

## TUNGSTEN

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

**Domestic Production and Use:** In 1998, little if any tungsten concentrate was produced from U.S. mines. Approximately 10 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. More than 70 industrial consumers were surveyed on a monthly or annual basis. Based on data reported by these consumers, approximately 75% of tungsten consumed in the United States went into making cemented carbide parts to be used as cutting and wear-resistant materials primarily in the metalworking, oil and gas drilling, mining, and construction industries. The remaining tungsten was consumed in making lamp filaments, electrodes, and other components for the electrical and electronics industries, 10%; other steels, superalloys, and wear-resistant alloys, 10%; tool steels, 4%; and chemicals for catalysts and pigments, 1%. The total estimated value of primary tungsten materials consumed in 1998 was \$300 million.

<b>Salient Statistics—United States:</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998<sup>e</sup></b>
Production, mine shipments	W	W	W	W	W
Imports for consumption, concentrate	2,960	4,660	4,190	4,850	4,800
Exports, concentrate	44	20	72	40	50
Government stockpile shipments, concentrate	—	—	—	—	—
Consumption: Reported, concentrate	13,630	5,890	5,260	6,590	5,300
Apparent, all forms	7,900	10,000	10,800	12,100	12,800
Price, concentrate, dollars per mtu WO <sub>3</sub> , <sup>2</sup> average:					
U.S. spot market, Platt's Metals Week	45	62	66	64	52
European market, Metal Bulletin	42	64	53	47	45
Stocks, producer and consumer, yearend concentrate	955	671	613	702	900
Employment, mine and mill, number	35	46	58	58	50
Net import reliance <sup>3</sup> as a percent of apparent consumption	95	90	89	84	78

**Recycling:** During 1998, the tungsten content of scrap consumed by processors and consumers was estimated at 3,500 tons. This represented approximately 27% of apparent consumption of tungsten in all forms.

**Import Sources (1994-97):** China, 33%; Russia, 24%; Germany, 6%; Bolivia, 5%; and other, 32%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations (NTR)<sup>4</sup></b>	<b>Non-NTR<sup>5</sup></b>
		<b>12/31/98</b>	<b>12/31/98</b>
Ore	2611.00.3000	Free	\$1.10/kg W cont.
Concentrate	2611.00.6000	37.5¢/kg W cont.	\$1.10/kg W cont.
Ferrotungsten	7202.80.0000	5.6% ad val.	35.0% ad val.
Tungsten powders	8101.10.0000	7.7% ad val.	58.0% ad val.
Ammonium tungstate	2841.80.0010	6.4% ad val.	49.5% ad val.
Tungsten carbide	2849.90.3000	8.5% ad val.	55.5% ad val.

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

**Government Stockpile:** In October, Congress passed and the President signed the Defense Authorization Act for fiscal year 1999. The act granted authority to dispose of all the tungsten materials in the National Defense Stockpile, but stated that disposals must not result in undue disruption of the usual markets of producers, processors, and consumers of the materials, or avoidable loss to the United States. The Annual Materials Plan for fiscal year 1999, which would specify the maximum quantity of each tungsten material that could be sold during the fiscal year, was being reviewed by the interagency Market Impact Committee in October and November. In addition to the data shown below, the stockpile contained the following quantities of nonstockpile-grade tungsten materials (tons of tungsten content): ores and concentrates, 7,010; ferrotungsten, 533; metal powder, 151; and carbide powder, 51.

<b>Material</b>	<b>Stockpile Status—9-30-98<sup>6</sup></b>				
	<b>Uncommitted inventory</b>	<b>Committed inventory</b>	<b>Authorized for disposal</b>	<b>Disposal plan FY 1998</b>	<b>Disposals FY 1998</b>
Carbide powder	871	—	—	—	—
Ferrotungsten	385	—	—	—	—
Metal powder	710	—	—	—	—
Ore and concentrate	27,600	—	—	—	—

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**Events, Trends, and Issues:** World demand for tungsten was very strong through mid-1998, but was expected to be weaker during the second half of the year. World consumption remained higher than world mine production, with the shortfall being met from releases of stockpiled tungsten materials from Russia, Kazakhstan, and Eastern Europe. Prices of tungsten concentrates and ammonium paratungstate continued to decrease in 1998 and were expected to result in a further decrease in mine production from market economy countries. China remained the dominant supplier of tungsten to world markets.

Late in the year, the U.S. Congress authorized the sale of tungsten materials from the National Defense Stockpile. Tungsten was last sold by the U.S. Government in 1989.

### World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves <sup>7</sup>	Reserve base <sup>7</sup>
	<u>1997</u>	<u>1998<sup>e</sup></u>		
United States	W	W	140,000	200,000
Australia	—	—	1,000	63,000
Austria	1,400	1,400	10,000	15,000
Bolivia	500	500	53,000	100,000
Brazil	170	150	20,000	20,000
Burma	280	280	15,000	34,000
Canada	—	—	260,000	490,000
China	25,000	25,500	870,000	1,200,000
France	—	—	20,000	20,000
Kazakhstan	200	200	NA	38,000
Korea, North	900	900	NA	35,000
Korea, Republic of	—	—	58,000	77,000
Portugal	1,936	900	25,000	25,000
Russia	3,000	3,000	250,000	420,000
Tajikistan	50	50	NA	23,000
Thailand	25	25	30,000	30,000
Turkmenistan	—	—	NA	10,000
Uzbekistan	250	250	NA	20,000
Other countries	<u>618</u>	<u>378</u>	<u>280,000</u>	<u>360,000</u>
World total (may be rounded)	33,400	33,500	2,000,000	3,200,000

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**World Resources:** More than 90% of the world's estimated tungsten resources are outside the United States. Nearly 40% of these resources are in China, 15% are in Canada, and 13% are in Russia.

**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 nitrides, oxides, and carbides to extend the life of the inserts. Tungsten remained the preferred and essentially unsubstitutable material for filaments, electrodes, and contacts in lamp and lighting applications. However, an electrodeless, nontungsten lamp is available for commercial and industrial use.

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

<sup>1</sup>Excludes 3 months of withheld data.

<sup>2</sup>A metric ton unit (mtu) of tungsten trioxide (WO<sub>3</sub>) contains 7.93 kilograms of tungsten.

<sup>3</sup>Defined as imports - exports + adjustments for Government and industry stock changes.

<sup>4</sup>Special tariff rates apply for Canada and Mexico.

<sup>5</sup>See Appendix B.

<sup>6</sup>See Appendix C for definitions.

<sup>7</sup>See Appendix D for definitions.