

## STRONTIUM

(Data in metric tons of strontium content<sup>1</sup> unless otherwise noted)

**Domestic Production and Use:** Although deposits of strontium minerals occur widely throughout the United States, strontium minerals have not been mined in the United States since 1959. Domestic production of strontium carbonate, the principal strontium compound, ceased in 2006. A few domestic companies produce small quantities of downstream strontium chemicals from imported strontium carbonate. Estimates for end uses of strontium compounds in the United States were pyrotechnics and signals, 30%; ceramic ferrite magnets, 30%; master alloys, 10%; pigments and fillers, 10%; electrolytic production of zinc, 10%; and other applications, including glass, 10%. It is thought that virtually all of the strontium minerals consumed in the United States since 2006 was used in drilling fluids for oil and natural gas wells.

<b>Salient Statistics—United States:</b>	<b><u>2010</u></b>	<b><u>2011</u></b>	<b><u>2012</u></b>	<b><u>2013</u></b>	<b><u>2014<sup>e</sup></u></b>
Production	—	—	—	—	—
Imports for consumption:					
Strontium minerals	2,370	7,320	8,660	21,900	25,000
Strontium compounds	8,640	10,000	8,150	7,190	7,700
Exports, compounds	72	18	71	37	84
Consumption, apparent, minerals and compounds	10,900	17,300	16,700	29,000	33,000
Price, average value of mineral imports at port of exportation, dollars per ton	45	46	50	50	50
Net import reliance <sup>2</sup> as a percentage of apparent consumption	100	100	100	100	100

**Recycling:** None.

**Import Sources (2010–13):** Strontium minerals: Mexico, 100%. Strontium compounds: Mexico, 83%; Germany, 11%; China, 5%; and other, 1%. Total imports: Mexico, 89%; Germany, 7%; China, 3%; and other, 1%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations</b>
			<b><u>12–31–14</u></b>
	Celestite	2530.90.8010	Free.
	Strontium metal	2805.19.1000	3.7% ad val.
	Compounds:		
	Strontium oxide, hydroxide, peroxide	2816.40.1000	4.2% ad val.
	Strontium nitrate	2834.29.2000	4.2% ad val.
	Strontium carbonate	2836.92.0000	4.2% ad val.

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

**Government Stockpile:** None.

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**Events, Trends, and Issues:** Imports of celestite, the most commonly used strontium mineral, have increased every year since 2010, with virtually all of the material coming from Mexico. Celestite is typically used as the raw material for the production of strontium compounds; however, these imports are thought to be used in drilling fluids for oil and natural gas exploration and production. As such, celestite is ground, but undergoes no chemical processing.

Consumption of strontium compounds was thought to be approximately equal in the production of ceramic ferrite magnets and pyrotechnics and signals. Strontium carbonate is sintered with iron oxide to produce permanent ceramic ferrite magnets. Strontium nitrate contributes a brilliant red color to fireworks and signal flares. Smaller quantities of strontium compounds were consumed in several other applications, including glass production, electrolytic production of zinc, master alloys, and pigments and fillers. Strontium may be ingested by humans as a dietary supplement, as an active ingredient in toothpastes, and as a pain reliever for some types of cancer. Although specific information is not available, these uses likely consume very small quantities of strontium compounds, but the compounds must be extremely pure, and thus are of high unit value.

With expected improvements to global economic conditions, consumption of strontium compounds is expected to increase. Little information is available about the potential for celestite consumption in drilling fluids, but if oil and gas drilling continues to increase, celestite consumption may increase as well.

In descending order of production, Spain, China, and Mexico are the world's leading producers of celestite. China also is a major importer of celestite.

### World Mine Production and Reserves:<sup>3</sup>

	Mine production		Reserves <sup>4</sup>
	2013	2014 <sup>e</sup>	
United States	—	—	—
Argentina	5,000	5,000	All other:
China	120,000	100,000	6,800,000
Mexico	40,000	45,000	
Morocco	2,500	2,500	
Spain	165,000	165,000	
World total (rounded)	333,000	318,000	6,800,000

**World Resources:** World resources of strontium are thought to exceed 1 billion tons.

**Substitutes:** Barium can be substituted for strontium in ferrite ceramic magnets; however, the resulting barium composite will have reduced maximum operating temperature when compared with that of strontium composites. Substituting for strontium in pyrotechnics is hindered by difficulty in obtaining the desired brilliance and visibility imparted by strontium and its compounds. In the drilling mud market, barite is the preferred material, but celestite may substitute for barite, especially when barite prices are high.

<sup>e</sup>Estimated. — Zero.

<sup>1</sup>The strontium content of celestite is 43.88%; this factor was used to convert units of celestite to strontium content.

<sup>2</sup>Defined as imports – exports.

<sup>3</sup>Gross weight of strontium minerals in metric tons.

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