

TITANIUM AND TITANIUM DIOXIDE¹

(Data in metric tons, unless otherwise noted)

Domestic Production and Use: Titanium sponge metal was produced by two firms with operations in Nevada and Oregon. Ingot was made by the two sponge producers and by nine other firms in seven States. About 30 companies produced titanium forgings, mill products, and castings. In 1996, an estimated 65% of the titanium metal used was in aerospace applications. The remaining 35% was used in the chemical process industry, power generation, marine, ordnance, medical, and other nonaerospace applications. The value of sponge metal consumed was about \$286 million, assuming an average selling price of \$4.50 per pound.

In 1996, titanium dioxide (TiO₂) pigment, valued at about \$2.6 billion, was produced by 5 companies at 11 plants in 9 States. In 1996, TiO₂ was used in paint, varnishes, and lacquers, 47%; paper, 25%; plastics, 18%; and other, 10%. Other uses of TiO₂ included catalysts, ceramics, coated fabrics and textiles, floor coverings, printing ink, and roofing granules.

| Salient Statistics—United States: | 1992 | 1993 | 1994 | 1995 | 1996^e |
|---|-------------|-------------|-------------|-------------|-------------------------|
| Titanium metal: | | | | | |
| Production, sponge | W | W | W | W | W |
| Imports for consumption, sponge | 684 | 2,160 | 6,470 | 7,560 | 8,970 |
| Exports, all metal forms | 8,020 | 7,890 | 9,660 | 10,800 | 12,100 |
| Shipments from Government stockpile excesses | — | — | — | — | — |
| Consumption of sponge metal, reported | 14,200 | 15,100 | 17,200 | 21,500 | 28,800 |
| Price, sponge, dollars per pound, yearend | 3.75 | 3.75 | 4.00 | 4.40 | 4.50 |
| Stocks, sponge, industry yearend ^e | 1,929 | 2,905 | 5,570 | 5,270 | 4,000 |
| Employment, reduction plants ^e , number | 350 | 350 | 300 | 300 | 300 |
| Net import reliance, ² sponge only, as a percent of apparent consumption | W | W | W | W | W |
| Titanium dioxide: | | | | | |
| Production | 1,140,000 | 1,160,000 | 1,250,000 | 1,250,000 | 1,230,000 |
| Imports for consumption | 169,000 | 172,000 | 176,000 | 183,000 | 165,000 |
| Exports | 270,000 | 290,000 | 352,000 | 342,000 | 275,000 |
| Consumption, apparent | 1,000,000 | 1,030,000 | 1,090,000 | 1,080,000 | 1,140,000 |
| Price, rutile, list, dollars per pound, yearend | 0.94 | 0.94 | 0.93 | 1.01 | 1.09 |
| Stocks, producer, yearend | 108,000 | 123,000 | 106,000 | 120,000 | 98,300 |
| Employment ^e , number | 4,500 | 4,600 | 4,600 | 4,600 | 4,600 |
| Net import reliance ² as a percent of apparent consumption | E | E | E | E | E |

Recycling: New scrap metal recycled by the titanium industry was about 25,000 tons in 1996. In addition, estimated use of titanium as scrap and in the form of ferrotitanium made from scrap by the steel industry was 4,700 tons; by the superalloy industry, 730 tons; and in other industries, 510 tons. Old scrap reclaimed was about 200 to 400 tons. Minor amounts of TiO₂ were recycled.

Import Sources (1992-95): Sponge metal: Russia, 72%; Japan, 16%; China, 6%; Ukraine, 2%; and other, 4%. Titanium dioxide pigment: Canada, 36%; Germany, 13%; France, 12%; United Kingdom, 11%; and other, 28%.

| Tariff: | Item | Number | Most favored nation (MFN) | Non-MFN³ |
|----------------|---------------------------|---------------|----------------------------------|----------------------------|
| | | | 12/31/96 | 12/31/96 |
| | Waste and scrap metal | 8108.10.1000 | Free | Free. |
| | Unwrought metal | 8108.10.5000 | 15.0% ad val. | 25.0% ad val. |
| | Wrought metal | 8108.90.6000 | 15.0% ad val. | 45.0% ad val. |
| | Titanium dioxide pigments | 3206.10.0000 | 6.0% ad val. | 30.0% ad val. |
| | Titanium oxides | 2823.00.0000 | 5.8% ad val. | 30.0% ad val. |

Depletion Allowance: Not applicable.

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Government Stockpile: In addition to the quantities shown below, the stockpile contained 9,860 tons of nonstockpile-grade sponge metal.

Stockpile Status—9-30-96

| Material | Uncommitted inventory | Committed inventory | Authorized for disposal | Disposals Jan.-Sept. 96 |
|-----------------------|--------------------------|------------------------|----------------------------|----------------------------|
| Titanium sponge metal | 23,600 | — | — | — |

Events, Trends, and Issues: In 1996, domestic production of titanium pigments was close to the record level achieved in 1995. Apparent domestic demand increased slightly while published prices increased moderately. Owing to depressed global demand, many pigment producers temporarily delayed the addition and expansion of capacity. However, several expansions were expected in 1997 and 1998 to meet expected increases in demand.

Demand for titanium metal products increased significantly in 1996. Increased demand was largely attributed to increased demand by the commercial aircraft market. However, demand by selected nonaerospace markets, particularly titanium golf clubs, experienced unexpectedly high growth. To meet increased demands, production of nearly all forms of titanium metal products increased significantly. Imports of titanium, primarily in the form of titanium sponge and waste and scrap, also increased significantly. The leading import sources were Russia, Japan, and the United Kingdom. At yearend, several producers were considering expanding their capability to produce titanium ingot.

World Sponge Metal Production and Sponge and Pigment Capacity:

| | Sponge production | | Capacity 1996 | |
|------------------------------|---------------------|-------------------------|---------------|----------------|
| | <u>1995</u> | <u>1996^e</u> | Sponge | Pigment |
| United States | W | W | 29,500 | 1,360,000 |
| Australia | — | — | — | 164,000 |
| Belgium | — | — | — | 80,000 |
| Canada | — | — | — | 91,000 |
| China ^e | 2,000 | 2,000 | 7,000 | 45,000 |
| Finland | — | — | — | 80,000 |
| France | — | — | — | 225,000 |
| Germany | — | — | — | 350,000 |
| Italy | — | — | — | 80,000 |
| Japan | 16,700 | 20,500 | 25,800 | 326,000 |
| Kazakstan ^e | 5,000 | 9,000 | 35,000 | 1,000 |
| Russia ^e | 16,000 | 21,000 | 35,000 | 20,000 |
| Spain | — | — | — | 65,000 |
| Ukraine ^e | — | — | — | 120,000 |
| United Kingdom ^e | — | — | — | 275,000 |
| Other countries | — | — | — | <u>585,000</u> |
| World total (may be rounded) | ⁴ 39,700 | ⁴ 52,500 | 130,000 | 3,900,000 |

World Resources: Resources of titanium minerals are discussed in the sections on ilmenite and rutile. Most titanium for domestic sponge production was obtained from rutile or rutile substitutes. The sources for pigment production were ilmenite, slag, and rutile.

Substitutes: There are few substitutes for titanium in aircraft and space use without some sacrifice of performance. For industrial uses, high-nickel steel, zirconium, and, to a limited extent, the superalloy metals may be substituted. There is no cost-effective substitute for TiO₂ pigment.

^eEstimated. E Net exporter. W Withheld to avoid disclosing company proprietary data.

¹See also Ilmenite and Rutile.

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

³See Appendix B.

⁴Excludes U.S. production.