

## TUNGSTEN

(Data in metric tons of tungsten content unless otherwise noted)

**Domestic Production and Use:** The last reported U.S. production of tungsten concentrates was in 1994. In 2006, approximately nine companies in the United States processed tungsten concentrates, ammonium paratungstate, tungsten oxide, and/or scrap to make tungsten powder, tungsten carbide powder, and/or tungsten chemicals. Approximately 65 industrial consumers were surveyed on a monthly or annual basis. Data reported by these consumers indicate that more than one-half of the tungsten consumed in the United States was used in cemented carbide parts for cutting and wear-resistant materials primarily in the metalworking, mining, oil- and gas-drilling, and construction industries. The remaining tungsten was consumed to make tungsten heavy alloys for applications requiring high density; electrodes, filaments, wires, and other components for electrical, electronic, heating, lighting, and welding applications; steels, superalloys, and wear-resistant alloys; and chemicals for various applications. The estimated value of apparent consumption in 2006 was \$470 million.

<b>Salient Statistics—United States:</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006<sup>e</sup></b>
Production:					
Mine	—	—	—	—	—
Secondary	4,380	4,130	4,000	4,640	4,500
Imports for consumption:					
Concentrate	4,090	4,690	2,310	2,080	2,100
Other forms	6,510	7,620	8,240	9,070	10,200
Exports:					
Concentrate	94	20	43	52	190
Other forms	3,220	5,070	3,730	5,890	7,100
Government stockpile shipments:					
Concentrate	1,140	710	979	2,310	3,500
Other forms	177	182	80	404	16
Consumption:					
Reported, concentrate	W	W	W	W	W
Apparent, <sup>1</sup> all forms	11,900	10,100	12,600	11,600	13,200
Price, concentrate, dollars per mtu WO <sub>3</sub> , <sup>2</sup> average:					
U.S. spot market, Platts Metals Week	55	50	49	146	205
European market, Metal Bulletin	38	45	55	123	165
Stocks, industry, yearend:					
Concentrate	W	W	W	W	W
Other forms	1,610	1,820	1,780	2,300	2,100
Net import reliance <sup>3</sup> as a percentage of apparent consumption	69	63	73	68	66

**Recycling:** In 2006, the tungsten contained in scrap consumed by processors and end users represented approximately 34% of apparent consumption of tungsten in all forms.

**Import Sources (2002-05):** Tungsten contained in ores and concentrates, intermediate and primary products, wrought and unwrought tungsten, and waste and scrap: China, 42%; Canada, 21%; Germany, 8%; Portugal, 5%; and other, 24%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations<sup>4</sup></b>	<b>12-31-06</b>
Ore	2611.00.3000		Free. <sup>5</sup>
Concentrate	2611.00.6000		Free. <sup>5</sup>
Ferrotungsten	7202.80.0000		5.6% ad val.
Tungsten powders	8101.10.0000		7.0% ad val.
Ammonium tungstate	2841.80.0010		5.5% ad val.
Tungsten carbide	2849.90.3000		5.5% ad val.
Tungsten oxide	2825.90.3000		5.5% ad val.

**Depletion Allowance:** 22% (Domestic), 14% (Foreign).

**Government Stockpile:** Sales of National Defense Stockpile tungsten began in 1999. Included in the data listed in the following table, as of September 30, 2006, are 4,690 tons of tungsten contained in uncommitted nonstockpile-grade ores and concentrates authorized for disposal.

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Material	Stockpile Status—9-30-06 <sup>6</sup>				
	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 2006	Disposals FY 2006
Ferrotungsten	—	—	—	7136	133
Metal powder	266	—	266	7136	—
Ores and concentrates	22,500	252	22,500	7,3630	3,630

**Events, Trends, and Issues:** World tungsten supply was dominated by Chinese production and exports. China's Government restricted the amounts of tungsten that could be produced and exported, continued to shift the balance of export quotas towards value-added downstream tungsten materials and products, eliminated export tax rebates on all tungsten materials, and imposed export duties on ferrotungsten and tungsten scrap. The growth in China's economy during the past decade has resulted in China becoming the world's largest tungsten consumer. Tungsten prices remained high as a result of inadequate supplies of tungsten concentrates within China combined with increased demand for tungsten materials in China and elsewhere. To meet its needs for tungsten raw materials, China imported higher amounts of tungsten concentrates and scrap.

The sole Canadian producer of tungsten concentrates signed a memorandum of understanding with a U.S. company to form a joint venture to build a processing plant in Minnesota that would use new technology to produce sodium tungstate, ammonium paratungstate, and tungsten metal powder. Tungsten concentrate production began in Peru, and various companies worked towards developing tungsten deposits or reopening inactive tungsten mines in Australia, Canada, China, Spain, Thailand, the United States, Uzbekistan, and Vietnam.

Health, safety, and environmental issues are becoming increasingly significant to the production and use of metals such as tungsten.

**World Mine Production, Reserves, and Reserve Base:** Reserves and reserve base estimates for Portugal were revised downward based on new information from that country.

	Mine production		Reserves <sup>8</sup>	Reserve base <sup>8</sup>
	2005	2006 <sup>e</sup>		
United States	—	—	140,000	200,000
Austria	1,350	1,350	10,000	15,000
Bolivia	520	530	53,000	100,000
Canada	700	2,500	260,000	490,000
China	61,000	62,000	1,800,000	4,200,000
Korea, North	600	600	NA	35,000
Portugal	820	900	2,600	7,500
Russia	4,400	4,500	250,000	420,000
Other countries	710	950	350,000	700,000
World total (rounded)	70,100	73,300	2,900,000	6,200,000

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**World Resources:** World tungsten resources are geographically widespread. China ranks number one in the world in terms of tungsten resources and reserves and has some of the largest deposits. Canada, Kazakhstan, Russia, and the United States also have significant tungsten resources.

**Substitutes:** Potential substitutes include cemented carbides based on molybdenum carbide and titanium carbide, ceramics, ceramic-metallic composites (cermets), diamond tools, and tool steels for cemented tungsten carbides; molybdenum for certain tungsten mill products; molybdenum steels for tungsten steels; lighting based on carbon nanotube filaments, induction technology, and light-emitting diodes (LEDs) for lighting based on tungsten electrodes or filaments; depleted uranium for tungsten alloys or unalloyed tungsten in weights and counterweights; and depleted uranium alloys for cemented tungsten carbides or tungsten alloys in armor-piercing projectiles. In some applications, substitution would result in increased cost or a loss in product performance.

<sup>6</sup>Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data. — Zero.

<sup>7</sup>The sum of U.S. secondary production, as estimated from scrap consumption, and net import reliance.

<sup>8</sup>A metric ton unit (mtu) of tungsten trioxide ( $WO_3$ ) contains 7.93 kilograms of tungsten.

<sup>9</sup>Defined as imports – exports + adjustments for Government and industry stock changes.

<sup>10</sup>Special tariff rates apply for Canada and Mexico. Tariffs for other countries for some items may be eliminated under special trade agreements.

<sup>11</sup>Special tariff rate effective on or before December 31, 2003, under number 9902.26.1100.

<sup>12</sup>See Appendix B for definitions.

<sup>13</sup>Actual quantity limited to remaining sales authority.

<sup>14</sup>See Appendix C for definitions.