

**NIOBIUM (COLUMBIUM)**

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

**Domestic Production and Use:** Significant U.S. niobium mine production has not been reported since 1959. Domestic niobium resources are of low grade, some are mineralogically complex, and most are not commercially recoverable. Companies in the United States produced ferroniobium and niobium compounds, metal, and other alloys from imported niobium minerals, oxides, and ferroniobium. Niobium was consumed mostly in the form of ferroniobium by the steel industry and as niobium alloys and metal by the aerospace industry. Major end-use distribution of reported niobium consumption was as follows: steels, 78%; and superalloys, 22%. In 2007, the estimated value of niobium consumption was \$229 million and was expected to be about \$370 million in 2008, as measured by the value of imports.

<b>Salient Statistics—United States:</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008<sup>e</sup></b>
Production:					
Mine	—	—	—	—	—
Recycling	NA	NA	NA	NA	NA
Imports for consumption <sup>e, 1</sup>	6,910	7,610	10,500	10,120	10,500
Exports <sup>e, 1</sup>	276	337	561	1,100	600
Government stockpile releases <sup>e, 2</sup>	90	152	156	—	10
Consumption: <sup>e</sup>					
Apparent	6,730	7,430	10,100	9,020	9,910
Reported <sup>3</sup>	4,220	4,600	5,050	6,510	6,500
Price, ferroniobium, dollars per pound <sup>4</sup>	6.57	6.58	NA	NA	NA
Unit value, ferroniobium, dollars per metric ton <sup>5</sup>	13,355	13,197	14,022	21,918	14,000
Net import reliance <sup>6</sup> as a percentage of apparent consumption	100	100	100	100	100

**Recycling:** Niobium was recycled when niobium-bearing steels and superalloys were recycled; scrap recovery specifically for niobium content was negligible. The amount of niobium recycled is not available, but it may be as much as 20% of apparent consumption.

**Import Sources (2004-07):** Niobium contained in niobium and tantalum ore and concentrate; ferroniobium; and niobium metal and oxide: Brazil, 82%; Canada, 9%; Estonia, 2%; and other, 7%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations</b>
			<b>12-31-08</b>
	Synthetic tantalum-niobium concentrates	2615.90.3000	Free.
	Niobium ores and concentrates	2615.90.6030	Free.
	Niobium oxide	2825.90.1500	3.7% ad val.
	Ferroniobium:		
	Less than 0.02% of P or S, or less than 0.4% of Si	7202.93.4000	5.0% ad val.
	Other	7202.93.8000	5.0% ad val.
	Niobium, unwrought:		
	Waste and scrap <sup>7</sup>	8112.92.0600	Free.
	Alloys, metal, powders	8112.92.4000	4.9% ad val.
	Niobium, other <sup>7</sup>	8112.99.9000	4.0% ad val.

**Depletion Allowance:**<sup>8</sup> 22% (Domestic), 14% (Foreign).

**Government Stockpile:** For fiscal year (FY) 2008 (October 1, 2007, through September 30, 2008), the Defense National Stockpile Center (DNSC), Defense Logistics Agency, disposed of no niobium materials. The DNSC's niobium mineral concentrate inventory was exhausted in FY 2007; niobium carbide powder, in FY 2002; and ferroniobium, in FY 2001. The DNSC announced maximum disposal limits for FY 2009 of about 9 tons<sup>9</sup> of niobium metal ingots.

<b>Material</b>	<b>Stockpile Status—9-30-08<sup>8</sup></b>			
	<b>Uncommitted inventory</b>	<b>Authorized for disposal</b>	<b>Disposal plan FY 2008</b>	<b>Disposals FY 2008</b>
Niobium metal	10.1	10.1	<sup>9</sup>	—

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**Events, Trends, and Issues:** Niobium was imported principally in the form of ferroniobium and niobium unwrought metal, alloy, and powder. Niobium import dependence was expected to be the same as it was in 2007 when Brazil was the leading supplier of niobium. By weight, Brazil supplied 87% of niobium comprising 91% of ferroniobium, 87% of niobium metal, and 63% of niobium oxide. The leading suppliers of niobium in ore and concentrate were Australia (73%) and Canada (22%). Niobium apparent consumption is believed to have increased in 2008 compared with that of 2007. Capital market problems and the subsequent economic slowdown were expected to result in reduced niobium material consumption, price, and production.

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

	Mine production		Reserves <sup>10</sup>	Reserve base <sup>10</sup>
	<u>2007</u>	<u>2008<sup>e</sup></u>		
United States	—	—	—	NA
Australia	NA	NA	21,000	320,000
Brazil	57,300	57,000	2,600,000	2,600,000
Canada	3,020	3,000	62,000	92,000
Other countries	119	150	NA	NA
World total (rounded)	60,400	60,000	2,700,000	3,000,000

**World Resources:** World resources are more than adequate to supply projected needs. Most of the world's identified resources of niobium occur mainly as pyrochlore in carbonatite [igneous rocks that contain more than 50% by volume carbonate (CO<sub>3</sub>) minerals] deposits and are outside the United States. The United States has approximately 150,000 tons of niobium resources in identified deposits, all of which were considered uneconomic at 2008 prices for niobium.

**Substitutes:** The following materials can be substituted for niobium, but a performance or cost penalty may ensue: molybdenum and vanadium, as alloying elements in high-strength low-alloy steels; tantalum and titanium, as alloying elements in stainless and high-strength steels; and ceramics, molybdenum, tantalum, and tungsten in high-temperature applications.

<sup>e</sup>Estimated. NA Not available. — Zero.

<sup>1</sup>Imports and exports include the estimated niobium content of niobium and tantalum ores and concentrates, niobium oxide, ferroniobium, niobium unwrought alloys, metal, and powder.

<sup>2</sup>Government stockpile releases are the uncommitted inventory change as reported by the Defense National Stockpile Center.

<sup>3</sup>Includes ferroniobium and nickel niobium.

<sup>4</sup>Price is time-weighted (by week) average of trade journal reported ferroniobium price per pound of contained niobium, standard (steelmaking) grade. Ferroniobium price was discontinued in 2005; columbite price was discontinued in 2000; and pyrochlore price was discontinued in 1993.

<sup>5</sup>Unit value is mass-weighted average U.S. import value of ferroniobium assuming 65% niobium content. To convert dollars per metric ton to dollars per pound, divide by 2,205.

<sup>6</sup>Defined as imports – exports + adjustments for Government and industry stock changes.

<sup>7</sup>This category includes other than niobium-containing material.

<sup>8</sup>[See Appendix B for definitions.](#)

<sup>9</sup>Actual quantity limited to remaining sales authority; additional legislative authority is required.

<sup>10</sup>[See Appendix C for definitions.](#)