

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 2003, approximately seven 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 70 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, oil- and gas-drilling, mining, and construction industries. The remaining tungsten was consumed in making heavy metal alloys; lamp filaments, electrodes, and other components for the electrical and electronics industries; steels, superalloys, and wear-resistant alloys; and chemicals for catalysts and pigments. The total estimated value of tungsten consumed in 2003 was \$170 million.

Salient Statistics—United States:	1999	2000	2001	2002	2003^e
Production:					
Mine	—	—	—	—	—
Secondary	4,980	5,210	5,390	4,380	4,300
Imports for consumption:					
Concentrate	2,870	2,370	2,680	4,090	4,900
Other forms	8,230	7,810	8,150	6,510	7,700
Exports:					
Concentrate	26	70	220	94	10
Other forms	2,860	2,800	4,860	3,220	5,000
Government stockpile shipments:					
Concentrate	(1)	1,240	2,200	1,140	600
Other forms	(1)	591	986	177	200
Consumption:					
Reported, concentrate	² 2,100	W	W	W	W
Apparent, all forms	12,900	14,400	14,500	11,900	11,700
Price, concentrate, dollars per mtu WO ₃ , ³ average:					
U.S. spot market, Platts Metals Week	47	47	64	55	50
European market, Metal Bulletin	40	45	65	38	45
Stocks, industry, yearend:					
Concentrate	W	W	W	W	W
Other forms	2,490	2,280	2,110	1,610	1,600
Net import reliance ⁴ as a percentage of apparent consumption	65	66	64	69	69

Recycling: During 2003, the tungsten content of scrap consumed by processors and end users was estimated at 4,300 tons. This represented approximately 37% of apparent consumption of tungsten in all forms.

Import Sources (1999-2002): Tungsten content of ores and concentrates, intermediate and primary products, wrought and unwrought tungsten, and waste and scrap: China, 49%; Russia, 11%; Canada, 10%; and other, 30%. In 2002, imports of tungsten materials from Russia decreased to 1%, and imports from Canada increased to 27% of total tungsten imports.

Tariff: Item	Number	Normal Trade Relations⁵ 12/31/03
Ore	2611.00.3000	Free.
Concentrate	9902.26.1100	Free.
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	6.0% ad val.
Tungsten oxide	2825.90.3000	5.5% ad val.

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

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Government Stockpile: Sales of National Defense Stockpile tungsten began in 1999. Included in the data listed in the table below, as of September 30, 2003, are 6,410 tons of tungsten contained in uncommitted nonstockpile-grade ores and concentrates authorized for disposal.

Material	Stockpile Status—9-30-03 ⁶				
	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 2003	Disposals FY 2003
Ferrotungsten	263	41	263	136	141
Metal powder	463	—	463	136	28
Ores and concentrates	28,700	728	28,700	1,810	1,370

Events, Trends, and Issues: World tungsten supply continued to be dominated by Chinese production and exports. Beginning in 1999 and continuing into 2003, the Chinese Government took several steps to control the release of Chinese tungsten into the world market. In addition to regulating production and the total volume of tungsten exports, the Government was gradually shifting the balance of export quotas towards value added downstream tungsten materials and products. China was also becoming a larger tungsten consumer. During the past decade, the growth in China's economy has resulted in a significant increase in consumption of tungsten materials to produce finished products for the domestic market, such as cemented carbide tools.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves ⁷	Reserve base ⁷
	2002	2003 ^e		
United States	—	—	140,000	200,000
Austria	1,400	1,400	10,000	15,000
Bolivia	500	450	53,000	100,000
Canada	2,550	3,000	260,000	490,000
China	49,500	49,500	1,800,000	4,200,000
Korea, North	600	600	NA	35,000
Portugal	700	700	25,000	25,000
Russia	3,400	3,400	250,000	420,000
Other countries	430	450	360,000	690,000
World total (rounded)	59,100	59,500	2,900,000	6,200,000

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: Cemented tungsten carbide remained a primary cutting-tool insert material because of its versatility in meeting technical requirements in many turning and milling operations. However, ceramics, ceramic-metallic composites, and other materials continued to be developed and utilized as substitutes to meet the changing needs of the world market. Increased quantities of carbide cutting-tool inserts were coated with alumina, diamond, titanium carbide, and/or titanium nitride to extend the life of the inserts. Tungsten remained the preferred and essentially unsubstitutable material for electrodes or filaments in incandescent, halogen, fluorescent, and gas discharge lighting applications. A nontungsten electrodeless lamp based on induction technology has been developed for commercial and industrial use. The use of light-emitting diodes (LEDs) in lighting applications is expected to increase. As LEDs substitute for traditional lighting technologies, the overall impact on tungsten consumption will depend on whether tungsten-copper heat sinks are used to dissipate heat from the LED devices.

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

¹Less than ½ unit.

²Excludes 6 months of withheld data.

³A metric ton unit (mtu) of tungsten trioxide (WO₃) contains 7.93 kilograms of tungsten.

⁴Defined as imports – exports + adjustments for Government and industry stock changes.

⁵Special tariff rates apply for Canada and Mexico.

⁶See Appendix B for definitions.

⁷See Appendix C for definitions.