STRONTIUM

(Data in metric tons, strontium content, unless otherwise specified)

Domestic Production and Use: Although deposits of strontium minerals occur widely throughout the United States, none have been mined since 1959. Large-scale domestic production of strontium carbonate, the principal strontium compound, ceased in 2006. Virtually all the strontium mineral celestite consumed in the United States since 2006 is estimated to have been used as an additive in drilling fluids for oil and natural-gas wells. A few domestic companies manufactured and (or) distributed small quantities of downstream strontium chemicals from imported strontium carbonate.

Based on import data, the estimated end-use distribution in the United States for strontium, including celestite and strontium compounds, was ceramic ferrite magnets, 29%; pyrotechnics and signals, 29%; drilling fluids, 23%; and other uses, including electrolytic production of zinc, master alloys, pigments and fillers, and other applications, including glass, 19%.

Salient Statistics—United States:	2019	2020	2021	2022	2023[e]
Production	—	—	—	—	—
Imports for consumption:					
Celestite[1]	7,960	1,060	106	7,200	1,100
Strontium compounds[2]	5,560	4,440	5,020	5,850	3,700
Exports, strontium compounds[3]	20	32	6	15	79
Consumption, apparent:[4]					
Celestite	7,960	1,060	106	7,200	1,100
Strontium compounds	5,540	4,410	5,010	5,840	3,600
Total	13,500	5,470	5,120	13,000	4,700
Price, average unit value of celestite imports at port of exportation, dollars per ton	82	90	210	114	79
Net import reliance[4] as a percentage of apparent consumption	100	100	100	100	100

Recycling: None.

Import Sources (2019–22): Celestite: Mexico, 100%. Strontium compounds: Germany, 50%; Mexico, 43%; China, 3%; and other, 4%. Total imports: Mexico, 68%; Germany, 28%; China, 2%; and other, 2%.

Tariff: Item	Number	Normal Trade Relations 12–31–23
Celestite	2530.90.8010	Free.
Strontium compounds:		
Strontium metal	2805.19.1000	3.7% ad valorem.
Strontium oxide, hydroxide, peroxide	2816.40.1000	4.2% ad valorem.
Strontium nitrate	2834.29.2000	4.2% ad valorem.
Strontium carbonate	2836.92.0000	4.2% ad valorem.

Depletion Allowance: 22% (domestic), 14% (foreign).

Government Stockpile: None.

Events, Trends, and Issues: Apparent consumption of total strontium decreased by 64% in 2023 compared with that in 2022. Apparent consumption of strontium compounds decreased by 38%, and apparent consumption of celestite decreased by 85%. The decrease in 2023 was likely the result of decreased drilling activity as well as decreased consumption of strontium compounds for various end uses, owing to economic considerations such as inflation and ongoing supply chain logistical issues. World celestite production in 2023 was estimated to have remained essentially unchanged from that in 2022.

The final 2022 U.S critical minerals list published in the Federal Register (87 FR 10381) did not include strontium as a critical mineral. The list is to be updated every 3 years and revised as necessary consistent with available data. The U.S. Department of Energy evaluated strontium for the 2023 final critical materials list, but strontium did not meet the threshold for criticality assessment and was considered a lower risk material. After similar evaluations, strontium was variously considered critical or not critical on minerals lists developed by several other countries and regions. In 2023, strontium was identified as a critical raw material by the European Union, and strontium was also included on the first critical minerals list released by India.

Prepared by **Ashley K. Hatfield [(703) 648–7751, ahatfield@usgs.gov]**

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Imports of celestite decreased by 85%, likely the result of decreased use of celestite in natural-gas- and oil-well-drilling fluids. The average active rig count[5] was essentially unchanged in the first 9 months in 2023 compared with that in the same period in 2022 but remained 28% lower than that in the same period in 2019 before the global coronavirus disease 2019 (COVID-19) pandemic in 2020. In recent years, nearly all celestite imports were from Mexico and were thought to be used as additives in drilling fluids for oil and natural gas exploration and production; however, barite is preferred over celestite for drilling mud. For these applications, celestite is ground but undergoes no chemical processing. A small quantity of high-value celestite imports were reported; these were most likely mineral specimens. Although strontium carbonate was not produced in the United States, in July, an Australia-based company announced its acquisition of an 80% interest in a strontium deposit in California and planned to undertake an exploration program for mineralization. Celestite is the raw material from which strontium carbonate and other strontium compounds are produced.

Strontium carbonate is the most traded strontium compound and is used as the raw material from which other strontium compounds are derived. Strontium carbonate is sintered with iron oxide to produce permanent ceramic ferrite magnets. Strontium nitrate, the second most traded strontium compound, contributes a brilliant red color to fireworks and signal flares. Smaller quantities of these and other strontium compounds and strontium metal were consumed in several other applications, including electrolytic production of zinc, glass production, master alloys, and pigments and fillers. Imports of strontium compounds were estimated to have decreased by 37% in 2023.

World Mine Production and Reserves:[6] Reserves for China and Iran were revised based on Government reports.

	Mine production[e]		Reserves[7]
	2022	2023	
United States	—	—	NA
Argentina	700	700	NA
China	80,000	80,000	12,000,000
Iran	200,000	200,000	7,100,000
Mexico	[8]33,800	35,000	NA
Spain	200,000	200,000	NA
World total (rounded)	514,000	520,000	Large

World Resources:[7] World resources of strontium may exceed 1 billion tons.

Substitutes: Barium can be substituted for strontium in ceramic ferrite magnets; however, the resulting barium composite will have a 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 drilling mud, barite is the preferred material, but celestite may substitute for some barite, especially when barite prices are high.

[e]Estimated. NA Not available. — Zero.

[1]The strontium content of celestite is 43.88%, assuming an ore grade of 92%, which was used to convert units of celestite to strontium content.

[2]Strontium compounds (with their respective strontium contents) include metal (100%); oxide, hydroxide, and peroxide (70%); carbonate (59.35%); and nitrate (41.40%). These factors were used to convert gross weight of strontium compounds to strontium content.

[3]Calculated from Schedule B number 2836.92.0000 for strontium carbonate. Other strontium compounds exports are not included because these shipments likely consisted of materials misclassified as strontium compounds.

[4]Defined as imports − exports.

[5]Source: Baker Hughes Co., 2023, Rig count overview & summary count: Baker Hughes Co., accessed October 20, 2023, at https://rigcount.bakerhughes.com/na-rig-count.

[6]Gross weight of celestite in metric tons.

[7]See Appendix C for resource and reserve definitions and information concerning data sources.

[8]As reported by the National Statistical and Geographic Information System (INEGI).