



2011 Minerals Yearbook

TUNGSTEN

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In 2011, one U.S. tungsten operation produced and shipped ore concentrates. Most of the U.S. supply of tungsten raw materials comprised imports, scrap, and sales from the National Defense Stockpile (NDS). China continued to be the world's leading producer of tungsten concentrates and the leading supplier of tungsten imports to the United States. U.S. apparent consumption increased significantly in 2011, as compared with that of 2010. World tungsten mine production increased from that of 2010, primarily because of increases in production from Canada, China, and Russia. Salient U.S. tungsten statistics and world tungsten concentrate production for 2007–11 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. Most 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 by weight. 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.

Tungsten is a whitish-gray metal with many unique properties and a wide variety of commercial, industrial, and military applications. The leading use is as tungsten carbide in cemented carbides, which are wear-resistant materials used by the construction, metalworking, mining, and oil and gas drilling industries. Pure or doped tungsten metal contacts, electrodes, and wires are used in electrical, electronic, heating, lighting, and welding applications. Tungsten is also used to make alloys and composites to substitute for lead in ammunition and other products; heavy-metal alloys for armaments, heat sinks, radiation shielding, and weights and counterweights; superalloys for turbine engine parts; tool steels; and wear-resistant alloy parts and coatings. Tungsten chemicals are used to make catalysts, corrosion-resistant coatings, dyes and pigments, fire-resistant compounds, lubricants, phosphors, and semiconductors.

Legislation and Government Programs

DLA Strategic Materials (DLA), U.S. Department of Defense, sold tungsten materials via three sales formats—a basic ordering agreement, negotiated sales, and a strategic supply alliance. During fiscal year 2011 (October 1, 2010, through September 30, 2011), 1,190 metric tons (t) of contained tungsten was sold. During the calendar year, 1,220 t of tungsten was sold. DLA tungsten inventories at the end of the calendar year are

listed in tables 1 and 2. The 2011 Biennial Report on Stockpile Requirements listed tungsten ores and concentrates as a required material with an NDS inventory greater than the amount needed and tungsten metal powder as a material that was not required in the NDS (U.S. Department of Defense, 2012, p. 8, 58).

The Annual Materials Plan (AMP) for fiscal year 2011, which represented the maximum quantities of tungsten materials that could be sold, is listed in table 2. The proposed AMP for fiscal year 2012 (October 1, 2011, through September 30, 2012), was to remain unchanged for tungsten (U.S. Department of Defense, 2012, p. 6–7).

The National Toxicology Program of the U.S. Department of Health and Human Services released the 12th edition of the “Report on Carcinogens.” Cobalt-tungsten carbide powders and hard metals were listed as reasonably anticipated to be human carcinogens based on limited evidence of carcinogenicity from studies in humans and supporting evidence from studies on mechanisms of carcinogenesis (National Toxicology Program, 2011, p. 3, 115–120).

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, purchase, disposition, and stocks of tungsten ores and concentrates. In 2011, Curtis Tungsten, Inc. (Upland, CA) produced and shipped scheelite concentrates from the Andrew Mine northeast of Los Angeles, CA.

EMC Metals Corp. (Vancouver, British Columbia, Canada) was considering selling or restarting production from its Springer complex in Pershing County, NV. The complex comprised an underground scheelite mine, a beneficiation plant, and a processing circuit designed to produce either ammonium paratungstate (APT) or calcium tungstate (also known as synthetic scheelite). Although on care-and-maintenance status since 1982, investments had been made to the facilities in recent years, and work to make the primary milling and flotation circuits fully operational was nearly complete (EMC Metals Corp., 2012, p. 16).

The USGS monthly “Tungsten Concentrate and Tungsten Products Survey” canvassed companies that produced tungsten carbide powder, tungsten chemicals, and (or) tungsten metal powder from APT, tungsten-bearing scrap, and tungsten concentrate. U.S. processors of tungsten materials operating in 2011 are listed in table 4.

In 2011, U.S. processors consumed less APT and tungsten concentrates, but more tungsten scrap than they did in 2010. Domestic production of APT was higher than that of 2010. Total

net production of tungsten metal powder and tungsten carbide powder decreased by 7% in 2011 compared with that of 2010 (table 3).

Buffalo Tungsten Inc. announced that it planned to renovate its Depew, NY, plant to be able to process tungsten concentrates and scrap to produce APT. Currently, Buffalo Tungsten purchases APT as feed for its metal powder production (Besecker and Watson, 2011).

Consumption

U.S. apparent consumption of all tungsten materials, as calculated from net imports, secondary production, and changes in Government and industry stock levels, was 18,100 t in 2011, 17% higher than the revised 2010 apparent consumption of 15,500 t. Primary U.S. production was not available to include in the calculation. The increase in apparent consumption in 2011 was mainly the result of a significant increase in scrap consumption compared with that of 2010.

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 60 tungsten consumers were canvassed on a monthly or annual basis. Reported consumption and stock data in tables 1 and 5 include estimates to account for nonrespondents.

Total U.S. reported consumption of tungsten materials to make end-use products in 2011 was 12% higher than that of 2010. Tungsten consumption by steelmakers and producers of cemented carbides, superalloys, and other alloys increased from that of 2010 and consumption by producers of chemical products and mill products decreased. Compared with consumption in 2010, U.S. end users consumed more tungsten carbide powder and scrap, but less ferrotungsten, tungsten chemicals, and tungsten metal powder.

Weekly reports of the number of operating drilling rigs give an indication of the demand for tungsten carbide in the form of cemented carbide components used by industry to explore for or produce oil and natural gas. The number of rigs operating each week in the United States trended upward during the year. In 2011, the average of weekly operating rigs was 1,879, 22% higher than the average of 1,546 operating rigs in 2010 (Baker Hughes Inc., undated).

In 2011, total consumption of tungsten scrap by U.S. processors and consumers was 9,560 t of contained tungsten, which was 63% more than the 5,880 t consumed in 2010.

Prices

Annual average APT prices were significantly higher than those of 2010 (table 1). The U.S. APT price reported by Platts Metals Week increased sharply in March, then more gradually until late October, when it decreased slightly. During the year, this price ranged from \$190 to \$450 per short ton unit (\$209 to \$496 per metric ton unit). The U.S. APT price reported by Metal Bulletin increased sharply in late January and again in late September, before decreasing slightly in mid-October. During the course of the year, the price ranged between \$237 and \$445 per short ton unit (\$261 to \$491 per metric ton unit).

The semiweekly tungsten ore price reported by Metal Bulletin has remained unchanged since late 2008. The U.S. spot tungsten ore concentrate price reported by Platts Metals Week increased sharply in September and ranged from \$170 to \$330 per short ton unit (\$187 to \$364 per metric ton unit) during the course of the year. The annual average of Platts' tungsten ore concentrate prices was 36% higher than that of 2010. Platts' annual average ferrotungsten price increased by 49% to \$51.18 per kilogram of contained tungsten in 2011, from \$34.30 per kilogram of contained tungsten in 2010. In 2011, the ferrotungsten price ranged between \$46 and \$57 per kilogram.

Foreign Trade

The tungsten content of U.S. exports was 7,130 t, 54% more than the 4,620 t exported in 2010 (tables 6–10). The tungsten content of U.S. imports was 13,200 t, 7% more than the 12,400 t imported in 2010 (tables 11–14). China, which continued to be the leading supplier of imported tungsten to the United States, provided 43% of all tungsten imports in 2011. In 2011, the tungsten content of imports from China decreased by 6% to 5,690 t from 6,080 t in 2010. The distribution of materials imported from China was as follows: APT, 33%; tungsten oxide, 27%; tungsten carbide powder, 12%; wrought tungsten, 10%; tungsten metal powders and unwrought tungsten, 5% each; tungsten waste and scrap, 4%; ferrotungsten, 3%; other tungstates, other tungsten compounds, and tungsten ores and concentrates, minor amounts. Other significant suppliers of tungsten materials to the United States were as follows: Vietnam, 10%; Bolivia, 7%; Germany, 5%; and Canada, Portugal, the Republic of Korea, and Spain, 4% each.

U.S. imports of ores and concentrates, on a contained tungsten basis, was 33% higher than that of 2010 (table 11). In 2011, the leading suppliers of tungsten ores and concentrates were Bolivia (24%), Vietnam (21%), Portugal (14%), Spain (13%), and Peru (12%).

U.S. imports of APT were 19% lower than those of 2010 (table 12). China continued to be the dominant supplier, providing 93% of U.S. APT imports. Imports of other tungsten materials are presented in tables 13–14.

Net import reliance as a percentage 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 2011, U.S. net import reliance for tungsten as a percentage of apparent consumption decreased to 40% from 60% or more in recent years as a result of an increase in scrap consumption.

World Review

Estimated world tungsten mine production increased by 8% from that of 2010, primarily because of increases in production from Canada, China, and Russia (table 15). In addition to mine production and tungsten recovered from scrap, tungsten materials from the NDS contributed to supply in 2011.

The British Geological Survey evaluated 52 chemical elements or element groups of economic value and identified tungsten as having a high risk of supply disruption because more than 75% of its production was from one country, China (British Geological Survey, 2011).

Australia.—Tasmania Mines Ltd. (Sydney) produced a small amount of scheelite concentrate from its Kara open pit magnetite mine south of Burnie in Tasmania.

Carbine Tungsten Ltd. (formerly Icon Resources Ltd., Sydney) was building a plant to process tailings generated during past mining operations at its Mt. Carbine tungsten mine in northern Queensland. During this first stage of production, expected to begin in 2012 and last 2 years, the company planned to produce 40 t of tungsten in concentrate per month. During a second stage, Carbine planned to process low-grade stockpiled ore for 5 to 7 years and produce concentrates containing 950 metric tons per year (t/yr) of tungsten. The final stage of production would be open pit and underground mining for more than 10 years, producing concentrates containing 1,900 t/yr of tungsten. The Mt. Carbine deposit contains about 80% wolframite and 20% scheelite (Icon Resources Ltd., 2011, p. 3–4, 6).

King Island Scheelite Ltd. (KIS, Sydney) studied the feasibility of reestablishing production at the former King Island Scheelite Mine on King Island, northwest of Tasmania. KIS was considering a 10-year operation, first retreating tailings from former mining operations, then underground mining from two ore bodies. At full production, 2,780 t/yr of tungsten in concentrate would be produced. KIS hoped to begin production in 2013, subject to finding a joint-venture partner and establishing offtake agreements to fund the project (King Island Scheelite Ltd., 2012, p. 1, 3, 13, 26).

Deutsche Rohstoff AG (DRAG, Heidelberg, Germany) acquired the Wolfram Camp tungsten-molybdenum open pit mine and beneficiation plant west of Cairns, Queensland, which had been on care-and-maintenance status since late 2008. DRAG signed a 5-year offtake agreement to supply 100% of the wolframite concentrates produced from the mine to U.S. tungsten processor Global Tungsten & Powders Corp. (GTP) and began production in December. At full production, the Wolfram Camp Mine was expected to produce 1,230 t/yr of tungsten in concentrate (Deutsche Rohstoff AG, 2011; 2012, p. 27–28).

Hazelwood Resources Ltd. (Perth) studied the feasibility of developing the Big Hill scheelite deposit in northwestern Western Australia. The company planned to begin production in 2013. Concentrates from Big Hill, containing 1,600 t/yr of tungsten, would be processed by the Asia Tungsten Products Co. Ltd. ferrotungsten plant in Vietnam (Hazelwood Resources Ltd., 2012, p. 4).

Thor Mining PLC (London, United Kingdom) commissioned a revised feasibility study on its Molyhil tungsten-molybdenum project, northeast of Alice Springs, Northern Territory. The study evaluated the economic viability of an open pit mine and beneficiation plant which would produce 2,200 t/yr of scheelite concentrate and 1,250 t/yr of molybdenite concentrate during an initial 4-year life (Thor Mining PLC, 2012, p. 2).

Venture Minerals Ltd. (Subiaco) began a feasibility study on its Mt. Lindsay tin-tungsten project in northwest Tasmania. Venture was considering an open pit mine and beneficiation plant with an initial life of 8 years (Venture Minerals Ltd., 2011, p. 6–7).

Vital Metals Ltd. (Subiaco) studied the feasibility of developing its Watershed project northwest of Cairns, Queensland. Vital was considering an open pit mining operation capable of producing approximately 1,560 t/yr of tungsten in scheelite concentrates, with an initial mine life of 6 years. The study was being funded by Japan Oil, Gas and Metals National Corp., which would earn a 30% interest in the project (Strizek, 2011, p. 18).

Austria.—Wolfram Bergbau und Hütten AG (owned by Sandvik AB, Sandviken, Sweden) operated the Mittersill scheelite mine and beneficiation plant in the State of Salzburg, the Bergla tungsten processing plant, and a tungsten recycling unit near St. Martin in the State of Steiermark.

Brazil.—Largo Resources Ltd. (Toronto, Ontario, Canada) began production from its Currais Novos project, which reprocessed tailings from two former tungsten-molybdenum mines west-southwest of Natal, Rio Grande do Norte State. Largo planned to produce concentrates containing about 180 t of tungsten in 2012 and increase production to about 330 t/yr of tungsten in subsequent years (Largo Resources Ltd., undated).

Canada.—North American Tungsten Corp. Ltd. (NATC, Vancouver) ramped up production at its Cantung Mine in Northwest Territories, following a restart of operations in October 2010. During 2011, NATC produced 1,967 t of tungsten in scheelite concentrates, significantly more than that of 2010, and about the same amount as that of 2009, prior to the mine's shutdown. Significant investments were made to the mine and beneficiation plant, which resulted in increased production and decreased unit costs during the fourth quarter. The company did exploration to increase reserves at Cantung and studied the feasibility of recovering tungsten from tailings. NATC also continued to evaluate alternatives for the development of its Mactung scheelite deposit in the Yukon (North American Tungsten Corp. Ltd., 2012a, p. 1–8; b, p. 2–6).

Northcliff Exploration Ltd. (Vancouver, British Columbia) worked on feasibility and environmental assessment studies for the Sisson tungsten-molybdenum project in New Brunswick. A 2009 scoping study on the project proposed the development of an open pit mine and beneficiation plant to produce concentrates containing approximately 3,700 t/yr of tungsten and 1,600 t/yr of molybdenum for a period of 20 years (Geodex Minerals Ltd., 2011, p. 3, 15, 18).

Adex Mining Inc. (Toronto, Ontario) studied the feasibility of restarting production from the tungsten-molybdenum-bismuth Fire Tower Zone at its Mount Pleasant Mine in southwestern New Brunswick. Adex was considering downstream processing of tungsten concentrate from the mine to produce APT (Adex Mining Inc., 2012, p. 1, 6).

China.—China's Government had a program to conserve its tungsten resources. In the mining sector, the Government regulated the production of tungsten concentrates by forbidding foreign investment in tungsten exploration and mining; closing mines that did not meet certain energy, environmental,

production, and safety standards; imposing a resource tax on tungsten ores; not issuing new exploration and mining licenses; and setting production quotas. For 2011, the tungsten concentrate production quota was increased by 9% to 87,000 t (65% WO₃). The quota was divided into three parts—primary mine production, 79%; comprehensive recovery from other sources, 19%; and an amount reserved for adjustments if necessary, 2% (Huang, 2009; Fang, 2011, p. 3, 44, 48; 2012, p. 5; Mining Journal, 2011).

In the processing sector, China's Government encouraged the recovery of tungsten from low-grade ores, mixed scheelite-wolframite concentrates, and scrap; banned tolling of tungsten concentrate; limited foreign investment in processing plants; and maintained requirements to limit the building or expansion of plants. These requirements included minimum capacities and meeting environmental, energy, production, and safety standards. In 2011, H.C. Starck GmbH (Goslar, Germany) and Jiangxi Rare Metals Tungsten Holding Group Co., Ltd. agreed to form two joint-venture companies in Ganzhou—one to produce APT and tungsten oxide and the other to produce tungsten metal powder and tungsten carbide (China Metal Market—Precious & Minor Metals Monthly, 2006; Zhang, 2007; Huang, 2008; Huang, 2009; H.C. Starck GmbH, 2011).

With respect to trade, the Chinese Government regulated tungsten exports by restricting the volumes and types of materials and products that could be sent out of the country, limiting the number of producers and traders authorized to export tungsten materials and products, and adjusting the export tax system. The 2011 export quota for tungsten materials was 15,691 t of contained tungsten, down from 15,990 t in 2010. To qualify for an export license, companies were required to have minimum production capacities and recycling rates (Ryan's Notes, 2007; Huang, 2009; Fang, 2011, p. 23, 44; 2012, p. 26).

Despite its position as the world's leading miner of tungsten, China has imported tungsten concentrates in recent years. In 2011, China imported 4,750 t of tungsten in concentrates, 50% more than it imported in 2010 (Fang, 2012, p. 33).

Tungsten producers from the Ganzhou Tungsten Association, Jiangxi Tungsten Group, China Minmetals, and Hunan Nonferrous Metals communicated monthly and issued recommended prices for tungsten concentrate, APT, and metal powder (Precious & Minor Metals Monthly, 2011).

Congo (Kinshasa).—The Minister of Mines of Congo (Kinshasa) ended the ban on artisanal mining in the eastern provinces of Maniema, Nord-Kivu, and Sud-Kivu. The ban, which began in 2010, was intended to give the Government time to establish a tracking program to restrict illegal mining and trade in minerals that provided funding to rebel groups (Kavanagh, 2011).

Japan.—The Japanese Government had a strategy to ensure the country's supply of raw materials, including tungsten. The strategy included providing assistance to develop new mine production in other countries, increasing recycling rates, promoting research to reduce consumption or develop substitutes, and improving the stockpiling program (Japan Oil, Gas and Metals National Corp., 2011, p. 1–2).

A.L.M.T. Corp. (a subsidiary of Sumitomo Electric Industries, Ltd., Osaka) began recycling cemented carbide scrap with

a newly developed, highly efficient, low cost, small-scale hydrometallurgical process. Researchers at Sumitomo Electric Industries also developed cutting tools composed of a cemented carbide layer on a cermet substrate that had 30% less tungsten than traditional cemented carbide tools (Ishida and others, 2012).

Japan New Metals Co., Ltd. (Tokyo) added the capability to produce tungsten carbide powder at its Akita plant. Prior to this expansion, all of the company's tungsten carbide powder was produced at its Osaka plant from APT produced at Akita (Japan Metal Bulletin, 2011).

Korea, Republic of.—State-run Korea Resources Corp. planned to increase its stockpile of various metals, including tungsten. The new target was to stock the equivalent of 60 days of domestic consumption by 2016 (Park, 2011).

Woulfe Mining Corp. (Vancouver, British Columbia, Canada) studied the feasibility of reopening the Sangdong tungsten-molybdenum mine southeast of Seoul in Gangwon Province. The company was considering an underground mine with a life of 11.5 years, a beneficiation plant to produce tungsten and molybdenum concentrates, and an onsite processing plant with the capacity to produce approximately 3,100 t/yr of tungsten in APT (Tetra Tech WEI Inc., 2012, p. 1-11).

Peru.—Malaga Inc. (Montreal, Quebec, Canada) produced tungsten concentrate from the Pasto Bueno Mine and beneficiation plant in the Ancash region. Production decreased in 2011, owing to lower tonnage and grade of mined ore. Competition for manpower and a shortage of explosives were cited as reasons for reduced ore extraction. Mine capacity continued to be less than plant capacity. Malaga planned to buy mine equipment and accelerate underground development to increase production. All concentrate from Pasto Bueno was sold to GTP under an offtake agreement (Malaga Inc., 2012, p. 5–8).

Portugal.—Sojitz Beralta Tin and Wolfram (Portugal) S.A. (Barroca Grande) planned to increase production from the Panasqueira Mine in central Portugal by nearly 50% by 2013. Wolframite concentrate from Panasqueira was sent to Japan and elsewhere to be processed (Ryan's Notes, 2011).

Russia.—Five companies mined tungsten and produced concentrates. The companies, with the locations of their operations and listed in order of their share of production during the first 6 months of 2011, were as follows: JSC A&IR Mining, which produced concentrates from ores mined by Primorsky GOK in Primorskiy Kray; KGUP Primteploenergo, which had the exploration and mining license for the Lermontov Mine in Primorskiy Kray; Russkaya Gornorudnaya Kompaniya (RGRK, the Russian Ore Mining Company), which managed JSC Novoorlovsky GOK in Zabaykal'sk Kray; prospectors' cooperative Artel Quartz Ltd. (Kvarz) in Zabaykal'sk Kray; and Wolfram Company CJSC, which owned CJSC Buryat Wolfram in Zakamensk, Buryatiya Republic (Gorbachev, 2011, p. 8).

Wolfram Company (Moscow) Hydrometallurg plant at Nalchik, Kabardino-Balkariya Republic, and Kirovgradskiy Zavod Tverdykh Splavov OAO's Kirovgrad Hard Alloys plant in Sverdlovsk Oblast produced APT, tungsten anhydride, and tungsten oxide. In 2011, Russian consumption of these materials was forecast to be greater than exports for the first time in 10 years. In addition to concentrates, Russian supply was forecast

to include 1,150 t of tungsten scrap in 2011 (Gorbachev, 2011, p. 9, 11–16).

Wolfram also began construction on the second phase of a refractory metals plant in Unecha, Bryansk Oblast, which was expected to produce tungsten metal powders as its main product. The company planned to gain full control of the Tynnyauz tungsten-molybdenum mining complex by purchasing the share held by the Kabardino-Balkariya Republic (Wolfram Company CJSC, undated a, b).

Spain.—Heemskirk Consolidated Ltd. (Melbourne, Australia) sold its share of the Los Santos tungsten mine in Salamanca Province to Almonty Partners LLC (New York, NY). Almonty established a new long-term agreement to supply tungsten concentrates from the mine to an undisclosed company, began to make improvements to the beneficiation plant, and started a drill program to expand the mine's reserves. In 2011, production of tungsten concentrates from Los Santos was more than twice that of 2010 (Almonty Industries Inc., 2012, p. 4–6, 9).

Ormonde Mining plc (Dublin, Ireland) studied the feasibility of developing its Barruecopardo tungsten project in Salamanca Province and completed the first stage of mine permitting. Barruecopardo was the leading tungsten mine in Spain until its closure in the early 1980s. Ormonde planned to mine the ore by conventional open pit methods and produce scheelite concentrates containing an average of 1,800 t/yr of tungsten during the initial 9 years of operation. Plant commissioning was scheduled to begin during the second half of 2013. The company planned to evaluate the feasibility of extracting mineral resources below the open pit by underground mining (Ormonde Mining plc, 2012).

Caspian Holdings Plc (London, United Kingdom) acquired Iberian Resources Spain SL, owner of the La Parrilla tungsten tailings deposit and had an option to acquire the La Parrilla open pit tungsten mine in the Extremadura region of the Provinces of Caceres-Badajoz. Caspian planned to process the tailings to produce tungsten concentrate by mid-2013 (Caspian Holdings Plc, 2012, p. 3).

Thailand.—Newly founded Siam Emco Corp. acquired SC Mining Co., Ltd., producer of ferberite concentrate. Siam Emco planned to increase production from the mine and continue to supply concentrate to customers in China, India, and Japan (Metal Bulletin, 2011b).

United Kingdom.—Wolf Minerals Ltd. (Subiaco, Australia) completed a feasibility study on redeveloping the Hemerdon Mine northeast of Plymouth and worked on funding the project. The open pit mine and beneficiation plant was expected to produce approximately 2,700 t/yr of tungsten in wolframite concentrate and 462 t/yr of tin in concentrate for a minimum of 10 years beginning in 2014. Wolf Minerals received updated planning permission for mining at Hemerdon from the Devon County Council and United Kingdom Secretary of State. Traxys Europe S.A. was to market the tungsten concentrate produced (Wolf Minerals Ltd., 2011, p. 3, 6, 10, 13–14, 20).

Uzbekistan.—The State Committee of the Republic of Uzbekistan on Geology and Mineral Resources and Shindong Resources Co. Ltd. (Republic of Korea) agreed to form a joint venture to explore the Sautbay tungsten deposit in Navoi region

and to build a mine and beneficiation plant (The Times of Central Asia, 2011).

Vietnam.—Vietnam Youngsun Tungsten Industry Co., Ltd. reportedly shut its ferrotungsten plant in Halong City, Quang Ninh Province for maintenance in early 2011. The plant restarted production at the end of March and was operating at nearly one-half capacity in early May. Most of the production was from scheelite and wolframite ores purchased from Thienke Mine in Tuyen Quang Province and Philieng Mine in Lam Dong Province. The ferrotungsten was produced for export to Europe, Japan, the Republic of Korea, and the United States (Vietnam Youngsun Tungsten Industry Co., Ltd., 2009a, b; Metal Bulletin, 2011a).

Hazelwood Resources completed construction of its majority-owned Asia Tungsten Products plant near the port of Haiphong. The plant had the capacity to produce 4,000 t/yr of ferrotungsten (approximately 3,000 t/yr of tungsten), which was to be sold by Wogen Resources Ltd. Hazelwood was negotiating financing to purchase feedstock for the plant, which would later use concentrates from the company's Big Hill Mine in Australia (Hazelwood Resources Ltd., 2012).

Masan Group Corp. (Ho Chi Minh City) began construction at its Nui Phao project in Thai Nguyen Province. The project comprised an open pit mine and processing complex to produce fluor spar, copper concentrate, APT, and bismuth, listed in order of annual output. Masan planned to begin production in early 2013 and forecast APT output during the first 5 years of full production to exceed 4,700 t/yr of contained tungsten (Masan Group Corp., 2012, p. 33–37).

Outlook

World tungsten supply will continue to be dominated by Chinese production and exports. The Chinese tungsten concentrate production quota for 2012 was increased by 2% to 89,000 t (65% WO₃). The export quota for 2012 was reduced to 15,400 t of all tungsten products, a decrease of 2% from the quota of 15,691 t in 2011 (Fang, 2012, p. 5, 26).

Tungsten use is strongly influenced by general economic conditions. Future consumption of tungsten in cemented carbides, which is the leading end-use sector, will depend on the performance of the following industries: automotive and aircraft production; construction; electronics manufacturing, where cemented carbide microdrills are used on circuit boards; general manufacturing; large equipment manufacturing; mining; and oil and gas drilling. Tungsten use is also influenced by Government spending for defense applications.

In the next few years, tungsten mine production outside of China is expected to increase. Seddon (2012, p. 23–25) forecast a slight market surplus for tungsten in 2012, followed by a slight deficit in 2013, and then significant surpluses in 2014 through 2016, as new production comes online.

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TABLE 1
SALIENT TUNGSTEN STATISTICS¹

(Metric tons, tungsten content and dollars per metric ton unit)

	2007	2008	2009	2010	2011
United States:					
Concentrates:					
Production	W	W	W	W	W
Consumption	W	W	W	4,820 ^r	W
Exports	109	496	38	276	169
Imports for consumption	3,880	3,990	3,590	2,740	3,640
Stocks, December 31:					
Consumer	W	W	W	W	W
U.S. Government ²	21,200	19,700	19,000	17,000	15,800
Price:					
U.S. spot quotation ³	189	184	151	183	248
European ⁴	165	164	150	150	150
Ammonium paratungstate:					
Production	W	W	W	W	W
Consumption ⁵	12,000	9,700	6,860	10,300	W
Stocks, December 31, producer and consumer	68	W	100	62	W
Price:					
U.S. free market ⁴	284	278	204	214	370
U.S. market ³	262	260	178	186	397
European free market ⁴	248	249	203	244	431
Primary products:					
Net production ⁶	8,360	8,950	5,300	8,340 ^r	7,790
Consumption ⁷	11,400	12,100	7,460	10,900	12,200
Stocks, December 31:					
Producer ⁶	825	707	682	678 ^r	682
Consumer ⁷	488	571	509	567	558
U.S. Government ²	235	183	171	171	125
World, production of concentrate	53,600 ^r	62,000 ^r	60,500 ^r	67,700 ^r	73,100 ^e

^eEstimated. ^rRevised. W Withheld to avoid disclosing company proprietary data.

¹Data are rounded to no more than three significant digits.

²Defense Logistics Agency, DLA Strategic Materials. Data are uncommitted material only.

³Annual average calculated from weekly prices reported by Platts Metals Week.

⁴Annual average calculated from semiweekly prices reported by Metal Bulletin.

⁵Reported by tungsten processors.

⁶Includes tungsten metal powder and tungsten carbide powder produced from metal powder; excludes cast and crystalline tungsten carbide powder and chemicals.

⁷Includes ammonium paratungstate and other tungsten chemicals, ferrotungsten, tungsten metal powder, tungsten carbide powder, and tungsten scrap.

TABLE 2
U.S. GOVERNMENT NATIONAL DEFENSE STOCKPILE TUNGSTEN STATISTICS IN 2011^{1,2}

(Metric tons, tungsten content)

Material	Inventory, yearend ³		Annual Materials Plan ⁵	Sales		Inventory decrease ⁴	
	Fiscal year ⁵	Calendar year		Fiscal year ⁵	Calendar year	Fiscal year ⁵	Calendar year
Ores and concentrates	15,800	15,800	3,630	1,180	1,180	1,180	1,180
Tungsten metal powder	160	125	136	11	46	11	46
Total	16,000	15,900	3,760	1,190	1,220	1,190	1,220

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

²Includes stockpile- and nonstockpile-grade materials.

³Uncommitted inventory only. Does not include material committed for sale pending shipment.

⁴From previous year. Based solely on uncommitted yearend inventories.

⁵Twelve-month period ending September 30, 2011.

Source: Defense Logistics Agency, DLA Strategic Materials (formerly Defense National Stockpile Center).

TABLE 3
U.S. NET PRODUCTION AND STOCKS OF TUNGSTEN PRODUCTS^{1,2,3}

(Metric tons, tungsten content)

	Tungsten metal powder	Tungsten carbide powder	Total
Net production:			
2010	4,110 ^r	4,230 ^r	8,340 ^r
2011	3,330	4,460	7,790
Producer stocks:			
December 31, 2010	343 ^r	335 ^r	678 ^r
December 31, 2011	273	410	682

^rRevised.

¹Net production equals receipts plus gross production less quantity used to make other products in table.

²Data are rounded to no more than three significant digits; may not add to totals shown.

³Data for cast and crystalline tungsten carbide powder and tungsten chemicals are withheld to avoid disclosing company proprietary data; not included in "Total."

TABLE 4
U.S. PROCESSORS OF TUNGSTEN IN 2011¹

Company	Plant location
ATI Alldyne ²	Huntsville, AL.
Buffalo Tungsten Inc.	Depew, NY.
Chem-Met Co., The	Clinton, MD.
Elmet Technologies, Inc.	Lewiston, ME.
General Electric Co.	Euclid, OH.
Global Tungsten & Powders Corp. ³	Towanda, PA.
Kennametal Inc.	Fallon, NV.
Do.	Latrobe, PA.
Tungsten Diversified Industries LLC ⁴	White Bear Lake, MN. ⁵
Do. Ditto.	

¹Consumers of ammonium paratungstate, tungsten-bearing scrap, tungsten concentrates, and (or) tungsten oxides.

²An Allegheny Technologies Inc. company.

³A division of Plansee Group.

⁴Joint venture of North American Tungsten Corp. Ltd., Tundra Particle Technologies LLC, and Queenwood Capital Partners LLC.

⁵Pilot-scale operation.

TABLE 5
U.S. REPORTED CONSUMPTION AND STOCKS OF TUNGSTEN PRODUCTS^{1,2,3}

(Metric tons, tungsten content)

	2010	2011
Consumption by end use:		
Steels	71	96
Superalloys	W	997
Other alloys ⁴	W	W
Cemented carbides ⁵	5,990	6,760
Mill products made from metal powder	W	W
Chemical uses	99	88
Total	10,900	12,200
Consumption by form:		
Ferrotungsten	129	115
Tungsten metal powder	W	W
Tungsten carbide powder	5,890	6,850
Tungsten scrap ⁶	W	W
Other tungsten materials ⁷	99	88
Total	10,900	12,200
Consumer stocks, December 31:		
Ferrotungsten	23	18
Tungsten metal powder	58	36
Tungsten carbide powder	414	445
Tungsten scrap ⁶	61	45
Other tungsten materials ⁷	11	13
Total	567	558

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

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

²Does not include materials used in making primary tungsten products.

³Includes estimates.

⁴Includes welding and hard-facing rods and materials, wear- and corrosion-resistant alloys, and nonferrous alloys.

⁵Includes diamond tool matrices, cemented and sintered carbides, and cast carbide dies or parts.

⁶Includes tungsten bars.

⁷Includes tungsten chemicals.

TABLE 6
U.S. EXPORTS OF TUNGSTEN ORES AND CONCENTRATES, BY COUNTRY¹

Country of destination	2010			2011		
	Quantity		Value (thousands)	Quantity		Value (thousands)
	Gross weight (metric tons)	Tungsten content ² (metric tons)		Gross weight (metric tons)	Tungsten content ² (metric tons)	
Brazil	(3)	(3)	\$5	39	20	\$609
Chile	2	1	25	--	--	--
China	--	--	--	190	98	3,720
Germany	487	251	5,570	--	--	--
India	11	5	116	3	2	98
Malaysia	9	5	254	3	2	46
Mexico	2	1	26	(3)	(3)	18
Netherlands	--	--	--	60	31	1,140
Peru	2	1	96	--	--	--
Taiwan	--	--	--	18	9	278
United Arab Emirates	3	2	28	--	--	--
United Kingdom	4	2	60	1	(3)	8
Vietnam	15	7	225	13	7	198
Other	2 ^r	1 ^r	42 ^r	1	1	22
Total	535	276	6,440	328	169	6,140

^rRevised. -- Zero.

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

²Content estimated from reported gross weight.

³Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 7
U.S. EXPORTS OF AMMONIUM PARATUNGSTATE, BY COUNTRY¹

Country of destination	2010		2011	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Austria	6	\$49	--	--
Belgium	--	--	26	\$557
Brazil	2	20	--	--
Finland	--	--	1	5
Germany	432	7,750	566	11,200
Hungary	44	581	152	1,730
India	26	230	4	34
Italy	2	21	(2)	8
Japan	--	--	23	335
Mexico	4	35	3	28
Netherlands	1	11	--	--
Switzerland	20	137	202	4,770
Taiwan	(2)	4	(2)	11
United Kingdom	(2)	4	(2)	5
Total	538	8,840	977	18,700

-- Zero.

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

²Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 8
U.S. EXPORTS OF TUNGSTEN METAL POWDERS, BY COUNTRY^{1,2}

Country of destination	2010			2011		
	Quantity		Value (thousands)	Quantity		Value (thousands)
	Gross weight (metric tons)	Tungsten content ³ (metric tons)		Gross weight (metric tons)	Tungsten content ³ (metric tons)	
Argentina	3	2	\$145	3	2	\$195
Australia	16	13	563	3	2	175
Austria	25	20	771	63	50	3,100
Belgium	8	6	193	1	(4)	27
Brazil	19	15	1,160	19	15	1,120
Canada	111	88	4,820	151	121	9,690
Chile	6	5	450	10	8	720
China	31	25	1,860	40	32	2,870
Colombia	(4)	(4)	11	5	4	281
Czech Republic	20	16	637	1	1	79
France	(4)	(4)	29	34	27	1,590
Germany	558	446	17,600	176	141	13,500
Hong Kong	1	(4)	21	3	3	125
Hungary	5	4	117	(4)	(4)	4
India	13	11	856	20	16	1,550
Ireland	4	3	172	(4)	(4)	4
Israel	1	1	124	4	3	217
Italy	(4)	(4)	9	1	1	82
Japan	17	14	1,140	13	10	979
Korea, Republic of	5	4	344	21	16	1,070
Mexico	28	22	878	31	25	1,490
Netherlands	43	34	941	1	1	35
Peru	5	4	238	19	16	1,310
Philippines	(4)	(4)	16	1	1	116
Saudi Arabia	6	5	494	114	91	4,830
Singapore	18	14	1,680	22	18	1,620
South Africa	8	6	542	21	17	1,820
Switzerland	9	8	868	12	10	1,040
Taiwan	19	15	1,430	31	25	2,440
Thailand	2	2	86	2	2	98
Turkey	3	2	231	17	14	1,000
United Arab Emirates	2	2	149	4	3	284
United Kingdom	9	7	401	6	5	323
Venezuela	8	6	376	4	3	284
Other	3	3 ^r	200 ^r	4	3	286
Total	1,000	803	39,600	857	686	54,300

^rRevised.

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

²May include tungsten alloy powders.

³Content estimated from reported gross weight.

⁴Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 9
U.S. EXPORTS OF TUNGSTEN CARBIDE POWDER, BY COUNTRY¹

Country of destination	2010		2011	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Argentina	1	\$30	1	\$55
Australia	15	379	26	819
Austria	119	2,900	169	5,950
Belgium	39	313	2	196
Brazil	17	543	13	431
Canada	124	5,380	127	6,730
Chile	1	44	1	138
China	27	1,600	31	1,900
Colombia	3	85	(2)	19
Czech Republic	14	422	3	137
Denmark	3	106	6	280
Ecuador	(2)	3	2	58
France	34	1,070	20	1,070
Germany	235	9,290	213	11,600
Hong Kong	15	606	7	600
India	7	282	5	275
Indonesia	3	279	5	267
Ireland	27	919	2	189
Israel	(2)	3	14	189
Italy	1	94	12	1,000
Japan	13	894	41	1,020
Korea, Republic of	5	274	6	336
Mexico	8	585	8	474
Netherlands	--	--	4	145
Peru	5	305	8	483
Saudi Arabia	47	547	15	870
Singapore	6	369	6	411
South Africa	77	2,360	16	952
Sweden	15	495	41	1,610
Switzerland	5	243	5	357
Taiwan	61	2,440	60	3,720
Thailand	1	162	3	213
United Kingdom	262	9,150	357	18,700
Venezuela	24	1,230	20	915
Other	3 ^r	210 ^r	8	839
Total	1,220	43,600	1,250	63,000

^rRevised. -- Zero.

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

²Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 10
U.S. EXPORTS OF MISCELLANEOUS TUNGSTEN-BEARING MATERIALS, BY COUNTRY¹

Product and country of destination	2010		2011	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Ferrotungsten and ferrosilicon tungsten:				
Belgium	--	--	8	\$133
Canada	(2)	\$3	--	--
Mexico	--	--	1	5
Netherlands	--	--	11	586
United Kingdom	(2)	8	2	5
Total	(2)	11	22	730
Unwrought tungsten:^{3,4,5}				
Australia	--	--	4	18
Austria	--	--	17	72
Belgium	103	467	86	361
Brazil	13	59	14	65
Canada	162	1,070	488	2,240
China	8	32	7	30
Colombia	4	17	--	--
Czech Republic	5	20	--	--
France	2	9	30	124
Germany	9	47	50	212
Hungary	15	66	9	40
Indonesia	19	84	33	139
Israel	4	19	2	8
Japan	8	38	103	435
Korea, Republic of	2	10	5	19
Luxembourg	--	--	6	24
Malaysia	2	15	6	27
Mexico	44	191	76	323
Netherlands	12	176	--	--
New Zealand	3	15	--	--
Philippines	--	--	15	64
Singapore	12	62	38	164
Taiwan	2	23	37	163
Turkey	--	--	24	100
United Kingdom	11	47	9	38
Other	2 ^r	11 ^r	11	50
Total	444	2,470	1,070	4,720
Waste and scrap:⁴				
Australia	7	58	--	--
Austria	--	--	10	87
Belgium	2	66	154	1,300
Brazil	11	378	7	108
Canada	92	947	132	1,190
China	132	2,860	291	2,460
Czech Republic	5	141	25	702
Finland	306	3,800	892	7,580
France	3	94	12	99
Germany	218	4,340	492	7,230
Hong Kong	1	9	9	109
Hungary	--	--	9	75
India	14	443	4	70
Israel	--	--	42	687
Japan	11	93	142	1,200
Mexico	2	22	2	21
Netherlands	27	497	--	--
Singapore	6	51	6	50
Sweden	--	--	319	2,700
Switzerland	3	24	1	6
Taiwan	8	69	7	61
United Arab Emirates	10	91	6	53

See footnotes at end of table.

TABLE 10—Continued
U.S. EXPORTS OF MISCELLANEOUS TUNGSTEN-BEARING MATERIALS, BY COUNTRY¹

Product and country of destination	2010		2011	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Waste and scrap—Continued: ⁴				
United Kingdom	55	\$740	92	\$1,430
Other	3 ^r	21 ^r	2	19
Total	915	14,700	2,660	27,200
Wrought tungsten: ^{3,4,6}				
Australia	9	1,470	1	84
Belgium	6	599	5	661
Brazil	7	808	7	517
Canada	37	4,190	41	5,030
China	9	1,400	6	1,270
Costa Rica	5	715	13	1,650
Czech Republic	27	3,450	23	2,840
France	1	106	5	371
Germany	82	7,570	68	7,700
Hungary	5	948	2	319
India	3	353	24	2,390
Indonesia	5	1,000	(2)	66
Japan	25	4,110	34	7,990
Mexico	17	3,190	14	2,480
Netherlands	4	926	1	49
Russia	2	164	1	122
Singapore	5	953	7	1,290
Spain	6	802	1	71
Sweden	9	2,240	4	580
Taiwan	(2)	86	2	420
United Kingdom	9	3,200	19	2,270
Other	15 ^r	3,020 ^r	13	2,840
Total	289	41,300	289	41,000
Tungsten compounds: ⁷				
Canada	21	75	3	9
China	(2)	4	1	19
France	2	21	--	--
Germany	117	1,470	3	112
Malaysia	1	31	--	--
Other	1	11 ^r	(2)	25
Total	142	1,610	7	165

^rRevised. -- Zero.

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

²Less than ½ unit.

³May include alloys.

⁴Content estimated from reported gross weight.

⁵Includes bars and rods produced simply by sintering; excludes powders and waste and scrap.

⁶Includes bars and rods other than those produced simply by sintering; profiles, plates, sheets, strip, and foil; wire; and other wrought products.

⁷Includes only other tungstates.

Source: U.S. Census Bureau.

TABLE 11
U.S. IMPORTS FOR CONSUMPTION OF TUNGSTEN ORES AND CONCENTRATES,
BY COUNTRY¹

Country of origin	2010		2011	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Bolivia	939	\$18,500	866	\$21,200
Brazil	--	--	52	1,680
Canada	13	396	110	3,620
Chile	--	--	14	460
China	--	--	49	789
Germany	(2)	44	1	32
Mexico	13	92	5	84
Mongolia	19	240	230	6,410
Peru	519	12,500	429	17,900
Portugal	635	15,900	522	21,200
Rwanda	79	1,290	11	194
Spain	215	5,510	481	18,800
Thailand	90	1,690	91	3,290
Uganda	94	1,810	20	422
United Kingdom	36	554	12	471
Vietnam	88	1,400	750	22,000
Total	2,740	60,000	3,640	119,000

-- Zero.

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

²Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 12
U.S. IMPORTS FOR CONSUMPTION OF AMMONIUM PARATUNGSTATE, BY COUNTRY¹

Country of origin	2010		2011	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
China	2,410	\$53,500	1,890	\$72,700
Germany	55	1,700	113	4,020
Hong Kong	3	56	--	--
Japan	--	--	(2)	41
United Kingdom	(2)	13	--	--
Vietnam	44	1,130	22	939
Total	2,510	56,400	2,020	77,700

-- Zero.

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

²Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 13
U.S. IMPORTS FOR CONSUMPTION OF FERROTUNGSTEN AND
FERROSILICON TUNGSTEN, BY COUNTRY¹

Country of origin	2010		2011	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Australia	4	\$110	--	--
China	304	9,320	184	\$6,950
France	(2)	4	--	--
Luxembourg	15	535	--	--
Netherlands	15	419	--	--
Vietnam	19	634	22	1,020
Total	357	11,000	206	7,980

-- Zero.

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

²Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 14
U.S. IMPORTS FOR CONSUMPTION OF MISCELLANEOUS TUNGSTEN-BEARING MATERIALS,
BY COUNTRY¹

Product and country of origin	2010		2011	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Tungsten metal powders:²				
Austria	2	\$66	1	\$112
Canada	63	2,310	182	8,950
China	249	8,390	292	15,700
Germany	214	8,500	203	11,000
Hong Kong	--	--	13	746
Israel	391	13,700	235	14,300
Japan	49	3,370	92	5,910
Korea, Republic of	374	13,500	311	19,100
Mexico	--	--	7	162
Singapore	(3)	2	15	1,050
United Kingdom	(3)	11	3	166
Vietnam	--	--	20	1,020
Other	2 ^r	170 ^r	(3)	44
Total	1,340	50,000	1,370	78,200
Tungsten carbide powder:				
Austria	14	483	48	3,030
Belgium	44	2,010	32	1,700
Canada	116	5,920	246	13,500
China	961	34,100	654	40,000
Czech Republic	49	2,540	51	4,890
Finland	--	--	4	214
France	5	353	8	563
Germany	127	8,040	166	15,400
Hong Kong	16	595	8	587
India	3	148	7	508
Israel	156	5,600	75	4,320
Japan	1	132	31	1,130
Korea, Republic of	17	707	18	1,260
Luxembourg	5	226	--	--
Netherlands	--	--	3	203
Singapore	5	77	--	--
Sweden	42	1,360	1	51
Vietnam	47	2,120	333	22,200
Other	(3) ^r	130 ^r	1	82
Total	1,610	64,500	1,690	110,000
Unwrought tungsten:^{2,4,5}				
Australia	3	48	--	--
Austria	1	67	3	75
China	310	9,170	296	14,500
Germany	2	210	2	301
Singapore	17	724	4	263
Sweden	--	--	5	280
United Kingdom	1	48	5	359
Vietnam	--	--	18	619
Other	2 ^r	119 ^r	1	65
Total	335	10,400	334	16,500
Waste and scrap:				
Austria	120	860	103	2,590
Canada	20	485	30	708
Chile	12	286	9	218
China	142	4,020	217	9,440
Croatia	--	--	20	838
Czech Republic	29	629	14	541
Germany	170	2,930	123	2,240
Hong Kong	37	1,010	12	628
India	47	974	156	5,170
Israel	--	--	12	402

See footnotes at end of table.

TABLE 14—Continued
 U.S. IMPORTS FOR CONSUMPTION OF MISCELLANEOUS TUNGSTEN-BEARING MATERIALS,
 BY COUNTRY¹

Product and country of origin	2010		2011	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Waste and scrap—Continued:				
Japan	32	\$702	74	\$2,060
Korea, Republic of	120	1,510	163	3,990
Luxembourg	318	4,970	46	627
Mexico	134	1,480	203	3,510
Pakistan	50	782	--	--
Singapore	19	438	22	281
Sweden	(3)	13	39	956
Switzerland	54	735	--	--
Taiwan	43	951	1	20
Thailand	60	946	18	442
United Kingdom	35	805	85	3,070
Other	9 ^r	233 ^r	20	619
Total	1,450	24,800	1,370	38,300
Wrought tungsten ^{2, 4, 6}				
Austria	61	11,100	91	18,000
Belgium	7	948	(3)	21
China	568	24,100	559	35,700
Czech Republic	5	3,370	(3)	339
France	3	662	7	1,340
Germany	9	1,550	23	3,600
Hong Kong	5	424	3	376
Hungary	8	1,550	6	1,090
Japan	21	6,190	19	5,360
Mexico	2	146	(3)	12
Russia	10	1,140	20	2,270
Singapore	1	247	13	2,050
South Africa	43	1,050	6	228
Sweden	4	1,110	2	759
United Kingdom	1	530	3	1,040
Other	9 ^r	1,730 ^r	10	2,400
Total	759	55,900	762	74,600
Tungsten oxides:				
China	1,090	25,100	1,540	73,300
Czech Republic	12	487	12	696
Germany	8	263	4	147
Hong Kong	32	782	--	--
Israel	5	106	--	--
Japan	--	--	39	1,720
Russia	(3)	6	99	6,840
Taiwan	16	420	--	--
Vietnam	48	1,560	115	5,420
Other	(3)	13 ^r	2	160
Total	1,210	28,700	1,810	88,300
Other tungstates:				
China	41	1,050	11	779
Germany	1	141	3	234
India	8	216	16	541
Ireland	62	173	--	--
Other	(3) ^r	46 ^r	(3)	38
Total	111	1,630	31	1,590
Other tungsten compounds: ⁷				
China	1	37	1	93
Germany	(3)	244	2	324
Japan	4	975	5	1,530
Russia	--	--	2	86
Total	5	1,260	10	2,040

^rRevised. -- Zero.

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

TABLE 14—Continued
 U.S. IMPORTS FOR CONSUMPTION OF MISCELLANEOUS TUNGSTEN-BEARING MATERIALS,
 BY COUNTRY¹

- ²May include alloys.
³Less than ½ unit.
⁴Content estimated from reported gross weight.
⁵Includes bars and rods produced simply by sintering; excludes powders and waste and scrap.
⁶Includes bars and rods other than those produced simply by sintering; foil, plates, profiles, sheets, and strip; wire; and other wrought products.
⁷Includes tungsten chlorides.

Source: U.S. Census Bureau.

TABLE 15
 TUNGSTEN: WORLD CONCENTRATE PRODUCTION, BY COUNTRY^{1,2}

(Metric tons, tungsten content)

Country ³	2007	2008	2009	2010	2011 ^c
Australia	7	28	33	16	15 ⁴
Austria	1,117	1,122	887	977 ^r	1,100
Bolivia	1,107	1,148	1,023	1,204	1,124 ⁴
Brazil	537	408	192 ^r	166 ^r	170 ^p
Burma ⁵	183	136	87	163 ^r	130
Burundi	144	125 ^r	79 ^r	107 ^r	110
Canada	2,305	2,277	1,964	420	1,967 ⁴
China ^{c,6}	41,000	50,000	51,000	59,000	61,800
Congo (Kinshasa) ^{c,7}	600 ^r	370	200 ^r	25 ^r	30
Korea, North ^{c,8}	230	270	100	110	110
Mongolia	245	142	39	20	13
Peru ⁹	366	456	502	571	439 ⁴
Portugal	846	982 ^r	823 ^r	799 ^r	819 ⁴
Russia ^c	3,400	3,000	2,300	2,800	3,500
Rwanda	920	670	450	390 ^r	620 ⁴
Spain	--	150 ^c	200 ^c	229 ^r	497 ⁴
Thailand ^c	477	617	600	600	600
Uganda	86 ⁴	50 ^c	9 ^r	55 ^r	10 ⁴
United States	NA	NA	NA	NA	NA
Total	53,600 ^r	62,000 ^r	60,500 ^r	67,700 ^r	73,100

^cEstimated. ^pPreliminary. ^rRevised. NA Not available. -- Zero.

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

²Table includes data available through May 1, 2012.

³Tungsten concentrates are thought to be produced in Mexico, Nigeria, Turkey, and Vietnam, and may be produced from tin-tungsten ores in Kyrgyzstan, but information is inadequate to make reliable estimates of production. Illegal tungsten (wolfram) mining in the Phuoc Trung Commune of the Bac Ai District, Ninh Thuan Province in Southern Vietnam reportedly was halted by the District People's Committee in April 2008.

⁴Reported figure.

⁵Includes tungsten content of tin-tungsten concentrate produced by state-owned mining enterprises under the Ministry of Mines.

⁶Based upon data published in the Yearbook of Nonferrous Metals Industry of China.

⁷Production estimated based on reported exports from Nord-Kivu and Sud-Kivu Provinces.

⁸Production estimated based on Chinese imports.

⁹Data based on production reported by Malaga Inc.