

Mineral Industry Surveys

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FLUORSPAR IN THE THIRD QUARTER 2023

Fluorspar imports in the third quarter of 2023 were 90,400 metric tons (t), 87,100 t of which were acid grade and 3,280 t of which were metallurgical grade (fig. 1, table 1). In terms of quantity, acid-grade imports decreased by 3% compared with those in the previous quarter and by 44% compared with imports in the third quarter of 2022. The leading sources of acid-grade imports were, in descending order of quantity, Mexico (64%), South Africa (19%), and China (17%). Imports of metallurgical-grade fluorspar decreased by 79% compared with those in the previous quarter and by 78% compared with imports in the third quarter of 2022. The leading sources of metallurgical-grade imports were Mexico (54%) and China (46%) (table 2).

In the third quarter of 2023, imports of other fluorine-containing materials produced directly from fluorspar were 19,200 t for hydrofluoric acid, 9,290 t for cryolite, and 5,430 t for aluminum fluoride (table 1). Mexico was the leading supplier of hydrofluoric acid, accounting for 85% of imports (table 3). Exports of acid- and metallurgical-grade fluorspar, aluminum fluoride, and cryolite were likely re-exports as there is no domestic production (table 1).

In the third quarter of 2023, the quarterly average unit value of acid-grade imports was \$457 per metric ton, an increase of 19% compared with the 2022 annual average unit value of \$383 per metric ton (table 2). The quarterly average unit value of acid-grade imports from Mexico was \$461 per metric ton, a 27% increase compared with the annual average unit value of \$362 per metric ton in 2022. The quarterly average unit value of acid-grade imports from South Africa was \$453 per metric ton, an increase of 31% compared with the annual average import value of \$347 per metric ton in 2022. The quarterly average unit value of acid-grade imports from China was \$443 per metric ton, a decrease of 13% compared with the 2022 annual average unit value of \$511 per metric ton.

The quarterly average unit value of metallurgical-grade imports was \$425 per metric ton, a 91% increase compared with the 2022 annual average unit value of \$223 per metric ton (table 2). The quarterly average unit value of metallurgical-grade imports from Mexico was \$161 per metric ton, a 48% increase compared with the annual average unit value of \$109

per metric ton in 2022. The quarterly average unit value of metallurgical-grade imports from China was \$738 per metric ton, a 29% increase compared with \$571 per metric ton in 2022.

Mining and Exploration News

In July, an article published in *Science* described a new methodology of producing fluorochemicals from fluorspar without the traditional intermediate production of hydrogen fluoride gas (Patel and others, 2023).

At the end of July, the U.S. Department of Energy released its 2023 Critical Materials Assessment. This updated assessment focused on key materials with a high risk of supply disruption that are integral to clean energy technologies. Fluorine, a key material used in lithium-ion batteries, was within the list of materials deemed near critical in the short and medium term (U.S. Department of Energy, 2023).

References Cited

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- U.S. Department of Energy, 2023, U.S. Department of Energy releases 2023 critical materials assessment to evaluate supply chain security for clean energy technologies: Washington, DC, U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy article, July 31. (Accessed February 27, 2024, at <https://www.energy.gov/eere/articles/us-department-energy-releases-2023-critical-materials-assessment-evaluate-supply>.)

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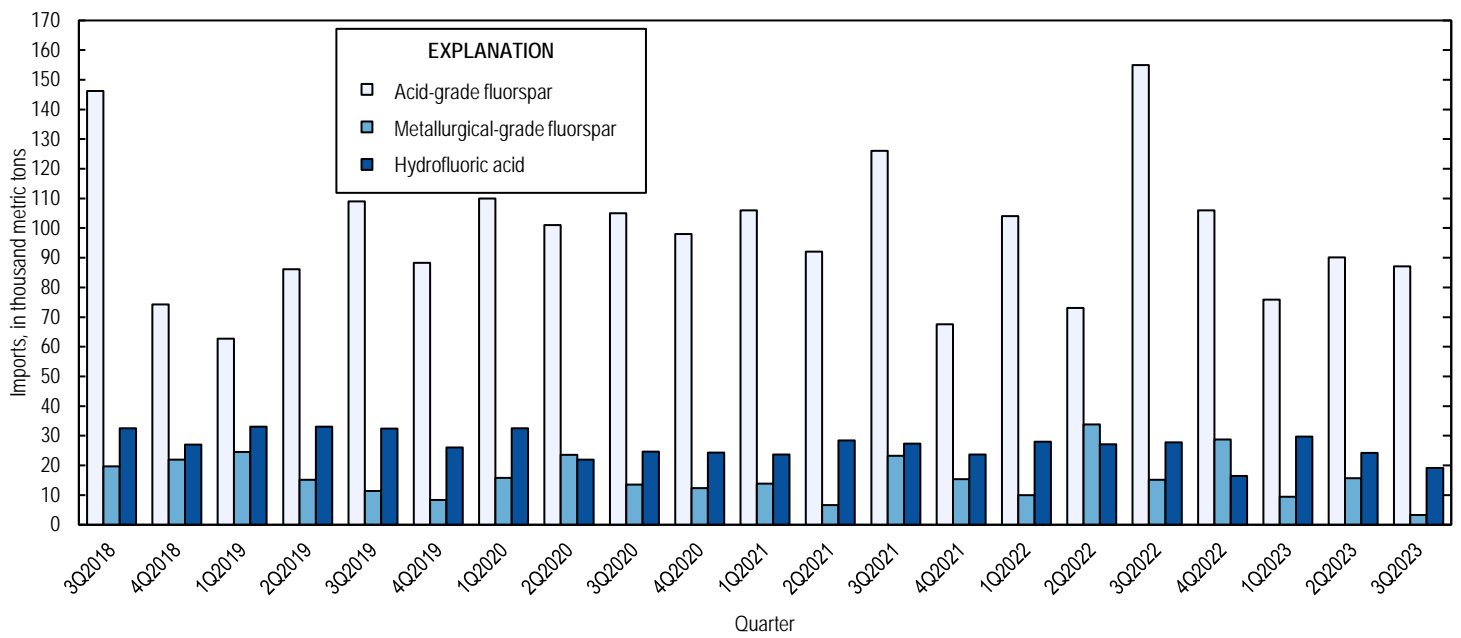


Figure 1. Acid-grade fluorspar, metallurgical-grade fluorspar, and hydrofluoric acid imports from the third quarter of 2018 through the third quarter of 2023. Source: U.S. Census Bureau and U.S. Geological Survey.

TABLE 1
SALIENT FLUORSPAR STATISTICS¹

(Metric tons)

	2022			2023		
	3d quarter	4th quarter	1st quarter– 4th quarter	1st quarter	2d quarter	3d quarter
Production, fluorspar	--	--	--	--	--	--
Imports for consumption: ²						
Fluorspar:						
Acid grade, more than 97% calcium fluoride	155,000	106,000	438,000	75,900	90,100	87,100
Metallurgical grade, less than 97% calcium fluoride	15,200	28,800	87,800	9,490	15,700	3,280
Total	170,000	135,000	526,000	85,400	106,000	90,400
Hydrofluoric acid	27,800	16,500	99,400	29,700	24,200	19,200
Aluminum fluoride	5,120	5,010	21,200	6,930	6,020	5,430
Cryolite	6,640	6,470	27,800	7,820	8,210	9,290
Exports: ²						
Fluorspar:						
Acid grade, more than 97% calcium fluoride	3,800	3,260	15,000	3,510	2,910	3,850
Metallurgical grade, less than 97% calcium fluoride	2,050	1,610	9,000	1,400	2,020	1,600
Total	5,850	4,880	24,000	4,910	4,930	5,440
Hydrofluoric acid	2,640	2,950	9,890	1,620	2,750	2,710
Aluminum fluoride	1	20	31	3	7	(4)
Cryolite	4,230	1,280	11,100	1,000	1,030	1,370
Apparent consumption, fluorspar: ³						
Acid grade, more than 97% calcium fluoride	151,000	102,000	423,000	72,300	87,200	83,200
Metallurgical grade, less than 97% calcium fluoride	13,200	27,200	78,800	8,100	13,700	1,680
Total	164,000	130,000	502,000	80,400	101,000	84,900

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Source: U.S. Census Bureau; may be adjusted by U.S. Geological Survey.

³Defined as imports minus exports

⁴Less than ½ unit.

TABLE 2
U.S. IMPORTS FOR CONSUMPTION OF FLUORSPAR, BY COUNTRY AND VALUE^{1, 2, 3}

	2022						2023					
	3d quarter		4th quarter		1st quarter–4th quarter		1st quarter		2d quarter		3d quarter	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Acid grade, more than 97% calcium fluoride:												
Canada	11	\$3	--	--	12	\$6	2	\$7	145	\$77	--	--
China	43,600	21,600	21,200	\$9,340	92,500	47,300	--	--	11,600	5,170	14,600	\$6,480
Germany	1	3	64	50	65	53	73	42	74	43	--	--
Hong Kong	142	88	--	--	276	160	--	--	--	--	--	--
India	--	--	--	--	--	--	--	--	--	--	2	9
Japan	249	131	--	--	4,460	1,070	26	17	--	--	235	122
Mexico	72,100	27,300	64,200	25,300	240,000	87,000	52,100	21,200	62,000	26,400	55,900	25,800
Mongolia	--	--	--	--	--	--	--	--	145	77	--	--
South Africa	16,000	5,770	--	--	34,200	11,900	--	--	16,100	7,190	16,300	7,390
Spain	43	42	--	--	43	42	--	--	--	--	--	--
United Kingdom	29	16	21	12	57	51	--	--	1	4	--	--
Vietnam	22,700	7,620 ^e	20,200	6,270 ^e	65,900	20,200 ^e	23,600	7,330 ^e	--	--	--	--
Total	155,000	62,600 ^e	106,000	40,900 ^e	438,000	168,000 ^e	75,900	28,600 ^e	90,100	39,000	87,100	39,800
Metallurgical grade, less than 97% calcium fluoride:												
Canada	8	5	--	--	8	5	--	--	43	16	--	--
China	3,020	1,870	8,120	4,480	12,900	7,370	4,460	2,630	5,530	3,700	1,500	1,110
Mexico	9,440	1,090	15,500	1,890	66,600	7,260	4,010	521	9,040	995	1,780	287
Mongolia	--	--	--	--	249	147	--	--	--	--	--	--
Pakistan	--	--	3,850	2,050	3,930	2,110	--	--	--	--	--	--
South Africa	2,730	1,820	1,330	838	4,070	2,650	1,020	702	1,130	893	--	--
United Kingdom	2	6	1	3 ^r	9	18	--	--	--	--	--	--
Total	15,200	4,790	28,800	9,260	87,800	19,600	9,490	3,860	15,700	5,610	3,280	1,390
Grand total	170,000	67,400 ^e	135,000	50,200 ^e	526,000	187,000 ^e	85,400	32,500 ^e	106,000	44,600	90,400	41,200

^eEstimated. ^rRevised. -- Zero.

¹Imports for consumption include imports of immediate entry and warehouse withdrawals.

²Data are rounded to no more than three significant digits; may not add to totals shown.

³Cost, insurance, and freight at U.S. ports.

Source: U.S. Census Bureau; may be adjusted by U.S. Geological Survey.

TABLE 3
U.S. IMPORTS FOR CONSUMPTION OF HYDROFLUORIC ACID^{1,2}

	2022						2023					
	3d quarter		4th quarter		1st quarter–4th quarter		1st quarter		2d quarter		3d quarter	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	(metric tons)	(thousands)	(metric tons)	(thousands)	(metric tons)	(thousands)	(metric tons)	(thousands)	(metric tons)	(thousands)	(metric tons)	(thousands)
Belgium	--	--	--	--	--	--	(3)	\$19	(3)	\$15	(3)	\$12
Canada	86	\$184	19	\$60	329	\$693	135	232	37	406	155	264
China	165	273	535	715	757	1,080	236	327	430	535	614	706
Germany	14	22	265	898	628	1,790	371	1,060	145	443	53	178
India	79	231	--	--	98	271	--	--	40	66	97	190
Japan	524	1,300	422	1,210	2,060	4,820	517	1,520	363	1,130	418	1,090
Korea, Republic of	898	1,450	493	1,300	2,140	4,330	154	390	216	548	200	489
Mexico	24,100	50,000	13,700	34,000	87,900	177,000	26,500	54,900	21,400	57,300	16,300	43,200
Singapore	128	516	97	426	422	1,690	32	133	145	558	97	372
Spain	724	1,780	425	820	1,870	4,220	651	1,270	616	1,230	443	741
Sweden	--	--	--	--	--	--	--	--	--	--	21	6
Taiwan	934	2,720	423	1,250	2,830	8,850	868	2,530	520	1,310	422	1,200
United Kingdom	229	313	151	237	380	549	265	378	294	472	308	559
Total	27,800	58,800	16,500	40,900	99,400	205,000	29,700	62,700	24,200	64,100	19,200	49,000

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Cost, insurance, and freight at U.S. ports.

³Less than ½ unit.

Source: U.S. Census Bureau.