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Mineral Industry Surveys

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FLUORSPAR IN THE FIRST QUARTER 2023

Fluorspar imports in the first quarter of 2023 were 85,400 metric tons (t), 77,200 t of which were acid grade and 8,170 t of which were metallurgical grade (fig. 1, table 1). In terms of quantity, acid-grade imports decreased by 26% compared with imports in the first quarter of 2022 and by 16% compared with those in the previous quarter. The leading sources of acid-grade imports were, in descending order of quantity, Mexico (68%) and Vietnam (31%). Imports of metallurgical-grade fluorspar decreased by 18% compared with imports in the fourth quarter of 2022 and by 72% compared with those in the previous quarter. The sources of metallurgical-grade imports were Mexico (49%), China (38%), and South Africa (13%) (table 2).

In the first quarter of 2023, imports of other fluorine-containing materials produced directly from fluorspar were 29,700 t for hydrofluoric acid, 7,820 t for cryolite, and 6,930 t for aluminum fluoride (table 1). Mexico was the leading supplier of hydrofluoric acid, accounting for 89% 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 first quarter of 2023, the quarterly average unit value of acid-grade imports was $379 per metric ton, essentially unchanged compared with the 2022 annual average unit value of $384 per metric ton (table 2). The quarterly average unit value of acid-grade imports from Mexico was $407, a 12% increase compared with the annual average unit value of $362 in 2022. The estimated value of acid-grade imports from Vietnam was $310 per metric ton, essentially unchanged compared with $307 in 2022.

The quarterly average unit value of metallurgical-grade imports was $373 per metric ton, a 67% 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 $130, a 19% increase compared with the annual average unit value of $109 in 2022. The quarterly average unit value of metallurgical-grade imports from China was $581 per metric ton, a slight increase

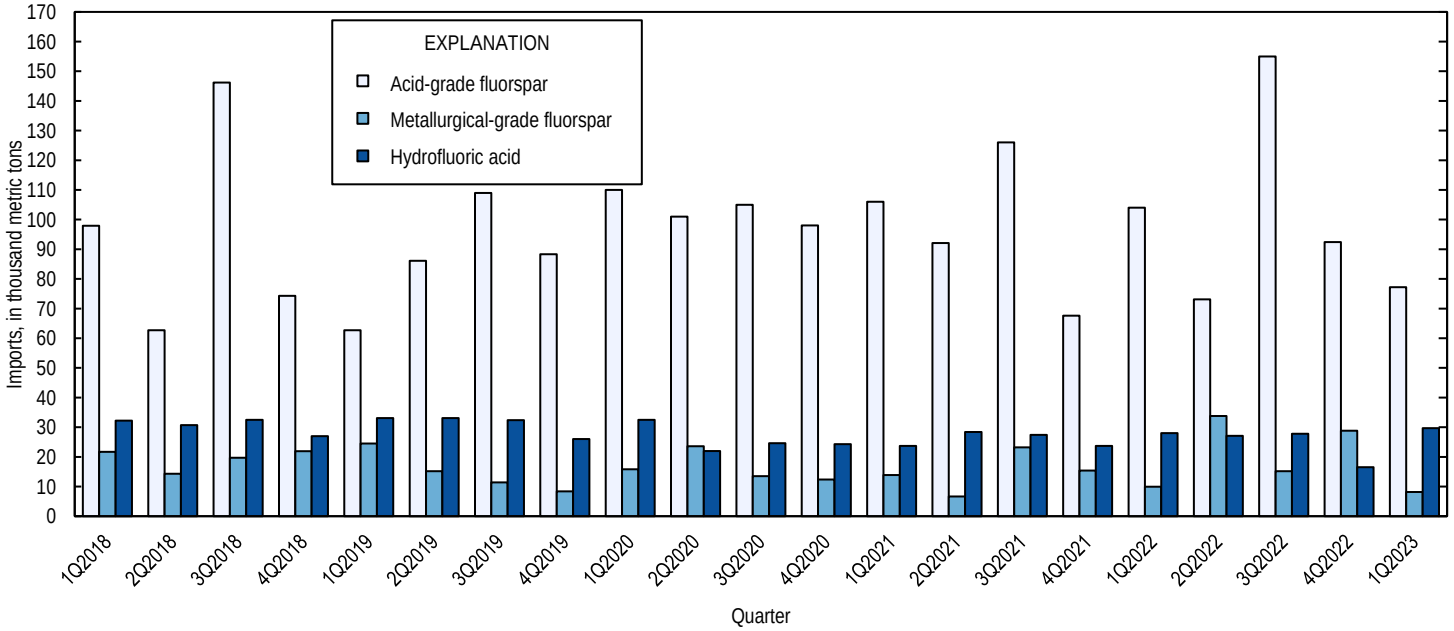

Figure 1. Acid-grade fluorspar, metallurgical-grade fluorspar, and hydrofluoric acid imports from the first quarter of 2018 through the first quarter of 2023. Source: U.S. Census Bureau and U.S. Geological Survey.

compared with $571 in 2022. The quarterly average unit value of metallurgical-grade imports from South Africa was $686 per metric ton, a 5% increase compared with $652 in 2022.

Legislation and Government Programs

In March, the U.S. Environmental Protection Agency announced proposed drinking water regulations for 6 per- and polyfluoroalkyl substances (PFAS) including hexafluoropropylene oxide dimer acid (HFPO-DA, commonly known as GenX™), perfluorobutane sulfonic acid (PFBS), perfluorohexane sulfonic acid (PFHxS), perfluorononanoic acid (PFNA), perfluorooctane sulfonic acid (PFOS), and perfluorooctanoic acid (PFOA). The proposed regulation would establish legally enforceable maximum contaminant levels (MCL's) for PFOA and PFOS at 4 parts per trillion per liter, the lowest level at which the substances can be reliably measured. The proposed regulation would also establish health-based, non-enforceable maximum contaminant level goals (MCLGs) for PFOA and PFOS as zero. HFPO-DA, PFBS, PFHxS, and PFNA would be regulated as a mixture, using a hazard index calculated according to methodology defined in the rule. The proposal would establish both the MCL and MCLG hazard indices as 1. Public water systems would be required to monitor and inform the public of PFAS levels, and to reduce PFAS levels that exceeded the proposed standards (U.S. Environmental Protection Agency, 2023).

The European Chemicals Agency released the details of a proposal to restrict the manufacture, use, and placing on the market of PFAS chemicals. The proposal broadly defined PFAS to encompass as many as 10,000 chemicals, specifically as any chemical that contained at least one fully fluorinated methyl (CF_3-) or methylene (-CF_2-) carbon atom without any bromine, chlorine, hydrogen, or iodine attached, unless the structural elements included methyl (-CH_3), methylene (-CH_2-), or an aromatic or carbonyl group. Although the proposal included a long list of temporary use exemptions, if enacted as written the proposal would still limit the use of many common fluorochemicals. For example, it would limit the use of polytetrafluoroethylene (PTFE) $(C_2F_4)_n$, the most commonly used fluoropolymer which accounts for up to 60% of global fluoropolymer capacity, and is typically used in diverse applications such as cookware coatings; lubricity materials used for mechanical joints; piping and fluid-handling components in the chemical, medical, petroleum, and semiconductor sectors; textile fibers for clothing, dental floss, and industrial/environmental applications, including laminates for clothing and industrial applications; and wire and cable insulation for electrical/electronic applications and aerospace (Roskill Information Services Ltd., 2020, p. 307–308; European Chemicals Agency, 2023, p. 1–4).

References Cited

European Chemicals Agency, 2023, Annex XV restriction report—Proposal for a restriction: Helsinki, Finland, European Chemicals Agency, 204 p. (Accessed June 28, 2023, at https://echa.europa.eu/documents/10162/f605d4b5-7c17-7414-8823-b49b9fd43aea.)

Roskill Information Services Ltd., 2020, Fluorspar—Outlook to 2029, 14th edition: London, United Kingdom, Roskill Information Services Ltd., 462 p.

U.S. Environmental Protection Agency, 2023, Per- and polyfluoroalkyl substances (PFAS)—Proposed PFAS national primary drinking water regulation: U.S. Environmental Protection Agency. (Accessed June 28, 2023, at https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas.)

TABLE 1
SALIENT FLUORSPAR STATISTICS[1]

(Metric tons)

	2022					
	1st quarter	2d quarter	3d quarter	4th quarter	1st quarter–4th quarter	2023 1st quarter
Production, fluorspar	--	--	--	--	--	--
Imports for consumption:[2]						
Fluorspar:						
Acid grade, more than 97% calcium fluoride	104,000	73,100	155,000	92,400	425,000	77,200
Metallurgical grade, less than 97% calcium fluoride	9,940	33,800	15,200	28,800	87,800	8,170
Total	114,000	107,000	170,000	121,000	512,000	85,400
Hydrofluoric acid	28,000	27,100	27,800	16,500	99,400	29,700
Aluminum fluoride	4,600	6,450	5,120	5,010	21,200	6,930
Cryolite	6,010	8,640	6,640	6,470	27,800	7,820
Exports:[2]						
Fluorspar:						
Acid grade, more than 97% calcium fluoride	2,250	5,650	3,800	3,260	15,000	3,510
Metallurgical grade, less than 97% calcium fluoride	2,420	2,920	2,050	1,610	9,000	1,400
Total	4,670	8,570	5,850	4,880	24,000	4,910
Hydrofluoric acid	2,310	2,000	2,530	2,950	9,790	1,620
Aluminum fluoride	1	10	1	20	31	3
Cryolite	2,980	2,560	4,230	1,280	11,000	1,000
Apparent consumption, fluorspar:[3]						
Acid grade, more than 97% calcium fluoride	102,000	67,500	151,000	89,100	410,000	73,700
Metallurgical grade, less than 97% calcium fluoride	7,520	30,900	13,200	27,200	78,800	6,770
Total	109,000	98,400	164,000	116,000	488,000	80,400

-- Zero.

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

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

[3]Imports minus exports.

TABLE 2

U.S. IMPORTS FOR CONSUMPTION OF FLUORSPAR, BY COUNTRY AND VALUE[1, 2, 3]

	2022										2023	
	1st quarter		2d quarter		3d quarter		4th quarter		1st quarter–4th quarter		1st 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	1	$3	--	--	11	$3	--	--	12	$6	2	$7
China	--	--	27,600	$16,300	43,600	$21,600	21,200	$9,340	92,500	47,300	1,330	658
Germany	--	--	--	--	1	3	64	50	65	53	73	42
Hong Kong	134	71	--	--	142	88	--	--	276	160	--	--
Japan	629	361	3,580	580	249	131	--	--	4,460	1,070	26	17
Mexico	62,300	19,200	42,000	15,200	72,100	27,300	50,800	20,400	227,000	82,100	52,100	21,200
South Africa	18,200	6,090	--	--	16,000	5,770	--	--	34,200	11,900	--	--
Spain	--	--	--	--	43	42	--	--	43	42	--	--
United Kingdom	3	9	4	14	29	16	21	12	57	51	--	--
Vietnam	23,000	6,310 e	--	--	22,700	7,620 e	20,200	6,270 e	65,900	20,200 e	23,600	7,330 e
Total	104,000	32,100 e	73,100	32,100	155,000	62,600 e	92,400	36,100 e	425,000	163,000 e	77,200	29,300 e
Metallurgical grade, less than 97% calcium fluoride:												
Canada	--	--	--	--	8	5	--	--	8	5	--	--
China	270	150	1,500	878	3,020	1,870	8,120	4,480	12,900	7,370	3,140	1,820
Mexico	9,580	1,110	32,100	3,160	9,440	1,090	15,500	1,890	66,600	7,260	4,010	521
Mongolia	--	--	249	147	--	--	--	--	249	147	--	--
Pakistan	83	57	--	--	--	--	3,850	2,050	3,930	2,110	--	--
South Africa	--	--	--	--	2,730	1,820	1,330	838	4,070	2,650	1,020	702
United Kingdom	5	4	1	5	2	6	1	4	9	18	--	--
Total	9,940	1,320	33,800	4,190	15,200	4,790	28,800	9,260	87,800	19,600	8,170	3,040
Grand total	114,000	33,400 e	107,000	36,300	170,000	67,400 e	121,000	45,400 e	512,000	182,000 e	85,400	32,300 e

eEstimated. -- Zero.

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

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

[3]Cost, 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	
	1st quarter		2d quarter		3d quarter		4th quarter		1st quarter–4th quarter		1st 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)
Belgium	--	--	--	--	--	--	--	--	--	--	(3)	$19
Canada	121	$230	104	$220	86	$184	19	$60	329	$693	135	232
China	56	96	--	--	165	273	535	715	757	1,080	236	327
Germany	111	282	238	590	14	22	265	898	628	1,790	371	1,060
India	--	--	18	40	79	231	--	--	98	271	--	--
Japan	393	854	724	1,460	524	1,300	422	1,210	2,060	4,820	517	1,520
Korea, Republic of	200	614	552	966	898	1,450	493	1,300	2,140	4,330	154	390
Mexico	26,100	47,900	24,100	45,000	24,100	50,000	13,700	34,000	87,900	177,000	26,500	54,900
Singapore	80	295	118	456	128	516	97	426	422	1,690	32	133
Spain	331	649	386	976	724	1,780	425	820	1,870	4,220	651	1,270
Taiwan	610	2,100	860	2,780	934	2,720	423	1,250	2,830	8,850	868	2,530
United Kingdom	--	--	--	--	229	313	151	237	380	549	265	378
Total	28,000	53,100	27,100	52,500	27,800	58,800	16,500	40,900	99,400	205,000	29,700	62,700

-- Zero.

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

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

[3]Less than ½ unit.

Source: U.S. Census Bureau.