

## QUARTZ CRYSTAL (INDUSTRIAL)

(Data in metric tons unless otherwise noted)

**Domestic Production and Use:** Cultured quartz crystal production capacity still exists in the United States but would require considerable refurbishment to be brought online. In the past several years, cultured quartz crystal was increasingly produced overseas, primarily in Asia. Electronic applications accounted for most industrial uses of quartz crystal; other uses included special optical applications. Lascas<sup>1</sup> mining and processing in Arkansas ended in 1997 and, in 2010, no U.S. firms reported the production of cultured quartz crystals.

Virtually all quartz crystal used for electronics was cultured rather than natural crystal. Electronic-grade quartz crystal was essential for making filters, frequency controls, and timers in electronic circuits employed for a wide range of products, such as communications equipment, computers, and many consumer goods, such as electronic games and television receivers.

**Salient Statistics—United States:** The U.S. Census Bureau, which is the primary Government source of U.S. trade data, does not provide specific import or export statistics on lascas. The U.S. Census Bureau collects export and import statistics on electronic and optical-grade quartz crystal; however, the quartz crystal export and import quantities and values reported in previous years included zirconia that was inadvertently reported to be quartz crystal. The price of as-grown quartz was estimated to be \$100 per kilogram in 2010. Lumbered quartz, which is as-grown quartz that has been processed by sawing and grinding, ranged in price from \$144 per kilogram to over \$900 per kilogram in 2010, depending on the application. Other salient statistics were not available.

**Recycling:** None.

**Import Sources (2006–09):** The United States is 100% import reliant on cultured quartz crystal. Although no definitive data exist listing import sources for cultured quartz crystal, imported material is thought to be mostly from China, Japan, and Russia.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations</b> <b>12-31-10</b>
	Sands:		
	95% or greater silica	2505.10.10.00	Free.
	Less than 95% silica	2505.10.50.00	Free.
	Quartz (including lascas)	2506.10.00.50	Free.
	Piezoelectric quartz	7104.10.00.00	3% ad val.

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

**Government Stockpile:** As of September 30, 2010, the Defense Logistics Agency, DLA Strategic Materials (formerly Defense National Stockpile Center) contained 7,134 kilograms of natural quartz crystal. The stockpile has 11 weight classes for natural quartz crystal that range from 0.2 kilogram to more than 10 kilograms. The stockpiled crystals, however, are primarily in the larger weight classes. The larger pieces are suitable as seed crystals, which are very thin crystals cut to exact dimensions, to produce cultured quartz crystal. In addition, many of the stockpiled crystals could be of interest to the specimen and gemstone industry. Little, if any, of the stockpiled material is likely to be used in the same applications as cultured quartz crystal. No natural quartz crystal was sold from the DLA Strategic Materials stockpile in 2010, and the Federal Government does not intend to dispose of or sell any of the remaining material. Previously, only individual crystals in the DLA Strategic Materials stockpile inventory that weighed 10 kilograms or more and could be used as seed material were sold.

### Stockpile Status—9-30-10<sup>2</sup>

<b>Material</b>	<b>Uncommitted inventory</b>	<b>Authorized for disposal</b>	<b>Disposal plan FY 2010</b>	<b>Disposals FY 2010</b>
Quartz crystal	7	( <sup>3</sup> )	—	—

## QUARTZ CRYSTAL (INDUSTRIAL)

**Events, Trends, and Issues:** Trends indicate that demand for quartz crystal devices will continue to increase, and consequently, quartz crystal production is expected to remain strong well into the future. Growth of the consumer electronics market (for products such as personal computers, electronic games, and cellular telephones) will continue to drive global production. The growing global electronics market may require additional production capacity worldwide.

**World Mine Production and Reserves:**<sup>4</sup> This information is unavailable, but the global reserves for lascas are thought to be large.

**World Resources:** Limited resources of natural quartz crystal suitable for direct electronic or optical use are available throughout the world. World dependence on these resources will continue to decline because of the increased acceptance of cultured quartz crystal as an alternative material; however, use of cultured quartz crystal will mean an increased dependence on lascas for growing cultured quartz.

**Substitutes:** Quartz crystal is the best material for frequency-control oscillators and frequency filters in electronic circuits. Other materials, such as aluminum orthophosphate (the very rare mineral berlinite), langasite, lithium niobate, and lithium tantalate, which have larger piezoelectric coupling constants, have been studied and used. The cost competitiveness of these materials as opposed to cultured quartz crystal is dependent on the type of application the material is used for and the processing required.

— Zero.

<sup>1</sup>Lascas is a nonelectronic-grade quartz used as a feedstock for growing cultured quartz crystal and for production of fused quartz.

<sup>2</sup>[See Appendix B for definitions.](#)

<sup>3</sup>Less than ½ unit.

<sup>4</sup>[See Appendix C for resource/reserve definitions and information concerning data sources.](#)