



2009 Minerals Yearbook

TUNGSTEN

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In 2009, one U.S. tungsten operation shipped ore concentrates. Most of the U.S. supply of tungsten raw materials comprised imports, tungsten-bearing scrap, releases from industry stocks, and sales of excess materials 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. In 2009, U.S. apparent consumption decreased as a result of the economic downturn that began in late 2008. Salient U.S. tungsten statistics and world tungsten concentrate production for 2009 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 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. Tungsten alloy and pure tungsten metal contacts, electrodes, and wires are used in electrical, electronic, heating, lighting, and welding applications. Tungsten is also used to make 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 alloys and composites are used as a substitute for lead in bullets, shot, and other products. Tungsten chemicals are used to make catalysts, corrosion-resistant coatings, dyes and pigments, fire-resistant compounds, lubricants, phosphors, and semiconductors.

Legislation and Government Programs

The Defense National Stockpile Center (DNSC), U.S. Department of Defense (DOD), had two sales formats for NDS tungsten materials—negotiated sales and a strategic supply alliance (SSA). Under the SSA format, prequalified purchasers could submit bids for tungsten ores and concentrates via the DNSC Web site at any time, 24 hours per day and 7 days per week. During fiscal year 2009 (October 1, 2008, through September 30, 2009), 262 metric tons (t) of contained tungsten was sold. At the end of the fiscal year, 11 t of tungsten metal

powder had been sold but not shipped from the stockpile. During the calendar year, 773 t of tungsten was sold. The quantities of uncommitted tungsten materials remaining in the stockpile at the end of the calendar year are listed in tables 1 and 2 (U.S. Department of Defense, 2010, p. 8, 60).

The Annual Materials Plan (AMP) for fiscal year 2009, which represented the maximum quantities of tungsten materials that could be sold, is listed in table 2. The AMP for fiscal year 2010 (October 1, 2009, through September 30, 2010) was to remain unchanged for the tungsten materials remaining in the stockpile (U.S. Department of Defense, 2010, p. 6–7).

The DOD was directed by Congress to review its current policy for disposal of NDS material and determine whether the NDS was properly configured to assure future availability of materials for defense needs in light of current world market conditions. A DOD working group concluded that DNSC's current disposal policy required revision and that the NDS should be reconfigured into a Strategic Material Security Program to encompass the full range of responsibilities required to develop an integrated and comprehensive approach to strategic materials management. The working group supported DNSC's recommendation to temporarily suspend or limit the sale of 13 materials that had no viable substitutes and on which the United States was wholly or substantially import dependent or at a significant risk of supply disruption. Sales of tungsten materials were curtailed to hold a goal quantity equivalent to 1 year's AMP (U.S. Department of Defense, 2010, p. 1–2).

The U.S. Fish and Wildlife Service (FWS) granted final approval to a new class of tungsten shot products for hunting waterfowl and coots. Approval of the tungsten-iron-fluoropolymer products brought the number of FWS-approved tungsten-based shot products to 10. The other nine products were tungsten bronze, tungsten-iron, tungsten-iron-copper-nickel, tungsten matrix (a tungsten-polymer composite), tungsten-nickel-iron, tungsten polymer, tungsten-tin-bismuth, tungsten-tin-iron, and tungsten-tin-iron-nickel (U.S. Fish and Wildlife Service, 2009).

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 2009, Curtis Tungsten, Inc. (Upland, CA) produced and shipped concentrates from the Andrew Mine in California. EMC Metals Corp. (Vancouver, British Columbia, Canada) maintained its Springer complex in Pershing County, NV, on care-and-maintenance status pending a sustained improvement in tungsten prices. The complex comprised an underground scheelite

mine, a mill, and a processing plant designed to produce either ammonium paratungstate (APT) or calcium tungstate (also known as synthetic scheelite). During the year, EMC Metals continued metallurgical testwork to optimize its milling process. EMC Metals had all the permits it needed to complete construction and begin operations at Springer. The company planned to obtain financing to complete mine and mill rehabilitation, and estimated that operations could start within 6 to 8 months of a decision to proceed (EMC Metals Corp., 2010, p. 1–3).

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 2009 are listed in table 4.

In 2009, U.S. processors consumed less APT, scrap, and tungsten concentrates than they did in 2008. Domestic production of APT was lower than that of 2008. Total net production of tungsten metal powder and tungsten carbide powder decreased by 41% in 2009 compared with that of 2008 (table 3).

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 11,600 t in 2009, 16% lower than the 2008 apparent consumption of 13,800 t. Primary U.S. production was not included in the calculation to avoid disclosing company proprietary data. In 2009, net imports increased as a result of a significant decrease in exports. The increase in net imports was more than offset by decreases in scrap consumption and NDS shipments.

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 2009 was 39% lower than that of 2008. With the exception of manufacturers of chemical products, tungsten consumption by all industries (steelmakers, producers of cemented carbides, mill products, and superalloys and other alloys) was lower than that of 2008. Compared with consumption in 2008, U.S. end users consumed less ferrotungsten, tungsten carbide powder, tungsten metal powder, and tungsten scrap, but more tungsten chemicals.

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 that operated in the United States decreased during the first half of 2009, and then gradually increased during the second half of the year. In 2009, the average of weekly reports of operating rigs in the United States was 1,089, 42% lower than the average of 1,879 operating rigs in 2008 (Baker Hughes Inc., undated).

In 2009, total consumption of tungsten scrap by U.S. processors and consumers was 3,550 t of contained tungsten, which was 26% less than the 4,790 t consumed in 2008.

Prices

APT is the most widely traded primary tungsten material, and as a result, its price has become a reference price for such upstream materials as tungsten ore concentrates and such downstream materials as tungsten metal powder and tungsten carbide powder. Annual average APT prices decreased from those of 2008 (table 1). The U.S. APT price reported by Platts Metals Week decreased twice during the year and ranged from \$154 to \$182 per short ton unit (\$170 to \$201 per metric ton unit). U.S. APT prices reported by Metal Bulletin trended downward during the first 11 months of the year, then recovered slightly at yearend. They ranged between \$160 and \$255 per short ton unit (\$176 to \$281 per metric ton unit).

Annual average tungsten ore concentrate prices decreased from those of 2008 (table 1). The U.S. spot tungsten ore concentrate prices reported by Platts Metals Week were within the range of \$127 to \$163 per short ton unit (\$140 to \$180 per metric ton unit). Platts’ annual average ferrotungsten price decreased by 23% to \$28.08 per kilogram of contained tungsten in 2009 from \$36.60 per kilogram of contained tungsten in 2008. In 2009, the ferrotungsten price ranged between \$25.50 and \$30 per kilogram.

Foreign Trade

The total tungsten content of U.S. exports was 2,770 t, less than one-half of the 5,980 t exported in 2008. In 2009, the quantity of tungsten in every export category was lower than that of 2008 (tables 6–10).

The total tungsten content of U.S. imports was 10,000 t, 23% less than the 13,100 t imported in 2008. China, which continued to be the leading supplier of imported tungsten to the United States, provided 46% of all tungsten imports in 2009. In 2009, the total tungsten content of imports from China decreased by 19% to 4,580 t from 5,630 t in 2008. The distribution of materials imported from China was as follows: APT, 54%; tungsten carbide powder, 12%; unwrought tungsten, 10%; wrought tungsten, 8%; tungsten oxide, 7%; tungsten waste and scrap, 6%; tungsten metal powders, 3%; and ferrotungsten and other tungstates, minor amounts. Other significant suppliers of tungsten materials were as follows: Bolivia and Canada, which each supplied 9% of the total tungsten imports to the United States; Portugal, 8%; Germany, 6%; and Peru, 4%.

The tungsten contained in U.S. imports of ores and concentrates was 10% lower than that of 2008 (table 11). In 2009, the leading suppliers of U.S. imports of tungsten ores and concentrates were Bolivia (25%), Canada (24%), Portugal (21%), and Peru (12%).

U.S. imports of APT were slightly higher than those of 2008 (table 12). China continued to be the dominant supplier, providing 97% of U.S. APT imports. Imports of other tungsten materials are presented in tables 13–14.

In 2009, U.S. net import reliance for tungsten as a percentage of apparent consumption was 68%. 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. Because there was only limited U.S. mine production in 2009, about 68% of U.S. tungsten supply was from imports and stock releases, and 32% was from scrap materials generated in the United States.

World Review

Estimated world tungsten mine production decreased slightly in 2009 (table 15). In addition to mine production and tungsten recovered from scrap, tungsten materials from the NDS contributed to supply in 2009.

Australia.—Byproduct tungsten concentrates were produced at two mining operations. Tasmania Mines Ltd. (Sydney) produced a small amount of scheelite concentrate from its Kara open pit magnetite mine south of Burnie in Tasmania, and Straits Resources Ltd. (West Perth) produced a small amount of tungsten concentrate from its Hillgrove underground gold-antimony mine near Armidale, New South Wales. In August, Straits suspended production to investigate modifications needed to make the plant commercially viable (Straits Resources Ltd., 2010, p. 6).

Planet Metals Ltd. (formerly Queensland Ores Ltd., Brisbane) investigated options for preconcentrating run-of-mine ore at its Wolfram Camp project west of Cairns, Queensland. The open pit mine and mill were placed on care-and-maintenance status in November 2008 to conserve cash and address metallurgical issues. The operation had been expected to produce approximately 330 metric tons per year (t/yr) of tungsten in wolframite concentrate and 100 t/yr of molybdenum in molybdenite concentrate at full production (Planet Metals Ltd., 2010).

King Island Scheelite Ltd. (Sydney) and Hunan Nonferrous Metals Corp. Ltd. (Changsha, China) reevaluated their plan to redevelop the former King Island Scheelite Mine at Grassy, King Island, northwest of Tasmania. The 50-50 Dolphin Joint Venture (DJV) originally planned to redevelop the Dolphin open pit and process 600,000 t/yr of ore to produce scheelite concentrates containing approximately 2,400 t/yr of tungsten during a period of at least 10 years. DJV was considering a smaller open pit combined with an underground mine at Dolphin in conjunction with redeveloping a scheelite resource at Bold Head, and an alternate plan that did not include an open pit mine at Dolphin (King Island Scheelite Ltd., 2010).

Vital Metals Ltd. (Subiaco) almost finished a feasibility study on developing an open pit mine and beneficiation plant at the Watershed tungsten deposit northwest of Cairns, Queensland. In response to economic conditions, Vital reduced its activity at the project to monitoring and compiling environmental data. The company indicated that a 25% increase in the price of tungsten was needed for the project to be profitable (Vital Metals Ltd., 2009, p. 2–3; Carr, 2010, p. 15).

Thor Mining PLC (London, United Kingdom) investigated alternatives to reduce capital and operating costs for its Molyhil tungsten-molybdenum project. As initially proposed, the open pit mine and mill, to be constructed northeast of Alice Springs in the Northern Territory, was to produce an average of 975 t/yr of tungsten in scheelite concentrate and 390 t/yr of molybdenum in molybdenite concentrate during a 5.7-year life. In November, Thor decided to reduce activity on the project until molybdenum

and tungsten prices recovered to levels that would support project development (Thor Mining PLC, 2010).

Austria.—Sandvik AB (Sandviken, Sweden), a tool, material, and machinery manufacturer, purchased Wolfram Bergbau und Hütten AG (St. Martin). Wolfram's assets included the Mittersill scheelite mine and mill in the State of Salzburg and the Bergla tungsten processing plant and a tungsten recycling unit near St. Martin in the State of Steiermark (Sandvik AB, 2010, p. 9, 82).

Brazil.—Largo Resources Ltd. (Toronto, Ontario, Canada) signed option agreements to acquire tailings deposited intermittently since the 1940s by the Barra Verde and Boca de Laje tungsten-molybdenum mines west-southwest of Natal, Rio Grande do Norte State. Largo began the Currais Novos project, which would reprocess tailings to recover approximately 830 t/yr of tungsten and 300 t/yr of molybdenum (Largo Resources Ltd., 2010, p. 3, 13).

Canada.—In mid-October, in response to weak demand, low tungsten prices, and increasing inventories of tungsten concentrates and primary materials, North American Tungsten Corp. Ltd. (Vancouver) suspended operations at its Cantung Mine in the Northwest Territories and placed the mine on care-and-maintenance status. As a result, 2009 production of tungsten in scheelite concentrates decreased by 14% compared with that of 2008. North American Tungsten sold concentrates and APT and tungsten blue oxide converted from its concentrates under tolling arrangements. During the suspension, the company evaluated its mining methods, tested new mill processing technologies, and evaluated new capital equipment with the objective of enhancing productivity and reducing operating costs. North American Tungsten planned to restart operations after tungsten prices returned to profitable levels and it had secured offtake agreements for all of its concentrates (North American Tungsten Corp. Ltd., 2010a, p. 10; 2010c, p. 4, 12–13).

North American Tungsten completed the work required for an updated feasibility study on developing its Mactung scheelite deposit in the Yukon. The study indicated that 5,930 t/yr of tungsten in concentrate (748,000 metric ton units per year) could be produced during the first 5 years of production from an underground mine. Additional exploration by North American Tungsten defined an area of near-surface, lower grade ore that could be mined by open pit methods, and which would add 17 years of production to the original 11-year mine life. Construction of the underground mine and mill was expected to take 27 months (North American Tungsten Corp. Ltd., 2010c, p. 3).

During the first quarter of 2009, in response to a decline in tungsten demand, H.C. Starck GmbH (Goslar, Germany) announced that it planned to suspend the expansion of its tungsten plant in Sarnia, Ontario, until economic conditions improved. The company had requested approval from the Ontario Ministry of the Environment for a manufacturing facility with a capacity to produce 4,500 t/yr of metal powder, including tungsten metal, tungsten carbide, and cast tungsten carbide powders. By yearend, H.C. Starck reportedly was considering restarting the expansion (H.C. Starck GmbH, 2009a; Ontario Ministry of the Environment, 2009; The Observer, 2009).

China.—China's Government had a program to conserve its tungsten resources and to try to stabilize tungsten prices. 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 2009, the tungsten concentrate production quota was increased by 3% to 68,555 t (65% WO₃). Concentrates recovered from gangue were to be 12% of the quota, and the remaining production was to be distributed by province or autonomous region as follows: Jiangxi (47%), Hunan (21%), Yunnan (5%), Guangdong (4%), Fujian (3%), Gansu, Guangxi, and Inner Mongolia (2% each), Anhui (1%), Zhejiang (0.4%), and Qinghai (0.1%). Local entities, such as the Ganzhou City Government (Jiangxi Province) and the Ganzhou Tungsten Industry Association (GTIA), also regulated the production and marketing of tungsten, including GTIA's monthly recommended prices for tungsten concentrates. In 2009, the Chinese Government encouraged local governments to provide inexpensive financing in exchange for tungsten concentrates and products to help producers maintain cash flow and support tungsten prices (Zhang, 2007; Huang, 2008; Beijing Antaike Information Development Co., Ltd., 2009b; 2010b; Ganzhou Government Online, 2009; Huang, 2009; Metal Bulletin, 2009).

In the processing sector, the 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, the ability to secure reliable supplies of raw materials, the use of the company's own funds for 50% or more of the investment, and meeting environmental, energy, production, and safety standards (Beijing Antaike Information Development Co., Ltd., 2006; Fu, 2007; Zhang, 2007; Huang, 2008, 2009).

With respect to trade, the 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 2009 export quota for tungsten materials was reduced to 14,600 t of contained tungsten. To qualify for an export license, companies were required to have minimum production capacities and recycling rates. In response to the global economic downturn and reduced demand from overseas, in 2009, the Chinese Government decreased export taxes on tungstates and tungsten oxides (Ryan's Notes, 2007; Beijing Antaike Information Development Co., Ltd., 2009a; Huang, 2009).

In spite of its position as the world's leading miner of tungsten, China has imported tungsten concentrates in recent years. In 2009, China imported an estimated 4,700 t of tungsten in concentrates. Chinese companies were involved in tungsten mine projects in Australia and Rwanda. In addition, China planned to add tungsten to its strategic stockpile (Beijing Antaike Information Development Co., Ltd., 2009c; 2010a; Ryan's Notes, 2009a).

Germany.—H.C. Starck increased the production capacity at its Goslar plant for ammonium metatungstate and sodium tungstate, which are compounds used by the chemical industry to produce catalysts and other products. The company also expanded

its recycling of tungsten materials to include spent catalysts, production wastes, and other tungsten-containing materials from the chemical industry (H.C. Starck GmbH, 2009b).

Japan.—The Ministry of Economy, Trade and Industry (METI) planned to reduce Japan's dependence on China for its supply of tungsten raw materials. METI's strategy comprised providing assistance to develop new mine production in other countries, increasing recycling rates, promoting research to reduce consumption by increasing the life of tungsten products or developing substitutes, and making improvements to the stockpiling program. As part of the strategy, Japan Oil, Gas and Metals National Corp. (JOGMEC) reportedly held tenders to purchase APT and ferrotungsten for the national rare metals stockpile; results of the tenders were not released (Ryan's Notes, 2009b).

Korea, Republic of.—The Korean Government reportedly planned to invest in developing the country's rare metals production industry during a 9-year period and to secure a strategic stockpile of various metals, including tungsten, by 2015 (Asia Pulse Data Source, 2009).

Peru.—In the Ancash region, Malaga Inc. (Montreal, Quebec, Canada) produced tungsten concentrate from the Pasto Bueno mine and mill; the concentrate was sold to U.S. tungsten processor Global Tungsten & Powders Corp. (GTP) under an offtake agreement. Malaga planned to increase its mill capacity to 500 metric tons per day (t/day) of ore by mid-2010 and then to 600 t/day by yearend. The company continued exploration and development work for new sources of ore to support the increased production (Malaga Inc., 2010, p. 3, 6).

Portugal.—Sojitz Beralt Tin and Wolfram (Portugal) S.A. (Barroca Grande) produced wolframite concentrates from the Panasqueira Mine and beneficiation plant in central Portugal. Sojitz planned to increase production from the mine to 1,500 t/yr of tungsten by the fiscal year ending March 31, 2010 (Sojitz Corp., 2008, p. 19; 2009, p. 72).

Russia.—In recent years, tungsten concentrates had been produced by more than five companies in Russia. The companies, with the locations of their operations and listed in order of their share of 2008 Russian production, were as follows: JSC A&IR Mining, which produced concentrates from ores mined by Primorsky GOK in Primorskiy Kray; prospectors' cooperative Artel Quartz Ltd. and ZAO Novoorlovsky GOK, both in Zabaykal'sk Kray (formerly Chita Oblast); JSC Lermontovskaya GRK in Primorskiy Kray; Kalgutinskoe Rudoupravlenie Ltd. in Altai Kray; and various prospectors. Scheelite concentrates were produced from Primorskiy Kray, and wolframite concentrates were produced from other areas. In addition to tungsten concentrates, Russian processors consumed approximately 1,500 t/yr to 2,000 t/yr of tungsten scrap (Makulov, 2008; Gorbachev, 2009, p. 8).

In an October auction, KGUP Primteploenergo won the exploration and mining license to the Lermontov Mine in Primorskiy Kray. By yearend, the new owner reportedly had purchased new equipment and restarted production from the mine and beneficiation plant. Operations at Lermontov had been idled for about 1 year (Interfax Ltd., 2009; Itar-Tass News Agency, 2009).

In 2009, Wolfram Company CJSC stated that it was building a refractory metals plant in Unecha, Bryansk Oblast, and searching for strategic investors for the redevelopment of the Tyrnyauz tungsten-molybdenum mining complex in Kabardino-Balkaria Republic and the development of the Kholtoson and Inkurskoe deposits in Buryatiya Republic (Gorbachev, 2009, p. 17–18).

Rwanda.—Xiamen Tungsten Co., Ltd. (Xiamen, China) transported equipment to its tungsten mine site. The company was developing the resource to ensure a supply of raw materials for its production of tungsten products in China (Beijing Antaika Information Development Co., Ltd., 2009c).

Spain.—Heemskirk Consolidated Ltd. (Melbourne, Australia) worked to reconfigure its milling process to improve throughput and tungsten recovery from the Los Santos tungsten mine in the Castilla y Leon region. The company aimed to increase its annual output to between 90,000 metric ton units and 100,000 metric ton units (between 714 t/yr of tungsten and 793 t/yr of tungsten). All of the scheelite concentrate produced was committed to GTP under a 6-year offtake agreement (Heemskirk Consolidated Ltd., 2010a; b, p. 14).

United Kingdom.—Wolf Minerals Ltd. (Subiaco, Australia) studied the feasibility of redeveloping the Hemerdon Ball tungsten and tin project northeast of Plymouth in southwestern England. The open pit mine and milling operation was expected to produce approximately 360,000 metric ton units per year (2,850 t/yr of tungsten) in wolframite concentrate and 500 t/yr of tin in concentrate for 12 years. As part of an equity placement, Wolf Minerals signed a memorandum of understanding with Traxys Europe S.A. to market 100% of the tungsten concentrates and an offtake agreement for 100% of the tin concentrates from the project. Wolf Minerals planned to begin construction in 2010, mining in 2011, and concentrate production in 2012 (Wolf Minerals Ltd., 2009; 2010, p. 10, 13).

Vietnam.—Vietnam Youngsun Tungsten Industry Co., Ltd. produced ferrotungsten in Halong City, Quang Ninh Province. Most of the production was from scheelite and wolframite ores purchased from Thienke tungsten mine in Tuyen Quang Province and Philieng tungsten mine in Lam Dong Province. The ferrotungsten was produced for export to Europe, Japan, Republic of Korea, and the United States (Vietnam Youngsun Tungsten Industry Co., Ltd., 2009a, b).

Tiberon Minerals Ltd. (Toronto, Ontario, Canada) and its joint-venture partners sought funding to develop the Nui Phao project in Thai Nguyen Province. The project comprised an open pit mine and mill to produce an estimated 3,800 t/yr of tungsten in concentrate as well as copper and fluorspar concentrates and bismuth cement during an expected mine life of more than 16 years. The Government of Vietnam informed Tiberon that it would revoke its mining license if the mine was not brought into production by November 2010 (Dragon Capital Markets Ltd., 2010).

Outlook

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. Economic conditions improved during the latter half of 2009 and into 2010, and tungsten consumption increased (Garrity, 2010, p. 3, 12, 37; Greaves, 2010, p. 8, 15, 17; Nishino, 2010, p. 11–17, 21).

World tungsten supply will continue to be dominated by Chinese production and exports. The Chinese tungsten concentrate production quota for 2010 was increased by 17% to 80,000 t (65% WO₃). Export licenses for 2010 were limited to 14,300 t of all tungsten products, a decrease of 2% from the quota of 14,600 t in 2009. In mid-July 2010, the Chinese Government canceled export tax rebates for certain materials, including some tungsten products (Beijing Antaika Information Development Co., Ltd., 2009a, 2010b; Ryan's Notes, 2010).

By mid-2010, North American Tungsten's inventories of excess tungsten concentrates had been sold and the company planned to restart production from its Cantung Mine in Northwest Territories, Canada (North American Tungsten Corp. Ltd., 2010b).

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TABLE 1
 SALIENT TUNGSTEN STATISTICS¹

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

	2005	2006	2007	2008	2009
United States:					
Concentrates:					
Production	--	--	W	W	W
Consumption	W	W	W	W	W
Exports	52	130	109	496	38
Imports for consumption	2,080	2,290	3,880	3,990	3,590
Stocks, December 31:					
Consumer	W	W	W	W	W
U.S. Government ²	26,100	22,900	21,200	19,700	19,000
Price:					
U.S. spot quotation ³	146	200	189	184	151
European ⁴	123	166	165	164	150
Ammonium paratungstate:					
Production	W	W	W	W	W
Consumption ⁵	9,530	11,300	12,000	9,700	6,860
Stocks, December 31, producer and consumer	W	W	68	W	100
Price:					
U.S. free market ⁶	237	293	284	278	204
U.S. market ³	240	273	262	260	178
European free market ⁶	223	261	248	249	203
Primary products:					
Net production ⁷	7,810	8,050	8,360	8,950	5,300
Consumption ⁸	11,100	12,300	11,300	11,900	7,290
Stocks, December 31:					
Producer ⁹	800	827	825	707	682
Consumer ⁸	508	450	481	528	491
U.S. Government ²	282	266	235	183	171
World, production of concentrate	59,500	56,400 ^r	54,100	62,200 ^r	61,300 ^e

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

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

²Defense National Stockpile Center. Data through 2006 include material committed for sale pending shipment; data for 2007–09 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.

⁶Annual average calculated from annual average high and low prices reported by Metal Bulletin for 2005–06 and from semiweekly prices reported by Metal Bulletin for 2007–09.

⁷Includes only tungsten metal powder and tungsten carbide powder.

⁸Includes ammonium paratungstate and other tungsten chemicals, ferrotungsten, tungsten metal powder, tungsten carbide powder, and tungsten scrap.

⁹Data exclude cast and crystalline tungsten carbide powder and chemicals.

TABLE 2
U.S. GOVERNMENT NATIONAL DEFENSE STOCKPILE TUNGSTEN STATISTICS IN 2009^{1,2}

(Metric tons of 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	19,700	19,000	3,630	250	762	175	688
Tungsten metal powder	172	171	136	11	11	11	12
Total	19,800	19,200	3,760	261	773	187	700

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, 2009.

Source: Defense National Stockpile Center.

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

(Metric tons of tungsten content)

	Tungsten metal powder	Tungsten carbide powder	Total
Net production:			
2008	4,230	4,720	8,950
2009	2,880	2,420	5,300
Producer stocks:			
December 31, 2008	377	330	707
December 31, 2009	379	304	682

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 2009¹

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; formerly owned by Osram Sylvania Inc.

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 of tungsten content)

	2008	2009
Consumption by end use:		
Steels	283	244
Superalloys	W	399
Other alloys ⁴	W	W
Cemented carbides ⁵	6,650	4,070
Mill products made from metal powder	W	W
Chemical uses	80	84
Total	11,900	7,290
Consumption by form:		
Ferrotungsten	253	246
Tungsten metal powder	W	2,450
Tungsten carbide powder	6,750	3,980
Tungsten scrap ⁶	W	535
Other tungsten materials ⁷	80	84
Total	11,900	7,290
Consumer stocks, December 31:		
Ferrotungsten	16	16
Tungsten metal powder	26	27
Tungsten carbide powder	448	387
Tungsten scrap ⁶	29	48
Other tungsten materials ⁷	10	13
Total	528	491

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	2008			2009		
	Quantity		Value (thousands)	Quantity		Value (thousands)
	Gross weight (metric tons)	Tungsten content ² (metric tons)		Gross weight (metric tons)	Tungsten content ² (metric tons)	
Australia	(3)	(3)	\$13	(3)	(3)	\$10
Austria	(3)	(3)	3	--	--	--
Belgium	(3)	(3)	5	--	--	--
Brazil	--	--	--	2	1	38
Canada	--	--	--	(3)	(3)	4
China	288	149	4,770	14	7	219
Egypt	--	--	--	4	2	59
Georgia	(3)	(3)	5	--	--	--
Germany	664	343	9,570	1	(3)	15
Ireland	--	--	--	1	1	18
Israel	--	--	--	1	(3)	10
Italy	--	--	--	(3)	(3)	8
Japan	(3)	(3)	4	--	--	--
Korea, Republic of	--	--	--	(3)	(3)	6
Malaysia	2	1	25	8	4	168
Mexico	2	1	26	--	--	--
Singapore	1	(3)	12	--	--	--
Spain	--	--	--	18	9	176
United Kingdom	3	2	67	(3)	(3)	10
Vietnam	--	--	--	24	12	340
Total	961	496	14,500	73	38	1,080

-- 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	2008		2009	
	Quantity, tungsten content	Value (thousands)	Quantity, tungsten content	Value (thousands)
	(metric tons)		(metric tons)	
Austria	9	\$205	18	\$361
France	41	364	--	--
Germany	524	9,090	350	5,560
Hungary	--	--	2	28
India	6	50	1	10
Italy	5	44	2	14
Japan	(2)	3	--	--
Mexico	2	16	2	16
Spain	32	279	--	--
Taiwan	1	9	1	5
Total	621	10,100	375	5,990

-- 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	2008			2009		
	Quantity		Value (thousands)	Quantity		Value (thousands)
	Gross weight (metric tons)	Tungsten content ³ (metric tons)		Gross weight (metric tons)	Tungsten content ³ (metric tons)	
Australia	3	2	\$278	2	1	\$90
Austria	2	1	69	4	3	140
Belgium	4	3	153	--	--	--
Brazil	41	32	2,470	14	11	797
Canada	131	105	5,690	76	61	3,140
Chile	2	2	181	2	2	119
China	17	14	1,210	23	19	1,720
France	25	20	1,990	9	7	743
Germany	368	294	14,300	155	124	9,010
Hong Kong	1	1	64	1	1	31
India	6	4	384	13	10	739
Indonesia	1	(4)	36	2	1	81
Ireland	(4)	(4)	3	4	3	187
Israel	2	1	146	3	2	268
Italy	13	10	966	11	9	1,000
Japan	13	11	1,200	10	8	922
Korea, Republic of	3	3	262	5	4	403
Mexico	437	350	17,800	14	12	629
Netherlands	10	8	215	25	20	765
Peru	6	5	271	2	2	133
Russia	2	2	78	--	--	--
Singapore	46	37	2,590	18	14	1,610
South Africa	2	1	133	2	2	126
Spain	2	2	153	--	--	--
Switzerland	8	6	561	2	2	187
Taiwan	32	26	1,760	12	10	849
Turkey	4	3	357	2	2	129
United Arab Emirates	6	5	535	3	2	248
United Kingdom	27	22	2,470	15	12	969
Venezuela	4	3	219	1	1	71
Vietnam	--	--	--	18	14	260
Other	9	7	473 ^r	3	2	154
Total	1,230	981	57,100	450	360	25,500

^rRevised. -- Zero.

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	2008		2009	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Argentina	(2)	\$21	3	\$56
Australia	26	1,040	18	404
Austria	150	6,130	42	1,010
Belgium	17	814	2	234
Brazil	10	301	12	456
Canada	101	5,610	62	2,930
China	6	387	3	241
Cyprus	--	--	3	95
France	173	5,060	7	476
Germany	336	16,000	125	6,080
Hong Kong	4	143	2	181
India	17	612	4	142
Ireland	26	843	26	773
Israel	20	368	(2)	9
Italy	6	264	(2)	12
Japan	23	994	8	253
Korea, Republic of	4	241	3	160
Malaysia	1	66	6	212
Mexico	5	395	2	130
Norway	1	68	3	105
Poland	(2)	3	13	667
Singapore	5	363	9	380
South Africa	18	514	30	1,070
Switzerland	4	233	(2)	12
Taiwan	79	3,030	32	1,180
United Kingdom	236	7,670	38	1,280
Venezuela	56	1,310	7	402
Other	11 ^r	863 ^r	10	687
Total	1,340	53,300	469	19,600

^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	2008		2009	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Ferrotungsten and ferrosilicon tungsten:				
Canada	--	--	1	\$24
India	9	\$20	--	--
Mexico	2	107	1	26
United Kingdom	--	--	(2)	4
Total	10	127	1	55
Unwrought tungsten:^{3, 4, 5}				
Austria	8	34	14	121
Brazil	19	86	5	34
Canada	133	861	56	467
Chile	4	16	7	29
China	24	211	24	100
Czech Republic	--	--	17	70
France	--	--	38	162
Germany	75	321	16	73
Hong Kong	--	--	6	24
Hungary	16	76	18	85
India	12	52	--	--
Israel	5	100	1	3
Japan	16	68	(2)	12
Malaysia	5	22	5	22
Mexico	13	61	6	25
New Zealand	7	29	(2)	6
Philippines	5	110	8	36
Singapore	12	58	14	69
Taiwan	32	139	7	45
United Kingdom	29	123	27	113
Venezuela	6	23	--	--
Other	8 ^r	45 ^r	9	41
Total	429	2,430	277	1,530
Waste and scrap:⁴				
Afghanistan	8	34	--	--
Belgium	40	657	--	--
Canada	119	1,080	29	341
China	222	8,050	181	3,290
Finland	--	--	61	1,500
Germany	432	9,640	190	3,080
Hong Kong	32	557	--	--
India	131	1,040	32	703
Israel	--	--	6	82
Japan	164	3,960	19	159
Malaysia	33	280	212	1,790
Mexico	9	82	1	11
Netherlands	68	762	17	141
Philippines	--	--	5	41
Singapore	6	48	1	8

See footnotes at end of table.

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

Product and country of destination	2008		2009	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Waste and scrap—Continued: ⁴				
South Africa	1	\$20	6	\$71
Taiwan	--	--	31	558
United Arab Emirates	15	83	--	--
United Kingdom	369	3,420	181	1,570
Other	5 ^r	71 ^r	9	80
Total	1,650	29,800	981	13,400
Wrought tungsten: ^{3,4,6}				
Australia	9	1,510	6	1,170
Brazil	12	1,480	6	597
Canada	34	3,420	24	2,540
China	10	1,720	5	944
Colombia	3	481	2	369
Czech Republic	20	2,730	16	2,240
France	2	186	4	320
Germany	92	8,650	35	5,070
Hungary	6	1,130	3	579
India	2	244	3	260
Indonesia	3	372	3	797
Israel	9	2,470	(2)	35
Italy	7	1,810	2	451
Japan	55	10,400	25	5,640
Mexico	20	3,520	17	3,090
Netherlands	21	1,530	3	787
Spain	6	602	3	473
Sweden	4	1,340	7	1,860
United Kingdom	25	4,660	19	3,440
Other	16 ^r	2,410 ^r	17	2,380
Total	357	50,600	198	33,000
Tungsten compounds: ⁷				
Canada	23	82	25	84
Ireland	36	1,080	2	44
Mexico	33	41	21	18
Netherlands	1	15	19	329
Other	(2)	8	1	75
Total	92	1,230	67	551

^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	2008		2009	
	Quantity, tungsten content	Value	Quantity, tungsten content	Value
	(metric tons)	(thousands)	(metric tons)	(thousands)
Bolivia	1,100	\$24,800	891	\$16,800
Brazil	170	4,220	14	233
Canada	963	22,800	856	17,500
China	11	471	--	--
Guatemala	--	--	8	28
Kenya	13	281	20	356
Mexico	13	140	22	191
Mongolia	51	829	35	476
Peru	401	10,100	427	9,160
Portugal	836	23,100	756	18,100
Rwanda	113	2,190	216	3,470
Spain	147	4,000	196	4,250
Thailand	147	2,140	115	1,830
Uganda	30	790	12	245
United Kingdom	--	--	18	275
Total	3,990	95,900	3,590	72,900

-- Zero.

¹Data 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 COUNTRY¹

Country of origin	2008		2009	
	Quantity, tungsten content	Value	Quantity, tungsten content	Value
	(metric tons)	(thousands)	(metric tons)	(thousands)
China	2,430	\$64,300	2,470	\$51,000
Germany	81	2,470	47	1,020
United Kingdom	--	--	(2)	11
Vietnam	--	--	25	553
Total	2,510	66,700	2,540	52,600

-- 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	2008		2009	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
China	286	\$9,690	23	\$624
Hong Kong	15	568	--	--
Sweden	8	288	--	--
Vietnam	--	--	23	641
Total	309	10,500	46	1,260

-- Zero.

¹Data 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 COUNTRY¹

Product and country of origin	2008		2009	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Tungsten metal powders:²				
Canada	72	\$2,620	20	\$864
China	177	6,650	133	4,320
Czech Republic	14	575	(3)	19
Germany	318	14,100	255	9,720
Israel	371	16,100	211	9,140
Japan	24	1,180	27	1,220
Korea, Republic of	199	8,570	187	6,960
United Kingdom	(3)	10	2	55
Other	(3)	24 ^f	2	121
Total	1,180	49,800	837	32,400
Tungsten carbide powder:				
Austria	1	56	6	114
Belgium	2	212	5	304
Canada	306	12,500	26	1,250
China	796	29,500	536	16,500
Czech Republic	9	525	23	904
France	2	159	4	351
Germany	172	11,700	54	4,270
Hong Kong	28	1,160	8	183
India	7	333	3	85
Israel	96	3,960	43	1,680
Korea, Republic of	18	807	12	494
Sweden	168	6,110	32	1,130
Other	(3) ^f	35 ^f	1	77
Total	1,600	67,100	753	27,400

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	2008		2009	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Unwrought tungsten:^{2, 4, 5}				
China	517	\$17,500	475	\$12,000
Germany	13	1,220	3	229
Netherlands	19	644	--	--
Singapore	16	291	14	459
United Kingdom	7	142	(3)	38
Vietnam	10	314	--	--
Other	(3)	45 ^r	(3)	33
Total	581	20,200	492	12,800
Waste and scrap:				
Australia	16	311	--	--
Austria	(3)	19	69	937
Brazil	10	98	--	--
Canada	19	413	14	194
Chile	10	173	1	16
China	179	5,490	252	6,250
Czech Republic	21	231	4	84
Germany	382	7,520	215	3,110
Hong Kong	15	505	9	197
India	31	657	8	47
Israel	53	536	32	360
Japan	22	472	19	377
Korea, Republic of	85	1,160	65	609
Mexico	185	1,870	74	757
Pakistan	29	752	2	21
South Africa	14	216	(3)	5
Sweden	36	823	40	541
Taiwan	--	--	7	40
Thailand	122	1,280	8	97
United Kingdom	19	451	56	937
Other	27 ^r	696 ^r	3	113
Total	1,270	23,700	879	14,700
Wrought tungsten:^{2, 4, 6}				
Austria	26	4,750	29	4,670
Belgium	7	1,090	7	967
China	539	27,600	364	15,500
Czech Republic	4	2,600	8	6,050
France	6	1,120	6	1,260
Germany	37	3,490	5	938
Hong Kong	25	1,280	4	308
Hungary	3	682	3	648
Israel	14	2,010	1	191
Japan	21	4,760	16	4,090
Netherlands	11	1,050	4	842
Russia	5	601	1	73
South Africa	21	665	3	81
Vietnam	--	--	5	119
Other	12 ^r	2,930 ^r	7	1,780
Total	731	54,700	462	37,500

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	2008		2009	
	Quantity, tungsten content (metric tons)	Value (thousands)	Quantity, tungsten content (metric tons)	Value (thousands)
Tungsten oxides:				
China	676	\$19,800	329	\$8,170
Germany	17	445	5	167
Hong Kong	16	569	--	--
Japan	26	904	12	403
Netherlands	--	--	14	324
Russia	66	1,890	16	342
Vietnam	--	--	5	85
Other	(3)	16	--	--
Total	801	23,600	380	9,490
Other tungstates:				
China	15	430	1	30
India	36	1,050	4	112
Ireland	3	17	5	23
Italy	--	--	2	17
Japan	(3)	3	4	38
Other	(3)	82 ^r	1	135
Total	55	1,590	17	356
Other tungsten compounds:⁷				
Germany	8	180	3	159
Japan	4	943	1	392
Total	12	1,120	5	550

^rRevised. -- Zero.

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

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	2005	2006	2007	2008	2009 ^c
Australia	7	15	7	28	33
Austria	1,280	1,153	1,117	1,122	900
Bolivia	531	868	1,107	1,148	1,023 ⁴
Brazil	577	525	537	408 ^r	500
Burma ⁵	168	197	183	136 ^r	87 ⁴
Burundi	94	238	144	194	190
Canada	384	1,983	2,305	2,277	1,964 ⁴
China ^{e,6}	51,200	45,000	41,000	50,000 ^r	51,000
Congo (Kinshasa) ^e	180	500	570	340	170
Korea, North ^{e,7}	650	930 ^r	230 ^r	270 ^r	100
Mongolia	78	182 ^r	245	142	39 ⁴
Peru	--	50	366	456	502 ⁴
Portugal	816	780	846	900 ^r	900
Russia ^e	2,800	2,800	3,300	3,000	2,500
Rwanda	318	820	1,534	975	499 ⁴
Spain ^e	--	--	--	150	260
Thailand ^e	345	303	477	617 ^r	600
Uganda	36	75	86 ^r	50 ^{r,e}	20
United States	--	--	W	W	W
Total	59,500	56,400 ^r	54,100	62,200 ^r	61,300

^cEstimated. ^rRevised. W Withheld to avoid disclosing company proprietary data. -- 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 22, 2010.

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 Chinese imports.