

KYANITE AND RELATED MINERALS

(Data in thousand metric tons, unless otherwise noted)

Domestic Production and Use: One firm in Virginia with integrated mining and processing operations produced kyanite from hard-rock open pit mines. Another company produced synthetic mullite in Georgia. Of the kyanite-mullite output, 90% was estimated to have been used in refractories and 10% in other uses. Of the refractory usage, an estimated 60% to 65% was used in ironmaking and steelmaking and the remainder in the manufacture of chemicals, glass, nonferrous metals, and other materials.

Salient Statistics—United States:	1998	1999	2000	2001	2002^e
Production:					
Mine ^e	90	90	90	90	90
Synthetic mullite ^e	39	39	40	40	40
Imports for consumption (andalusite)	10	6	6	3	5
Exports ^e	35	35	35	35	35
Shipments from Government stockpile excesses	—	—	—	—	—
Consumption, apparent ^e	104	100	101	100	100
Price, average, dollars per metric ton:					
U.S. kyanite, raw	157	158	165	165	165
U.S. kyanite, calcined	267	268	279	279	279
Andalusite, Transvaal, South Africa, 57% ¹ Al ₂ O ₃	190	200	161	162	176
Andalusite, Transvaal, South Africa, 58% ² Al ₂ O ₃	230	225	189	210	206
Stocks, producer	NA	NA	NA	NA	NA
Employment, kyanite mine and plant, number ^e	150	150	150	150	150
Net import reliance ³ as a percentage of apparent consumption	E	E	E	E	E

Recycling: Insignificant.

Import Sources (1998-2001): South Africa, 100%.

Tariff:	Item	Number	Normal Trade Relations 12/31/02
	Andalusite, kyanite, and sillimanite	2508.50.0000	Free.
	Mullite	2508.60.0000	Free.

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

Government Stockpile:

Material	Stockpile Status—9-30-02⁴				
	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 2002	Disposals FY 2002
Kyanite, lump	0.1	—	0.1	—	—

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Events, Trends, and Issues: Consumption of kyanite and related minerals has decreased somewhat, partly because of an overall decline in refractory raw materials consumption. Higher performance refractory products are lasting longer. Consumption of refractories in steelmaking, the largest end-use market, has decreased in the last two decades from about 20 to 25 kilograms per ton of steel produced to 10 kilograms per ton.⁵

In South Africa, the market for andalusite also has experienced some decrease. Reasons for this include changes in slag types and temperatures in new metal making technology and the use of imported Chinese refractory products. Another example of changed refractory requirements was a steel plant in the Netherlands, where alumina spinel rather than andalusite bricks was used in steel ladles for the production of a certain type of steel. However, this was not seen to be an overall industry trend from andalusite to alumina spinel.⁵

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves and reserve base ⁶
	2001	2002 ^e	
United States	^e 90	90	Large in the United States. South Africa reports reserve base of about 51 million tons of aluminosilicates ore (andalusite and sillimanite).
France	65	65	
India	19	20	
South Africa	^e 170	170	
Other countries	<u>11</u>	<u>10</u>	
World total	355	355	

World Resources: Large resources of kyanite and related minerals are known to exist in the United States. The chief resources are in deposits of micaceous schist and gneiss mostly in the Appalachian Mountains area and in Idaho. Other resources are in aluminous gneiss in southern California. These resources are not economical to mine at present, but some may be eventually. The characteristics of kyanite resources in the rest of the world are thought to be similar to those in the United States.

Substitutes: Two types of synthetic mullite (fused and sintered), superduty fire clays, and high-alumina materials are substitutes for kyanite in refractories. Principal raw materials for synthetic mullite are bauxite, kaolin and other clays, and silica sand.

^eEstimated. E Net exporter. NA Not available. — Zero.

¹From 1998-99, 57.5% Al₂O₃.

²From 1998-99, 59.5% Al₂O₃.

³Defined as imports - exports + adjustments for Government and industry stock changes.

⁴See Appendix B for definitions.

⁵O'Driscoll, Mike, 2002, Irons in the fire: Industrial Minerals, no. 417, June, p. 45.

⁶See Appendix C for definitions.