## TITANIUM MINERAL CONCENTRATES<sup>1</sup>

(Data in thousand metric tons of contained TiO<sub>2</sub> unless otherwise noted)

**Domestic Production and Use:** Two firms produced ilmenite and rutile concentrates from surface-mining operations in Florida and Virginia. Based on reported data through October 2014, the estimated value of titanium mineral concentrates consumed in the United States in 2014 was \$835 million. Zircon was a coproduct of mining from ilmenite and rutile deposits. About 95% of titanium mineral concentrates was consumed by domestic titanium dioxide (TiO<sub>2</sub>) pigment producers. The remaining 5% was used in welding-rod coatings and for manufacturing carbides, chemicals, and metal.

Salient Statistics—United States:	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014<sup>e</sup></u>
Production <sup>2</sup> (rounded)	200	300	300	200	100
Imports for consumption	1,040	1,010	1,110	1,190	1,050
Exports, <sup>e</sup> all forms	11	16	24	7	2
Consumption, estimated	1,230	1,300	1,390	1,390	1,150
Price, dollars per metric ton:	_				
Ilmenite, bulk, minimum 54% TiO <sub>2</sub> , f.o.b. Australia	ຳ 75	195	300	265	165
Rutile, bulk, minimum 95% TiO <sub>2</sub> , f.o.b. Australia <sup>3</sup>	780	1,350	2,200	1,250	975
Slag, 80%–95% TiO <sub>2</sub> <sup>4</sup>	431–451	463–489	694–839	538–777	699–774
Employment, mine and mill, number <sup>e</sup>	178	195	195	195	236
Net import reliance <sup>5</sup> as a percentage of					
apparent consumption	65	77	78	86	91

## Recycling: None.

Import Sources (2010–13): South Africa, 40%; Australia, 21%; Canada, 18%; Mozambique, 4%; and others, 17%.

<u>Tariff</u> : Item	Number	Normal Trade Relations 12–31–13
Synthetic rutile	2614.00.3000	Free.
Ilmenite and ilmenite sand	2614.00.6020	Free.
Rutile concentrate	2614.00.6040	Free.
Titanium slag	2620.99.5000	Free.

Depletion Allowance: Ilmenite and rutile; 22% (Domestic), 14% (Foreign).

## Government Stockpile: None.

**Events, Trends, and Issues:** Consumption of titanium mineral concentrates is tied to production of TiO<sub>2</sub> pigments that are primarily used in paint, paper, and plastics. Domestic consumption of titanium mineral concentrates was estimated to have decreased by 8% in 2014 compared with that in 2013. Employment at domestic mining operations increased, however, due to development of a new heavy-mineral mine in Georgia.

Domestic production of titanium mineral concentrates continued at one operation near Starke, FL, and two near Stony Creek, VA. In May, a new heavy-mineral mine started up in Charlton County, GA, and a second mine in Brantley County, GA, was expected to begin production in the fourth quarter 2015. A mineral sands plant in Pierce County, GA, was being constructed to process the heavy minerals from the two new mines and was expected to be completed in the second quarter 2015. Mining at one of the two Virginia operations was halted in April, and the associated mineral separation plant operated at reduced capacity, in order to draw down existing inventories. The operator of the two mines in Virginia announced the decision to mine out deposits at both Virginia operations without further investment and was expected to compete mining and processing activities at these locations at the end of 2015.

Globally, three heavy-mineral concentrate prospects began production in 2014. In South Africa, the Tormin project began production of zircon and rutile concentrates in January and was expected to produce 48,000 tons per year of nonmagnetic concentrate grading 81% zircon and 11.6% rutile over a 4-year mine life. In Kenya, production of titanium mineral concentrates at the Kwale project began in February. Production of ilmenite and rutile was expected to be 360,000 tons per year and 80,000 tons per year, respectively, during a mine life of 13 years. In Senegal, production began at the Grande Cote in March 2014 with the first shipment of ilmenite made in August. At full production capacity the Grand Cote project was expected to produce about 575,000 tons per year of ilmenite during a mine life of more than 20 years. Heavy-mineral exploration and mining projects were also underway in Australia, Brazil, Madagascar, Mozambique, Tanzania, and Sri Lanka.

## **TITANIUM MINERAL CONCENTRATES**

<u>World Mine Production and Reserves</u>: Reserves for Australia were revised based on a Geoscience Australia publication.

	Mine pr <u>2013</u>	oduction <u>2014<sup>e</sup></u>	Reserves <sup>6</sup>
Ilmenite:	7	7	
United States <sup>2</sup>	<sup>′</sup> 200	<sup>′</sup> 100	2,000
Australia	960	1,100	170,000
Brazil	100	70	43,000
Canada°	770	900	31,000
China	1,020	1,000	200,000
India	340	340	85,000
Madagascar	264	340	40,000
Mozambique	430	500	14,000
Norway	498	400	37,000
South Africa <sup>8</sup>	1,190	1,100	63,000
Sri Lanka	32	32	NA
Ukraine	150	210	5,900
Vietnam	720	500	1,600
Other countries	60	90	26,000
World total (ilmenite, rounded)	6,730	6,680	720,000
Rutile:			
United States	( <sup>9</sup> )	( <sup>9</sup> )	( <sup>9</sup> )
Australia	423	480	28,000
India	24	26	7,400
Madagascar	8	7	NA
Malaysia	14	14	NA
Sierra Leone	81	120	NA
South Africa	59	65	8,300
Ukraine	50	50	2,500
Other countries	8	8	400
World total (rutile, rounded)	<sup>9</sup> 667	<sup>9</sup> 770	47,000
World total (ilmenite and rutile, rounded)	7,400	7,450	770,000

<u>World Resources</u>: Ilmenite accounts for about 92% of the world's consumption of titanium minerals. World resources of anatase, ilmenite, and rutile total more than 2 billion tons.

<u>Substitutes</u>: Ilmenite, leucoxene, rutile, slag, and synthetic rutile compete as feedstock sources for producing TiO<sub>2</sub> pigment, titanium metal, and welding-rod coatings.

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

<sup>1</sup>See also Titanium and Titanium Dioxide.

<sup>2</sup>Rounded to one significant digit to avoid disclosing company proprietary data.

<sup>3</sup>Source: Industrial Minerals; yearend average of high-low price.

<sup>4</sup>Landed duty-paid value based on U.S. imports for consumption. Data series revised to reflect annual average price range of significant importing countries.

<sup>5</sup>Defined as imports – exports.

<sup>6</sup>See <u>Appendix C</u> for resource/reserve definitions and information concerning data sources.

<sup>7</sup>Includes rutile.

<sup>8</sup>Mine production is primarily used to produce titaniferous slag.

<sup>9</sup>U.S. rutile production and reserves data are included with ilmenite.