VANADIUM

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

<u>Domestic Production and Use</u>: Eight firms make up the U.S. vanadium industry. One of these firms processes ferrophosphorus slag generated at a mine in Idaho, while the others process material such as petroleum residues, spent catalysts, utility ash, and vanadium-bearing iron slag to produce ferrovanadium, vanadium pentoxide, vanadium metal, and vanadium-bearing chemicals or specialty alloys. Metallurgical use, primarily as an alloying agent for iron and steel, accounts for about 95% of the vanadium consumed domestically. Of the other uses for vanadium, the major nonmetallurgical use was in catalysts for the production of maleic anhydride and sulfuric acid. With regard to total domestic consumption, major end-use distribution was as follows: carbon steel 32%; high-strength low-alloy steel, 23%; full alloy steel, 21%; tool steel, 9%; and other, 15%.

Salient Statistics—United States:	<u> 1996</u>	<u> 1997</u>	<u> 1998</u>	<u> 1999</u>	2000 ^e
Production:					
Mine, mill	W	W	W	W	W
Petroleum residues, recovered basis	3,730	NA	NA	NA	NA
Imports for consumption:					
Ash, ore, residues, slag	2,270	2,950	2,400	1,650	2,000
Vanadium pentoxide, anhydride	485	711	847	208	800
Oxides and hydroxides, other	11	126	33		10
Aluminum-vanadium master alloys (gross weight)	2	11	298	1,210	50
Ferrovanadium	1,880	1,840	1,620	1,930	2,400
Exports:					
Vanadium pentoxide, anhydride	241	614	681	747	600
Oxides and hydroxides, other	2,670	385	232	70	100
Aluminum-vanadium master alloys (gross weight)	310	974	856	514	700
Ferrovanadium	479	446	579	213	100
Shipments from Government stockpile	201	260	_	_	_
Consumption: Reported	4,630	4,710	4,380	3,830	4,000
Price, average, dollars per pound V ₂ O ₅	3.19	3.90	5.47	1.99	2.00
Stocks, consumer, yearend	305	323	336	368	300
Employment, mine and mill, number	390	400	400	400	400
Net import reliance ¹ as a percent of					
reported consumption	31	94	78	80	100

Recycling: Some tool steel scrap was recycled primarily for its vanadium content, and vanadium was recycled from spent chemical process catalysts, but these two sources together accounted for only a very small percentage of total vanadium used.

<u>Import Sources (1996-99)</u>: Ferrovanadium: Canada, 43%; South Africa, 20%; China, 17%; Czech Republic, 8%; and other, 12%. Vanadium pentoxide: South Africa, 98%; and other, 2%.

Tariff: Ash, residues, slag, and waste and scrap enter duty-free.

Item	Number	Normal Trade Relations <u>12/31/00</u>
Vanadium pentoxide anhydride	2825.30.0010	10.8% ad val.
Vanadium oxides and hydroxides, other	2825.30.0050	10.8% ad val.
Vanadates	2841.90.1000	8.4% ad val.
Ferrovanadium	7202.92.0000	4.2% ad val.
Aluminum-vanadium master alloys	7601.20.9030	Free.

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

<u>Government Stockpile</u>: Disposal of the vanadium pentoxide held in the National Defense Stockpile was completed in 1997.

VANADIUM

Events, Trends, and Issues: Preliminary data indicate that U.S. vanadium consumption in 2000 increased 4% from that in 1999. Among the major uses for vanadium, carbon steel accounted for 31% of domestic consumption. Full alloy steel and high-strength low-alloy steel accounted for 23% and 26% of domestic consumption, respectively.

Both ferrovanadium and vanadium pentoxide prices remained low during 2000. Articles in various industry-related publications attributed the falling prices primarily to an increased supply of material.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves ²	Reserve base ²	
	<u>1999</u>	<u>2000</u> e			
United States	W	W	45,000	4,000,000	
China	16,000	16,000	2,000,000	3,000,000	
Russia	9,000	9,000	5,000,000	7,000,000	
South Africa	16,000	16,000	3,000,000	12,000,000	
Other countries	1,000	1,000	NA	1,000,000	
World total (may be rounded)	³ 42,800	³ 42,000	10,000,000	27,000,000	

<u>World Resources</u>: World resources of vanadium exceed 63 million tons. Vanadium occurs in deposits of titaniferous magnetite, phosphate rock, and uraniferous sandstone and siltstone, in which it constitutes less than 2% of the host rock. Significant amounts are also present in bauxite and carboniferous materials, such as crude oil, coal, oil shale, and tar sands. Because vanadium is usually recovered as a byproduct or coproduct, demonstrated world resources of the element are not fully indicative of available supplies. While domestic resources are adequate to supply current domestic needs, a substantial part of U.S. demand is currently met by foreign material because of price advantages.

<u>Substitutes</u>: Steels containing various combinations of other alloying elements can be substituted for steels containing vanadium. Metals, such as columbium, manganese, molybdenum, titanium, and tungsten, are to some degree interchangeable with vanadium as alloying elements in steel. Platinum and nickel can replace vanadium compounds as catalysts in some chemical processes. There is currently no acceptable substitute for vanadium in aerospace titanium alloys.

^eEstimated. NA Not available. W Withheld to avoid disclosing company proprietary data.

¹Defined as imports - exports + adjustments for Government and industry stock changes.

²See Appendix C for definitions.

³Excludes U.S. mine production.