States.

World Review

As shown in table 15, estimated world production of tungsten concentrates increased 4% as compared with that of 1999. China remained the leading world producer of tungsten concentrates. In addition to mine production and tungsten recovered from scrap, tungsten materials from stockpiles in Russia and other countries in the Commonwealth of Independent States (CIS) have been a significant component of world supply in recent years. Between 1992, when exports of tungsten from CIS countries first entered western markets, and mid-2000, an estimated 41,800 t of tungsten was exported from CIS countries. Information on the amount of tungsten that remained in CIS stockpiles and whether these materials would be released for export continued to be unavailable. During the past few years, however, the quantity of tungsten exported from the CIS has been decreasing (Kerr, 2001, p. 18-19; Maby, 2000,

p. 3-6; Martin, 2000; Trickett, 2000).

Austria.—Wolfram Bergbau und Hutten GmbH Nfg KG produced tungsten concentrates from the Mittersill scheelite mine in the Province of Salzburg. All these concentrates were converted to primary tungsten products at Wolfram Bergbau's Bergla tungsten processing plant in the Province of Steiermark.

Canada.—North American Tungsten Corp. Ltd. commissioned a mining and geological engineering firm to prepare a report on the company's tungsten assets and to review internal reports to evaluate the economic potential of restarting production from the company's CanTung Mine in southwestern Northwest Territories, near the border with Yukon Territory. On the basis of the firm's report, North American Tungsten felt that production from the CanTung Mine would provide the company with an attractive internal rate of return at current (September 2000) prices for tungsten concentrates. As a result of these findings, North American Tungsten and its marketing advisors began discussions with major consumers of tungsten concentrates for the purpose of entering into long-term supply contracts and with investment bankers (North American Tungsten Corp. Ltd., 2001c, d).

China.—The Chinese Government continued to reorganize its nonferrous metals industry. In July, the Government decided to dissolve the centrally controlled holding company China Rare Metals and Rare Earth Group Corp. (CRRC) and to transfer the management of its mines, plants, and research institutes to local governments. Management of the tungsten mines formerly controlled by Tungsten Mining Corp., which was a subgroup of CRRC, was transferred to Jiangxi, Hunan, and Guangdong Provinces. The assets and equity of China Tungsten & Cemented Carbide Industry Corp. (CTCCC), another subgroup of CRRC, and China Tungsten & Advanced Materials Corp., which was CTCCC's holding company, were transferred to the provinces of Hunan, Sichuan, and Hainan, where the assets were located. CTCCC consisted of Zhuzhou Cemented Carbide Works, Zigong Cemented Carbide Co., and Jinhai Industry Co. China Tungsten & Advanced Materials Corp. was a listed company on the domestic stock exchange formed by combining partial assets from Zhuzhou and Zigong (Juqiu, 2000).

After the transfer of the tungsten enterprises, the Chinese Government planned to continue to take action to make full use of its tungsten resources. The Government planned to continue to control the export of tungsten materials from China by imposing quotas on products such as ammonium paratungstate, tungsten concentrates, and tungsten oxides; by encouraging the export of value-added downstream tungsten products; and by giving priority to key enterprises of metallurgy, processing, and trade when granting export licenses. The Government planned to continue to control total tungsten production by closing mines that were running out of resources; by banning mines operating without licenses; by ordering tungsten metallurgical facilities that used outdated processes, that wasted resources, or that caused environmental pollution to make improvements or cease operating; and by allowing plants with poor management and debts surpassing their assets to go bankrupt. The Government would no longer directly control the enterprises. Rather, it planned to focus on formulating laws, regulations, and industrial policy; on giving guidance on production and marketing; on establishing an orderly market; and on promoting the sustained development of the Chinese tungsten industry. The China Non-Ferrous Metals Industry Association was established to take on some responsibilities for administration, to participate in developing regulations and standards for the industry, and to coordinate relationships between industries and between Government and individual enterprises (Juqiu, 2000).

Czech Republic.—Hydrometalurgicke Zavody, a.s. (HMZ) produced tungsten metal powders, tungsten carbide powders, cobalt sulfate, and other chemical products at its plant in Bruntál. The plant used ammonium paratungstate and sintered cemented carbide scrap as feed. In August, Osram GmbH of Munich, Germany, announced that it had signed a letter of intent to purchase HMZ (Šarman, 1999; Osram Sylvania Inc., 2000).

Portugal.—Beralt Tin & Wolfram S.A., an Avocet subsidiary, expanded production from the Panasqueira Mine (Avocet Mining plc, 2000a).

Russia.—According to the State Statistics Committee, Russian production of metallic tungsten in 2000 was 90% of that of 1999 (Interfax International Ltd., 2001).

During the year, efforts were underway to rehabilitate the Orlovsky GOK tungsten concentrator in Chita oblast in eastern Siberia. Recommissioning of the concentrator, which had been idle since 1994, was to occur in March or April 2001. Production of tungsten concentrates at full capacity levels was not anticipated to occur before 2002. The plant was to process locally mined ores (Interfax International Ltd., 2000).

Vietnam.—Tiberon Minerals Ltd. of Calgary, Alberta, Canada, explored the Nui Phao exploration license area 80 kilometers north of Hanoi. In September, the company began a drilling program to test tungsten-gold-copper-bismuth-tin mineralization in the Da Lien prospect. Initial results from one drill core showed tungsten grades similar to those at deposits currently being mined in China, Austria, and elsewhere. The company planned to expand its exploration activities to three additional mineralized targets within the license area (Tiberon Minerals Ltd., 2000).

Outlook

Demand for tungsten tends to follow general economic conditions. Future consumption of tungsten in cemented carbides, which is the largest end-use sector, will depend on the performance of the following industries: automotive and aircraft production, construction, mining, oil and gas drilling, and semiconductor and other manufacturing. Some recent developments in uses for tungsten include the shift from lead to tungsten for military and recreational ammunition and the use of tungsten by the sporting goods industry to make golf clubs and golf ball cores. The consumption of tungsten to produce 5.56 millimeter "green ammunition" for the military was forecast to grow from nearly zero in 2000 to between 450 t and 800 t of tungsten in 2005 (Middleton, 2000, p. 22).

World tungsten supply will continue to be dominated by Chinese production and exports. Beginning in 1999, the Chinese Government took several steps to control the release of tungsten to the market, which resulted in significant increases in the prices of ammonium paratungstate and tungsten concentrates during the latter half of 2000. Higher prices are expected to encourage an increase in the production of tungsten concentrates outside China. For example, in Bolivia, Empresa Minera Urania S.A. began to increase production in 2001 and planned to reopen two closed mines; International Mining Co. planned to increase tungsten production from its La Chojlla tungsten-tin operation; and Empresa Minera Himalaya Ltda. entered into an agreement with North American Tungsten to study the feasibility of developing a tungsten-tin deposit in

Murillo and Sadyumyai Provinces. In Canada, North American Tungsten continued to advance its plans to reopen the Cantung Mine and in 2001 signed a concentrate sales and loan agreement with Osram Sylvania and Sandvik AB (Metal Bulletin, 2001; North American Tungsten Corp. Ltd., 2001a, b).

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TABLE 1
SALIENT TUNGSTEN STATISTICS 1/

(Metric tons, tungsten content, unless otherwise specified)

	1996	1997	1998	1999	2000
United States:					
Concentrates:					
Consumption	5,260	6,590	3,210 2/	2,100 2/	W
Exports	18	12	10	26	70
Imports for consumption	4,190	4,850	4,750	2,870	2,370
Stocks, December 31:					
Consumer	569	658	514	W	W
U.S. Government 3/	34,600	34,600	34,600	34,600	33,400
Price, per metric ton unit:					
U.S. spot quotation 4/	$66	$64	$52	$47	$47
European 5/	$53	$47	$44	$40	$45
Ammonium paratungstate:					
Production	4,450 6/	5,380 6/	838 7/	7,050 r/	W
Consumption	7,790	9,300	10,000	7,490	8,980
Stocks, December 31, producer and consumer	558	W	603	376	W
Price, per metric ton unit:					
U.S. free market 8/	$83	$77	$66	$56	$66
U.S. market 4/	$96	$83	$65	$57	$64
Primary products:					
Net production 9/	7,810	8,300	9,630	8,500	9,470
Consumption 10/	8,170 r/	8,830 r/	9,550 r/	8,760 r/	9,180
Stocks, December 31:					
Producer 11/	1,400	1,210	1,340	1,070	1,160
Consumer 10/	413	610	524	534 r/	504
U.S. Government 3/	2,700	2,700	2,700	2,700	2,110
World production of concentrate	34,700 r/	33,200	37,400 r/	36,100 r/	37,400 e/

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data.
1/ Data are rounded to no more than three significant digits.
2/ Excludes 6 months of "Withheld" data.
3/ Defense National Stockpile Center. Includes material committed for sale pending shipment.
4/ Annual average calculated from weekly prices reported by Platt's Metals Week.
5/ Annual average calculated from semiweekly prices reported by Metal Bulletin.
6/ Excludes 4 months of "Withheld" data.
7/ Excludes 11 months of "Withheld" data.
8/ Annual average calculated from annual average high and low prices reported by Metal Bulletin.
9/ Includes only tungsten metal powder and tungsten carbide powder made from metal powder.
10/ Includes scrap.
11/ Data for 1996-98 exclude cast and crystalline tungsten carbide powder. Data for 1999-2000 exclude cast and crystalline tungsten carbide powder and chemicals.

TABLE 2
U.S. GOVERNMENT NATIONAL DEFENSE STOCKPILE TUNGSTEN STATISTICS IN 2000 1/ 2/

(Metric tons, tungsten content)

	Inventory, yearend 3/		Annual materials	Sales		Inventory decrease 4/	
Material	Fiscal year 5/	Calendar year	plan, fiscal year 5/	Fiscal year 5/	Calendar year	Fiscal year 5/	Calendar year
Ores and concentrates	33,500	33,400	1,810	1,360	1,360	1,100	1,240
Ferrotungsten	815	775	136	142	597	103	143
Tungsten metal powder	757	757	68	67	71	104	104
Tungsten carbide powder	680	577	454	749	576	242	345
Total	35,800	35,500	2,470	2,320	2,610	1,550	1,830

1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Includes stockpile- and nonstockpile-grade materials.
3/ Includes material committed for sale pending shipment.
4/ From previous year.
5/ Twelve-month period ending September 30, 2000.

Source: Defense National Stockpile Center.

TABLE 3
U.S. NET PRODUCTION AND STOCKS OF TUNGSTEN PRODUCTS 1/ 2/

(Metric tons, tungsten content)

	Hydrogen reduced metal powder	Tungsten carbide powder		Chemicals	Total
		Made from metal powder	Cast and crystalline		
Net production:					
1999	4,540	3,960	W	W	8,500
2000	4,980	4,490	W	W	9,470
Producer stocks:					
December 31, 1999	626	441	W	W	1,070
December 31, 2000	621	538	W	W	1,160

W Withheld to avoid disclosing company proprietary data.
1/ Net production equals gross production less quantity used to make other products in table.
2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 4
U.S. REPORTED CONSUMPTION AND STOCKS OF TUNGSTEN PRODUCTS 1/ 2/ 3/

(Metric tons, tungsten content)

	1999	2000
Consumption by end use:		
Steels	486	408
Superalloys	306	403
Other alloys 4/	W	W
Cemented carbides 5/	5,910	5,960
Mill products made from metal powder	W	W
Chemical uses	93	89
Total	8,760 r/	9,180
Consumption by form:		
Ferrotungsten	484	388
Tungsten metal powder	1,860 r/	2,270
Tungsten carbide powder	5,930	5,980
Tungsten scrap	356	459
Other tungsten materials 6/	125	89
Total	8,760 r/	9,180
Consumer stocks, December 31:		
Ferrotungsten	33	33
Tungsten metal powder	15	29
Tungsten carbide powder	445 r/	381
Tungsten scrap	23	44
Other tungsten materials 6/	19	17
Total	534 r/	504

r/ Revised. W Withheld to avoid disclosing company proprietary data, included in "Total."
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Does not include materials used in making primary tungsten products.
3/ Includes estimates.
4/ Includes welding and hard-facing rods and materials, wear- and corrosion-resistant alloys, and nonferrous alloys.
5/ Includes diamond tool matrices, cemented and sintered carbides, and cast carbide dies or parts.
6/ Includes tungsten chemicals.

TABLE 5
MONTHLY PRICE QUOTATIONS OF TUNGSTEN CONCENTRATES IN 2000

Month	Metal Bulletin (London), European market, 65% WO_3 basis, c.i.f. 1/				Platt's Metals Week, U.S. spot quotations, 65% WO_3 basis, c.i.f. U.S. ports, including duty 2/			
	Dollars per metric ton unit			Dollars per short ton unit, average	Dollars per short ton unit			Dollars per metric ton unit, average
	Low	High	Average		Low	High	Average	
January	38	48	43	39	40	45	43	47
February	38	48	43	39	40	45	43	47
March	38	48	43	39	40	45	43	47
April	40	48	44	40	40	45	43	47
May	40	48	44	40	40	45	43	47
June	40	48	44	40	40	45	43	47
July	36	48	42	38	40	45	43	47
August	34	48	41	37	40	45	43	47
September	36	50	43	39	40	45	43	47
October	40	53	47	42	40	45	43	47
November	42	55	49	44	40	45	43	47
December	50	55	53	48	40	45	43	47

1/ Combined wolframite and scheelite quotations. Low and high prices are reported semiweekly. Monthly averages are arithmetic averages of semiweekly low and high prices. The average annual price per metric ton unit of WO_3 of all semiweekly low and high prices was $45 in 2000. The average equivalent price per short ton unit of WO_3 was $41 in 2000.

2/ Low and high prices are reported weekly. Monthly averages are arithmetic averages of weekly low and high prices. The average annual price per short ton unit of WO_3 of all weekly low and high prices was $43 in 2000. The average equivalent price per metric ton unit of WO_3 was $47 in 2000.

TABLE 6
U.S. EXPORTS OF TUNGSTEN ORES AND CONCENTRATES, BY COUNTRY 1/

Country of destination	1999			2000		
	Gross weight (metric tons)	Tungsten content 2/ (metric tons)	Value (thousands)	Gross weight (metric tons)	Tungsten content 2/ (metric tons)	Value (thousands)
Afghanistan	(3/)	(3/)	4	--	--	--
Argentina	--	--	--	(3/)	(3/)	3
Brazil	1	(3/)	9	--	--	--
China	--	--	--	5	2	71
Ecuador	1	(3/)	11	--	--	--
France	--	--	--	1	1	23
Germany	2	1	23	(3/)	(3/)	3
Hungary	--	--	--	1	1	20
Ireland	5	3	83	--	--	--
Italy	--	--	--	2	1	31
Japan	1	(3/)	17	10	5	148
Korea, Republic of	1	1	20	15	8	190
Luxembourg	--	--	--	1	1	13
Mexico	(3/)	(3/)	4	--	--	--
Netherlands	27	14	462	54	28	832
Russia	--	--	--	16	8	250
Singapore	(3/)	(3/)	6	--	--	--
Slovakia	--	--	--	(3/)	(3/)	4
South Africa	--	--	--	(3/)	(3/)	9
Sweden	--	--	--	(3/)	(3/)	7
Taiwan	--	--	--	1	(3/)	10
Thailand	1	1	21	--	--	--
United Kingdom	11	6	166	28	15	439
Total	51	26	826	135	70	2,050

-- Zero.

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

2/ Content estimated from reported gross weight.

3/ Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 7
U.S. EXPORTS OF AMMONIUM PARATUNGSTATE, BY COUNTRY 1/

Country of destination	1999 Tungsten content (metric tons)	1999 Value (thousands)	2000 Tungsten content (metric tons)	2000 Value (thousands)
Belgium	79	$673	2	$17
Czech Republic	--	--	25	204
Denmark	7	71	14	143
France	--	--	1	13
Germany	9	80	10	87
Japan	6	56	--	--
Korea, Republic of	(2/)	4	--	--
Mexico	(2/)	23	(2/)	4
Singapore	--	--	1	4
Spain	(2/)	4	1	17
Total	103	911	53	489

-- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 8
U.S. EXPORTS OF TUNGSTEN METAL POWDERS, BY COUNTRY 1/ 2/

Country of destination	1999 Gross weight (metric tons)	1999 Tungsten content 3/ (metric tons)	1999 Value (thousands)	2000 Gross weight (metric tons)	2000 Tungsten content 3/ (metric tons)	2000 Value (thousands)
Australia	12	9	$163	5	4	$162
Austria	2	2	50	(4/)	(4/)	26
Belgium	45	36	392	--	--	--
Brazil	7	6	212	16	13	428
Canada	57	46	1,500	66	53	1,880
Chile	4	3	161	1	1	34
China	(4/)	(4/)	19	2	2	85
Congo (Kinshasa)	10	8	51	--	--	--
Egypt	--	--	--	8	6	124
France	31	25	673	8	6	523
Germany	236	188	6,570	264	212	7,780
Hong Kong	19	15	29	4	3	133
India	90	72	1,570	1	(4/)	35
Israel	41	33	494	11	9	128
Italy	21	17	813	13	10	582
Japan	48	38	624	26	21	776
Korea, Republic of	8	6	132	2	2	119
Mexico	34	27	338	8	7	138
Netherlands	25	20	733	15	12	135
Panama	2	1	33	--	--	--
Poland	3	2	100	--	--	--
Saudi Arabia	--	--	--	6	4	$72
Singapore	6	5	$325	4	3	249
South Africa	4	3	61	2	1	69
Spain	1	1	60	2	2	101
Sweden	76	61	395	25	20	206
Switzerland	30	24	947	1	1	43
Taiwan	22	17	587	28	22	747
Turkey	(4/)	(4/)	20	4	3	74
United Kingdom	51	41	1,810	60	48	2,220
Other	4 r/	4	137 r/	3	3	155
Total	889	711	19,000	583	467	17,000

r/ Revised. -- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ May include tungsten alloy powders.
3/ Content estimated from reported gross weight.
4/ Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 9
U.S. EXPORTS OF TUNGSTEN CARBIDE POWDER, BY COUNTRY 1/

Country of destination	1999 Tungsten content (metric tons)	1999 Value (thousands)	2000 Tungsten content (metric tons)	2000 Value (thousands)
Argentina	2	$12	--	--
Australia	7	182	6	$158
Austria	20	362	6	61
Belgium	20	413	3	94
Brazil	6	195	2	106
Canada	177	4,490	181	4,460
China	--	--	3	50
Czech Republic	5	65	--	--
France	25	241	10	196
Germany	163	4,800	162	3,370
Hong Kong	11	165	(2/)	3
India	5	107	2	41
Ireland	8	282	1	117
Israel	26	313	16	193
Italy	62	1,630	64	1,650
Japan	15	808	13	686
Korea, Republic of	6	228	3	99
Luxembourg	13	158	--	--
Malaysia	(2/)	22	3	127
Mexico	3	61	12	294
Netherlands	53	736	11	314
Singapore	1	91	1	143
South Africa	21	314	18	254
Sweden	20	287	137	1,950
Switzerland	2	122	(2/)	7
Taiwan	(2/)	19	5	118
United Kingdom	27	622	306	4,370
Venezuela	1	53	2	66
Other	2	81 r/	2	80
Total	701	16,900	969	19,000

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.

Source: U.S. Census Bureau.

TABLE 10
U.S. EXPORTS OF MISCELLANEOUS TUNGSTEN-BEARING MATERIALS, BY COUNTRY 1/

Product and country of destination	1999 Tungsten content (metric tons)	1999 Value (thousands)	2000 Tungsten content (metric tons)	2000 Value (thousands)
Ferrotungsten and ferrosilicon tungsten:				
Canada	2	$26	(2/)	$6
Japan	--	--	3	44
Mexico	2	20	1	12
Total	4	46	4	62
Unwrought tungsten and waste and scrap: 3/ 4/ 5/				
Australia	22	143	4	30
Belgium	76	436	44	181
Brazil	1	11	1	7
Canada	5	77	48	338
China	2	7	58	329
France	1	10	3	47
Germany	226	1,230	395	1,640
Hong Kong	6	35	2	10
India	72	1,160	--	--
Israel	29	151	21	128
Italy	20	122	17	98
Japan	24	136	15	87

See footnotes at end of table.

TABLE 10--Continued
U.S. EXPORTS OF MISCELLANEOUS TUNGSTEN-BEARING MATERIALS, BY COUNTRY 1/

Product and country of destination	1999 Tungsten content (metric tons)	1999 Value (thousands)	2000 Tungsten content (metric tons)	2000 Value (thousands)
Unwrought tungsten and waste and scrap--Continued: 3/ 4/ 5/				
Korea, Republic of	12	71	12	71
Malaysia	9	60	3	21
Mexico	42	252	10	99
Netherlands	27	168	32	180
Norway	--	--	2	13
Philippines	14	80	20	112
Portugal	4	23	--	--
Singapore	1	6	20	127
Sweden	4	23	6	33
Taiwan	58	464	82	598
United Kingdom	186	1,140	26	148
Other	2	24 r/	6	59
Total	843	5,820	827	4,350
Wrought tungsten--wire: 3/ 4/				
Belgium	1	131	12	573
Brazil	11	695	10	647
Canada	10	458	11	481
China	3	290	1	200
France	9	924	16	939
Germany	1	179	7	710
Hong Kong	5	72	2	48
Hungary	16	868	24	1,750
India	22	1,400	15	912
Indonesia	2	117	10	476
Italy	2	249	9	465
Japan	14	935	17	1,920
Korea, Republic of	1	103	1	80
Mexico	9	888	27	2,170
Netherlands	3	105	3	165
Philippines	1	29	1	41
Singapore	1	159	1	196
Spain	6	386	15	1,420
Sweden	2	201	2	109
United Kingdom	3	1,160	2	318
Other	2 r/	296 r/	1	428
Total	122	9,650	187	14,000
Wrought tungsten, excluding wire: 3/ 4/				
Brazil	17	$483	(2/)	$18
Canada	19	810	22	954
China	(2/)	104	1	49
France	1	145	2	237
Germany	205	4,400	158	3,220
India	22	505	4	232
Israel	1	134	(2/)	41
Italy	1	84	2	155
Japan	14	1,290	6	818
Korea, Republic of	(2/)	27	1	89
Malaysia	1	25	--	--
Mexico	4	295	5	545
Netherlands	1	23	(2/)	3
Qatar	--	--	1	15
Poland	1	28	--	--
Singapore	(2/)	108	(2/)	124
Spain	--	--	2	176
Sweden	(2/)	43	1	114
Taiwan	1	119	(2/)	25
United Kingdom	6	376	3	250
Venezuela	1	21	(2/)	6
Other	2	192 r/	1	216
Total	297	9,210	210	7,290

See footnotes at end of table.

TABLE 10--Continued
U.S. EXPORTS OF MISCELLANEOUS TUNGSTEN-BEARING MATERIALS, BY COUNTRY 1/

Product and country of destination	1999 Tungsten content (metric tons)	1999 Value (thousands)	2000 Tungsten content (metric tons)	2000 Value (thousands)
Other tungsten metal: 3/ 4/				
Australia	6	527	2	318
Brazil	1	130	1	116
Canada	10	634	15	857
Finland	1	95	(2/)	25
France	1	162	2	358
Germany	2	520	6	1,020
Hungary	(2/)	65	3	245
India	1	52	(2/)	23
Israel	5	1,100	1	353
Japan	5	1,940	6	1,890
Korea, Republic of	2	167	(2/)	71
Mexico	8	846	8	807
Netherlands	1	88	1	221
Singapore	1	431	3	639
Taiwan	3	487	3	654
Turkey	1	34	--	--
United Kingdom	7	977	12	1,250
Other	3	626 r/	5	780
Total	57	8,880	68	9,630
Tungsten compounds: 6/				
Belgium	16	291	--	--
Canada	1	3	13	31
Mexico	--	--	(2/)	14
United Kingdom	1	23	--	--
Total	18	317	13	45

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/ May include alloys.
4/ Content estimated from reported gross weight.
5/ Includes bars and rods obtained by sintering.
6/ Includes only other tungstates.

Source: U.S. Census Bureau.

TABLE 11
U.S. IMPORTS FOR CONSUMPTION OF TUNGSTEN ORES AND CONCENTRATES, BY COUNTRY 1/

Country of origin	1999 Tungsten content (metric tons)	1999 Value (thousands)	2000 Tungsten content (metric tons)	2000 Value (thousands)
Australia	167	$601	--	--
Bolivia	361	1,670	449	$2,310
Burma	91	283	--	--
China	--	--	699	3,470
Kazakhstan	461	1,610	31	119
Mexico	27	75	--	--
Mongolia	55	138	67	261
Peru	22	136	107	460
Portugal	353	1,960	499	2,770
Russia	1,200	5,440	395	1,350
Rwanda	55	154	100	300
Thailand	11	45	12	49
Uganda	--	--	12	59
United Kingdom	72	274	--	--
Total	2,870	12,400	2,370	11,100

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

Source: U.S. Census Bureau.

TABLE 12
U.S. IMPORTS FOR CONSUMPTION OF AMMONIUM PARATUNGSTATE, BY COUNTRY 1/

Country of origin	1999 Tungsten content (metric tons)	1999 Value (thousands)	2000 Tungsten content (metric tons)	2000 Value (thousands)
Austria	--	--	18	$126
China	1,760	$9,070	1,760	10,200
Germany	103	968	131	844
Hong Kong	--	--	95	644
Netherlands	17	77	--	--
Russia	--	--	265	1,600
Sweden	34	115	--	--
Total	1,920	10,200	2,270	13,400

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

Source: U.S. Census Bureau.

TABLE 13
U.S. IMPORTS FOR CONSUMPTION OF FERROTUNGSTEN AND FERROSILICON TUNGSTEN, BY COUNTRY 1/

Country of origin	1999 Tungsten content (metric tons)	1999 Value (thousands)	2000 Tungsten content (metric tons)	2000 Value (thousands)
China	498	$2,930	395	$2,160
Germany	3	38	--	--
Russia	168	793	30	182
United Kingdom	--	--	45	255
Total	669	3,760	470	2,600

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

Source: U.S. Census Bureau.

TABLE 14
U.S. IMPORTS FOR CONSUMPTION OF MISCELLANEOUS TUNGSTEN-BEARING MATERIALS, BY COUNTRY 1/

Product and country of origin	1999 Tungsten content (metric tons)	1999 Value (thousands)	2000 Tungsten content (metric tons)	2000 Value (thousands)
Tungsten metal powders: 2/				
Belgium	3	$122	3	$138
Canada	4	117	6	53
China	145	2,000	267	2,790
Germany	32	865	70	1,580
Israel	7	125	50	584
Japan	15	1,400	17	1,340
Korea, Republic of	(3/)	8	8	133
Russia	3	24	26	213
South Africa	(3/)	2	--	--
United Kingdom	100	927	138	1,330
Other	-- r/	-- r/	8	39
Total	310	5,590	593	8,190
Tungsten carbide powder:				
Austria	43	639	16	431
Canada	412	6,590	540	8,180
China	113	1,740	167	2,200
France	(3/)	23	5	333
Germany	79	1,680	123	2,390
Hong Kong	--	--	8	102
Israel	77	1,700	86	1,300
Japan	2	77	7	471
Korea, Republic of	10	44	13	194
Luxembourg	34	577	13	252
Netherlands	--	--	8	124
Russia	20	78	11	126

See footnotes at end of table.

TABLE 14--Continued
U.S. IMPORTS FOR CONSUMPTION OF MISCELLANEOUS TUNGSTEN-BEARING MATERIALS, BY COUNTRY 1/

Product and country of origin	1999 Tungsten content (metric tons)	1999 Value (thousands)	2000 Tungsten content (metric tons)	2000 Value (thousands)
Tungsten carbide powder--Continued:				
United Kingdom	(3/)	7	1	42
Other	1	93	2	148
Total	790	13,200	1,000	16,300
Unwrought tungsten: 2/ 4/ 5/				
Austria	2	170	7	109
Canada	3	11	21	33
Germany	2	234	2	135
United Kingdom	(3/)	12	2	148
Other	(3/)	20	1	27
Total	8	447	32	452
Waste and scrap:				
Austria	17	147	11	89
Bermuda	12	65	--	--
Canada	19	102	24	109
China	169	1,380	253	2,200
Estonia	--	--	19	122
France	--	--	3	12
Germany	151	779	79	404
Hong Kong	13	120	--	--
India	16	64	9	41
Indonesia	13	101	--	--
Ireland	13	114	25	115
Israel	21	71	9	97
Japan	314	1,530	64	310
Korea, Republic of	60	212	146	420
Mexico	--	--	2	11
Netherlands	13	110	35	179
Russia	343	1,810	151	995
Singapore	11	59	9	49
South Africa	72	462	60	322
Sweden	11	66	--	--
Ukraine	16	$154	--	--
United Kingdom	93	545	30	$179
Uzbekistan	59	437	55	497
Other	2	12	8	72
Total	1,440	8,340	993	6,230
Wrought tungsten wire, plate, sheet, strip, foil, other: 2/ 4/				
Austria	17	2,490	39	4,490
Belgium	(3/)	9	1	113
Canada	21	649	(3/)	31
China	24	1,330	59	3,030
Estonia	(3/)	3	8	77
France	2	302	5	586
Germany	78	6,270	92	5,880
Hong Kong	1	37	1	89
Hungary	11	809	6	483
India	(3/)	30	1	52
Israel	11	1,010	13	968
Italy	(3/)	5	1	76
Japan	28	5,600	22	7,600
Korea, Republic of	(3/)	50	2	203
Mexico	1	601	(3/)	220
Netherlands	1	245	1	249
Russia	15	121	(3/)	12
Singapore	(3/)	78	1	95
Switzerland	3	416	3	433
United Kingdom	3	518	4	525
Other	(3/) r/	57 r/	1	408
Total	217	20,600	260	25,600
Tungsten oxides:				
Australia	--	--	36	188
China	1,530	7,940	1,220	6,730

See footnotes at end of table.

TABLE 14--Continued
U.S. IMPORTS FOR CONSUMPTION OF MISCELLANEOUS TUNGSTEN-BEARING MATERIALS, BY COUNTRY 1/

Product and country of origin	1999 Tungsten content (metric tons)	1999 Value (thousands)	2000 Tungsten content (metric tons)	2000 Value (thousands)
Tungsten oxides--Continued:				
Germany	1	28	(3/)	9
Netherlands	19	102	--	--
Russia	555	2,350	836	4,900
United Kingdom	4	29	--	--
Other	(3/)	5	--	--
Total	2,110	10,500	2,090	11,800
Calcium tungstate:				
China	--	--	97	317
Japan	1	24	(3/)	9
Total	1	24	97	326
Other tungstates:				
China	763	3,240	2	12
Germany	8	143	(3/)	30
Total	770	3,380	2	42
Other tungsten compounds: 6/				
Belgium	--	--	(3/)	2
France	(3/)	3	--	--
Germany	1	143	(3/)	34
Ireland	--	--	(3/)	4
Japan	2	513	1	159
Netherlands	--	--	1	7
Total	3	659	3	205

r/ Revised. -- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ May include alloys.
3/ Less than 1/2 unit.
4/ Content estimated from reported gross weight.
5/ Includes bars and rods obtained by sintering; excludes powders and waste and scrap.
6/ Includes tungsten chlorides.

Source: U.S. Census Bureau.

TABLE 15
TUNGSTEN: WORLD CONCENTRATE PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons, tungsten content)

Country	1996	1997	1998	1999	2000
Austria	1,413	1,400 e/	1,423	1,610	1,600 e/
Bolivia	582	513	497	334	381
Brazil	99	40	--	13 r/	14
Burma 3/	334	272	178	87	82 e/
Burundi e/	16	16	10	10	10
China e/	26,500	25,000	30,000 r/	29,000 r/	30,000
India	2	1	--	--	--
Korea, North e/	900	900	800	700	700
Mexico	188	179	130	40 r/	--
Mongolia e/	17	26	35	16	15 e/
Peru	332	280	76	--	--
Portugal	776	1,036	831	434 r/	750
Russia e/	3,000	3,000	3,000	3,500	3,500
Rwanda	49 r/	33 r/	149 r/	97 r/	130
Tajikistan e/	50	--	--	--	--
Thailand e/	37	30	35	30 r/	30
Uzbekistan e/	300	250	200	200	200
Vietnam	130	210	--	--	--
Total	34,700 r/	33,200	37,400 r/	36,100 r/	37,400

e/ Estimated. r/ Revised. -- Zero.
1/ World totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.
2/ Tungsten concentrates are believed to be produced in Kyrgyzstan, but information is inadequate for making production estimates. Table includes data available through May 30, 2001.
3/ Includes content of tin-tungsten concentrate.