TUNGSTEN

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

Domestic Production and Use: A mine in California produced tungsten concentrates in 2009. Approximately eight 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. Nearly 60 industrial consumers were surveyed on a monthly or annual basis. Data reported by these consumers indicated 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 construction, metalworking, mining, and oil- and gas-drilling 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 2009 was $400 million.


Production:
- Mine — — W W W
- Secondary 4,670 4,490 4,330 4,790 4,000

Imports for consumption:
- Concentrate 2,080 2,290 3,880 3,990 3,800
- Other forms 9,070 9,700 9,050 9,060 6,300

Exports:
- Concentrate 52 130 109 496 16
- Other forms 5,890 6,310 5,950 5,480 2,600

Government stockpile shipments:
- Concentrate 2,310 3,120 1,740 1,470 250
- Other forms 404 16 31 51 11

Consumption:
- Reported, concentrate W W W W W
- Apparent, all forms 11,700 13,300 13,300 13,800 10,800

Price, concentrate, dollars per mtu WO3, average:
- U.S. spot market, Platts Metals Week 146 200 189 184 150
- European market, Metal Bulletin 123 166 165 164 150

Stocks, industry, yearend:
- Concentrate W W W W W
- Other forms 2,300 2,110 1,980 2,200 2,750

Net import reliance3 as a percentage of apparent consumption 68 67 68 60 63

Recycling: In 2009, the tungsten contained in scrap consumed by processors and end users represented approximately 37% of apparent consumption of tungsten in all forms.

Import Sources (2005-08): Tungsten contained in ores and concentrates, intermediate and primary products, wrought and unwrought tungsten, and waste and scrap: China, 43%; Germany, 10%; Canada, 9%; Bolivia, 7%; and other, 31%.

Tariff: Item Number Normal Trade Relations4 12-31-09
Ore 2611.00.3000 Free.
Concentrate 2611.00.6000 37.5¢/kg tungsten content.
Tungsten oxide 2825.90.3000 5.5% ad val.
Ammonium tungstate 2841.80.0010 5.5% ad val.
Tungsten carbide 2849.90.3000 5.5% ad val.
Ferrotungsten 7202.80.0000 5.6% ad val.
Tungsten powders 8101.10.0000 7.0% ad val.

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

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TUNGSTEN

Government Stockpile:

<table>
<thead>
<tr>
<th>Material</th>
<th>Uncommitted inventory</th>
<th>Authorized for disposal</th>
<th>Disposal plan FY 2009</th>
<th>Disposals FY 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal powder</td>
<td>172</td>
<td>172</td>
<td>136</td>
<td>11</td>
</tr>
<tr>
<td>Ores and concentrates</td>
<td>19,700</td>
<td>19,700</td>
<td>3,630</td>
<td>250</td>
</tr>
</tbody>
</table>

Events, Trends, and Issues: World tungsten supply was dominated by Chinese production and exports. China’s Government limited the number of exploration and mining licenses for tungsten, restricted the amounts of tungsten that could be produced and exported, imposed constraints on mining and processing tungsten ores, continued to shift the balance of export quotas to favor value-added downstream tungsten materials and products, and adjusted export taxes on tungsten materials. The growth in China’s economy during the past decade has resulted in China becoming the world’s largest tungsten consumer. To conserve its resources and meet increasing domestic demand, the Chinese Government was expected to continue to limit tungsten production and exports and to increase imports of tungsten. In addition, the Chinese tungsten industry was investing in mine development projects outside China and developing technologies to increase the use of tungsten scrap and the processing of underutilized ores.

In late 2008, in response to global economic conditions, Chinese tungsten mines in Hunan and Jiangxi Provinces reportedly suspended production. In 2009, to help domestic producers, the Chinese Government decreased export taxes on some tungsten materials and encouraged local governments to offer loans to producers in exchange for tungsten concentrates and products. The sole Canadian tungsten mine was placed on care-and-maintenance status in October. Economic conditions were expected to delay the startup of some proposed new tungsten mine production. In recent years, the tungsten industry has increased its monitoring of proposed legislation and scientific research regarding the impact of tungsten on human health and the environment.

World Mine Production and Reserves: Production for Canada was revised downward to represent tungsten content of concentrates. Reserves for Canada were revised based on company data; reserves for Portugal were revised based on Government data.

<table>
<thead>
<tr>
<th>Mine production</th>
<th>Reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>W</td>
</tr>
<tr>
<td>Austria</td>
<td>1,100</td>
</tr>
<tr>
<td>Bolivia</td>
<td>1,100</td>
</tr>
<tr>
<td>Canada</td>
<td>2,300</td>
</tr>
<tr>
<td>China</td>
<td>43,500</td>
</tr>
<tr>
<td>Portugal</td>
<td>850</td>
</tr>
<tr>
<td>Russia</td>
<td>3,000</td>
</tr>
<tr>
<td>Other countries</td>
<td>4,100</td>
</tr>
<tr>
<td>World total (rounded)</td>
<td>55,900</td>
</tr>
</tbody>
</table>

World Resources: World tungsten resources are geographically widespread. China ranks first 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 for cemented tungsten carbides include cemented carbides based on molybdenum carbide and titanium carbide, ceramics, ceramic-metallic composites (cermets), diamond tools, and tool steels. Potential substitutes for other applications are as follows: 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.

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*Estimated. W Withheld to avoid disclosing company proprietary data. — Zero.
1The sum of U.S. net import reliance and secondary production, as estimated from scrap consumption.
2A metric ton unit (mtu) of tungsten trioxide (WO₃) contains 7.93 kilograms of tungsten.
3Defined as imports – exports + adjustments for Government and industry stock changes.
4No tariff for Canada and Mexico. Tariffs for other countries for some items may be eliminated under special trade agreements.
5See Appendix B for definitions.
6See Appendix C for definitions. Reserve base estimates were discontinued in 2009; see Introduction.
7Excludes U.S. production.

U.S. Geological Survey, Mineral Commodity Summaries, January 2010