

VANADIUM

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

Domestic Production and Use: The U.S. vanadium industry consisted of nine firms, but only eight had active operations. Raw materials included Idaho ferrophosphorus slag, petroleum residues, spent catalysts, utility ash, and vanadium-bearing iron slag. The chief use of vanadium was as an alloying agent for iron and steel. Vanadium was also important in the production of aerospace titanium alloys and as a catalyst for the production of maleic anhydride and sulfuric acid. Major end-use distribution was as follows: transportation, 32%; machinery and tools, 34%; building and heavy construction, 21%; and other, 13%.

Salient Statistics—United States:	1991	1992	1993	1994	1995^e
Production:					
Mine, recoverable basis	W	W	W	W	W
Mill, recovered basis ¹	W	W	W	W	W
Petroleum residues, recovered basis	2,250	1,350	2,870	2,740	2,500
Imports for consumption:					
Ores, slag, residues	882	838	1,450	1,900	1,500
Vanadium pentoxide, anhydride	133	206	70	294	150
Oxides and hydroxides, other	110	103	19	3	5
Aluminum-vanadium master alloys (gross weight)	73	50	19	38	50
Ferrovandium	420	592	1,630	1,910	1,200
Exports:					
Vanadium pentoxide, anhydride	700	26	126	335	450
Oxides and hydroxides, other	1,110	1,110	895	1,050	1,100
Aluminum-vanadium master alloys (gross weight)	141	60	866	1,030	700
Other compounds	816	2,020	989	—	—
Ferrovandium	94	213	219	374	350
Shipments from Government stockpile	—	—	—	—	—
Consumption: Reported					
Apparent	3,290	4,080	3,970	4,290	4,300
Price, average, dollars per pound V ₂ O ₅	2.85	2.28	1.45	2.95	2.80
Stocks, producer and consumer, yearend	935	1,080	900	1,110	1,000
Employment, mine and mill	490	430	430	400	430
Net import reliance ² as a percent of apparent consumption					
	W	W	W	W	W

Recycling: Some tool steel scrap was recycled primarily for its vanadium content. Vanadium was also recycled as a minor component of scrap iron and steel alloys, which were recycled principally for their iron content. An increasing amount of vanadium was also recycled from spent chemical process catalysts.

Import Sources (1991-94):³ Russia, 34%; South Africa, 29%; Canada, 20%; Mexico 12%; and other, 5%.

Tariff: Item	Number	Most favored nation (MFN) 12/31/95	Non-MFN⁴ 12/31/95
Slag	2619.00.9030	Free	Free.
Ash and residues	2620.50.0000	Free	Free.
Vanadium pentoxide anhydride	2825.30.0010	16.0% ad val.	40% ad val.
Vanadium oxides and hydroxides, other	2825.30.0050	16.0% ad val.	40% ad val.
Vanadates	2841.90.1000	11.2% ad val.	40% ad val.
Ferrovandium	7202.92.0000	4.2% ad val.	25% ad val.
Aluminum-vanadium master alloys	7601.20.9030	Free	10.5% ad val.
Waste and scrap	8112.40.3000	Free	Free.

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

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Government Stockpile:

	Stockpile Status—9-30-95			
Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposals Jan.-Sept. 95
Vanadium pentoxide	424	63	237	416

Events, Trends, and Issues: The U.S. International Trade Commission (ITC) determined on June 22, 1995, that ferrovanadium and nitrated vanadium imports from Russia caused injury to U.S. industry, and Russian exporters to the U.S. were subjected to antidumping deposits. The ITC voted 5 to 1 in the affirmative to find injury, concluding the antidumping investigation and putting in place the final antidumping margins set by the U.S. Department of Commerce. Deposit rates equal to those margins have been required since they were published in the Federal Register on May 26, 1995. They are as follows: Galt Alloys, Inc, 3.75%; Gesellschaft für Electrometallurgie mbH and its related companies, Shieldalloy Metallurgical Corp., and Metallurg, Inc., 11.72%; Odermet, Ltd., 10.10%; and Russia-wide, 108%.

Vanadium consumption in the United States for the first 6 months of 1995 increased by about 10% over consumption in the first 6 months of 1994. Consumption in the two largest end use categories, carbon and high-strength low-alloy steels, increased 6% and 13%, respectively, from consumption in the same period of 1994. Consumption in the full alloy sector was up 9% over last year's corresponding period, while consumption in the tool steel sector fell 16%. Consumption in the stainless and heat-resisting end use category, a small consuming sector, was up by about 20% in the first 6 months of the year over the same period in 1994.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves⁵	Reserve base⁵
	<u>1994</u>	<u>1995^e</u>		
United States	W	W	45,000	4,000,000
Australia	—	—	30,000	350,000
Brazil	—	—	—	24,000
China	5,000	5,500	2,000,000	3,000,000
Finland	—	—	—	100,000
Russia	10,000	10,500	5,000,000	7,000,000
South Africa	15,700	16,000	3,000,000	12,000,000
Other countries	3,200	3,500	—	1,000,000
World total (may be rounded)	⁶ 33,900	⁶ 35,000	10,000,000	27,000,000

World Resources: World resources of vanadium exceeded 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.

Substitutes: Steels containing various combinations of other alloying elements can be substituted for steels containing vanadium. Among various metals that are to some degree interchangeable with vanadium as alloying elements in steel are columbium, manganese, molybdenum, titanium, and tungsten. 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. W Withheld to avoid disclosing company proprietary data.

¹Produced from domestic materials.

²Defined as imports - exports + adjustments for Government and industry stock changes.

³The European Union, Canada, and Austria produced vanadium alloys and chemicals solely from imported raw materials.

⁴See Appendix B.

⁵See Appendix C for definitions.

⁶Excludes U.S. production.