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2019 Minerals Yearbook

POTASH [ADVANCE RELEASE]

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Potash

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In 2019, domestic potash production was 510,000 metric tons (t) of potassium oxide (K_2O) equivalent,[1] which was slightly lower than that in 2018 (table 1). Sales of potash were 480,000 t of K_2O in 2019, which was 8% lower than that in 2018. Apparent consumption decreased by 13% to 5.3 million metric tons (Mt) of K_2O in 2019 from 6.1 Mt of K_2O in 2018. In 2019, world potash production was 6% lower than that in 2018, at 41.3 Mt (tables 1, 5). The value of domestic sales of all potash compounds was the same as that in 2018. The average value, in terms of K_2O content, increased to $820 per metric ton from $755 per metric ton in 2018, owing to combined sales of higher value potassium sulfate (SOP) and potassium magnesium sulfate (SOPM) accounting for a greater percentage of total sales (table 1).

Potash denotes a variety of mined and manufactured salts, all of which contain the element potassium in water-soluble form. In agriculture, the term potash refers to potassic fertilizers, which are potassium chloride (KCl or sylvite), SOP [K_2SO_4 or sulfate of potash, usually a manufactured product], and SOPM [$K_2SO_4 \cdot 2MgSO_4$ or langbeinite or double sulfate of potash magnesia]. Muriate of potash (MOP) is an agriculturally acceptable mix of KCl (95% pure or greater) and sodium chloride (halite) for fertilizer use that includes minor amounts of other nontoxic minerals from the mined ore.

Production

Domestic production data were developed by the U.S. Geological Survey (USGS) from a semiannual voluntary canvass of U.S. operations. All seven operations canvassed for production data responded to the surveys. Potash companies in the United States produced MOP, SOP, and SOPM. Published production data of all types and grades of potash in the United States are rounded to two significant digits to avoid disclosing proprietary data. Three companies produced potash from seven operations in two States.

In southeastern New Mexico, Intrepid Potash, Inc. produced MOP and SOPM from one solution and one underground mine, respectively, and The Mosaic Company produced SOPM from one underground mine.

In Utah, Intrepid produced MOP from a solution mine in Moab and from a brine recovery facility in Wendover; Compass Minerals International, Inc. produced SOP at a solar evaporation facility in Ogden on the Great Salt Lake.

In July, Crystal Peak Minerals Inc. (Toronto, Ontario, Canada) completed a feasibility study of its Sevier Playa SOP project in southwestern Utah (Green Markets, 2019b). The company expected production to average about 300,000 metric tons per year (t/yr) of SOP for 30 years. Crystal Peak received final mining permits in 2019 and was to begin construction in 2020. The company expected construction to take 3 years and production to gradually increase from 30,000 t/yr of SOP in 2020 to reach full capacity of 372,000 t/yr in 2025 (Green Markets, 2019c).

PolyNatura Corp. continued with development of the Ochoa potash project in Lea County, NM. The company planned to mine and process polyhalite ore for direct application fertilizer. Polyhalite contains potassium, magnesium, calcium, and sulfur and can be used as an organic fertilizer. Production was planned to start in 2021 and gradually ramp up to 1.8 million metric tons per year (Mt/yr) by 2023. In January, Nitron Group LLC, a fertilizer trading company, agreed to purchase 75% of the production from Ochoa for 5 years (Green Markets, 2019h).

Consumption

Domestic apparent consumption of all forms of potash in 2019 decreased by 13% from that in 2018, in terms of K_2O content (table 1). World consumption of all forms of potash in 2019 was 42.9 Mt of K_2O, compared with 42.8 Mt in 2018 (Simonova, 2020, p. 7). The principal use of potash was as an agricultural fertilizer (plant nutrient) as a source of soluble potassium, which is one of the three primary plant nutrients required for plant growth and maturation; the other two are fixed nitrogen and soluble phosphorus. Potash and phosphorus were mined products and fixed nitrogen was produced from the atmosphere using industrial processes. Modern agricultural practice used large quantities of these primary nutrients and additional nutrients, such as boron, calcium, chlorine, copper, iron, magnesium, manganese, molybdenum, sulfur, and zinc, to ensure plant health and proper maturation. The three major plant nutrients had no cost-effective substitutes. Low-nutrient-content alternative potash sources, such as animal manure and guano, bone meal, compost, glauconite, and "tankage" from slaughterhouses, were available, but the cost of transportation per metric ton of the nutrient beyond relatively short distances could reduce their competitiveness.

Fertilizer consumption information was collected by the American Association of Plant Food Officials on a crop-year (July 1 to June 30) basis. For crop-year 2015 (July 1, 2014, to June 30, 2015, the most recent year for which data were available), consumption of K_2O in fertilizers was 4.30 Mt compared with 4.77 Mt in crop-year 2014 (Slater and Kirby, 2018, p. 6).

In addition to its use as a fertilizer, potassium chloride was used in refining secondary aluminum, producing potassium

[1]The potash industry has established a common standard of measurement for defining a product's potassium content (or purity) because the potassium content of its common salts varies in terms of equivalent percentage of potassium oxide (K_2O). A K_2O equivalent for muriate of potash (MOP) is 60%; sulfate of potash (SOP), 51%; double sulfate of potash magnesia products (SOPM), 22%; and polyhalite, 14%. All tonnages are reported in metric tons, K_2O equivalent, unless otherwise specified. All percentages are computed on rounded K_2O equivalent values, except for trade data.

hydroxide, electroplating, oil-well drilling mud, snow and ice melting, steel heat-treating, and water softening.

Potassium hydroxide was used in industrial water treatment and soap manufacturing, and was the precursor of potassium carbonate, several forms of potassium phosphate, and many other potassic chemicals. Potassium carbonate was used to produce animal feed supplements, cement, fire extinguishers, food products, and textiles. It also was used in pharmaceutical preparations and as a catalyst for synthetic rubber manufacturing. Generally, these nonfertilizer uses accounted for about 15% of annual potash consumption in the United States and 8% to 10% worldwide (Simonova, 2020).

Prices

The price of standard-grade MOP, in terms of K_2O, produced in the United States, averaged $545 per metric ton in the first half of 2019, $520 per ton in the second half, and $530 per ton for the entire year, compared with $490 per ton in 2018, according to sales data reported to the USGS (table 2). The Vancouver, British Columbia, Canada, spot market price for MOP (gross weight of product), which was the benchmark price for North American potash shipments, began the year at $274 per ton and ended the year at $248 per ton (CRU Fertilizer Week, 2020).

Foreign Trade

Total U.S. imports of all forms of potash decreased by 13% to 4.94 Mt of K_2O in 2019 from 5.71 Mt of K_2O in 2018. Potassium chloride accounted for 98% of the import tonnage, in terms of K_2O content. Canada was the leading source for imports, accounting for 77% of total imports of potash, in terms of gross weight. Belarus and Russia followed with 9%, each, of total potash imports. Total customs import value increased by 3% over that in 2018, owing to higher international potash prices in the first 6 months of the year (table 4).

The United States was not a significant exporter of potash. Of the 145,000 t of potash exported, SOP and SOPM accounted for 83% of exports, in terms of K_2O content. In 2019, total potash exports (K_2O equivalent) increased by 39% to 145,000 t from 105,000 t in 2018 (table 3).

World Industry Structure

World production of potash was 41.3 Mt in 2019, 6% lower than that in 2018. Major world producers closed mines and reduced output in the fourth quarter because of weak global demand caused by poor weather conditions in some regions and lower Chinese imports that resulted in higher stocks and falling prices (Fertilizer International, 2020). Canada (12.3 Mt), Belarus and Russia (7.3 Mt each), and China (5.0 Mt) were the world's leading potash producers, accounting for 77% of total production (table 5).

Belarus.—JSC Belaruskali continued developing a new mine in the Petrikov district, which was planned to have an initial production capacity of 1.5 Mt/yr of MOP. The Petrikov Mine was expected to open in 2020, reaching full capacity by the end of 2021. Belaruskali began construction of the new Darasinsky Mine in November 2019. The new mine was planned to have an initial capacity of 8 Mt/yr and take up to 9 years to complete (Green Markets, 2019a).

Slavkaliy Co. (Russia) continued construction of its Nezhinsky potash mine in central Belarus. The company planned to start production in 2023. The mine initially would have a production capacity of 2 Mt/yr of MOP and the capacity was planned to increase to 4 Mt/yr. Slavkaliy agreed to market its potash through Belarus Potash Co., a state-owned export company for Belaruskali (Green Markets, 2019i).

Canada.—Canada was the leading potash-producing country in the world, with 38% of global capacity. All production in Canada was from Saskatchewan in 2019. Potash was produced by three companies: Nutrien Ltd., which controled 24% of world MOP capacity at six mines; Mosaic, which operated three mines; and K+S Aktiengesellschaft, which operated one mine. Nutrien temporarily closed its Allan, Lanigan, and Vanscoy Mines for the final 8 weeks of 2019, in response to high inventories and low prices, reducing its operating production capacity by nearly 700,000 t/yr of MOP. The company reopened the Allan and Lanigan Mines in January 2020. The Vanscoy Mine was scheduled to reopen in March 2020 (Green Markets, 2019g).

Mosaic closed its Colonsay Mine in August 2019 and its Esterhazy Mine in October in response to market conditions, reducing its active production capacity by 600,000 t/yr of MOP (Green Markets, 2019f).

Morocco.—Emmerson Plc (Isle of Man), continued development of the Khemisset potash mine near Rabat. The company planned to begin production in mid-2022, with a production capacity of 800,000 t/yr for 20 years (Green Markets, 2019d).

Russia.—PJSC Uralkali continued work on modernization of its processing facilities and construction of new mines at Polovodovsky, Solikamsk, and Ust-Yayvinsky that would increase its capacity to 15 Mt/yr of MOP by 2025 from 13.3 Mt/yr of MOP in 2019. Uralkali accelerated the schedule for expansion after its Solikamsk 2 Mine was flooded in late 2014, reducing Uralkali's production capacity by 2 Mt/yr. The company planned to complete a new underground mine at Solikamsk 2 in 2024, with a production capacity of 2.3 Mt/yr (Green Markets, 2019j).

EuroChem MCC, OJSC began commercial production at the 2.3-Mt/yr-of-MOP Usolskiy Mine in early 2019, and rampup to full capacity was expected in 2021. Eurochem continued development of the VolgaKaliy Mine, which began test production in 2019. The mine project was scheduled to be completed in two phases, each with a production capacity of 2.3 Mt/yr of MOP. The first phase was projected to begin commercial production in 2021 and the second phase was expected to be completed after 2024 (Green Markets, 2019e).

JSC Acron Group continued development of its Talitsky Mine project through its subsidiary, Verkhnekamsk Potash Co. The company began sinking the mine shafts in 2018. The mine was planned to have an initial capacity of 1.3 Mt/yr of MOP and increase to full capacity of 2.0 Mt/yr of MOP 2 years later. Acron expected to open the mine in 2024 (Fertilizer International, 2019).

United Kingdom.—Sirius Minerals plc continued with development of its new Woodsmith polyhalite mine, which is about 19 kilometers from the existing Israel Chemicals Ltd. Boulby polyhalite mine in North Yorkshire. Sirius planned to begin production in 2021 and gradually increase production capacity to 10 Mt/yr by 2024 (Fertilizer International, 2019).

Outlook

Potash is an essential fertilizer nutrient that does not have a substitute. About 90% of world potash consumption is in fertilizer products. Growing world population and its need for food will require continued growth in potash production and consumption. Additionally, increased ethanol production from corn and other crops will require a proportional growth in fertilizer use. Global consumption of K_2O is projected to increase from 42.9 Mt in 2019 to 45.7 Mt in 2023 (Simonova, 2020).

Potash exploration and development is expected to remain very active during the next decade. Global potash production capacity is expected to increase to 67.8 Mt/yr of K_2O in 2023 from 61.4 Mt/yr of K_2O in 2019 primarily from projects in Belarus and Russia. Other potash mines are under development in Australia, Brazil, Canada, Congo (Brazzaville), Eritrea, Ethiopia, Kazakhstan, Laos, Peru, Spain, Thailand, and the United Kingdom. None of these projects, however, are expected to be completed before 2024 (Simonova, 2020).

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TABLE 1
SALIENT POTASH STATISTICS[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

		2015	2016	2017	2018	2019
United States:						
Production:[3]						
Gross weight		1,800	1,400	1,300	1,400	1,400
K_2O equivalent		740	510	480	520	510
Sales by producers:						
Quantity:[3]						
Gross weight		1,500	1,400	1,300	1,400	1,400
K_2O equivalent		620	600	490	520	480
Value[3, 4]		550,000	410,000	380,000	390,000	390,000
Average unit value:[5]						
Gross weight	dollars per metric ton	350	290	285	275 r	290
K_2O equivalent	do.	880	680	775	755 r	820
Exports:						
Gross weight		387	346	462	379	506
K_2O equivalent		106	96	128	105	145
Imports for consumption:[6]						
Quantity:						
Gross weight		8,250	7,490	9,660	9,430 r	8,230
K_2O equivalent		5,000	4,550	5,860	5,710 r	4,940
Value, customs		2,720,000	2,120,000	2,020,000	2,060,000 r	2,120,000
Consumption, apparent:[3, 7]						
Gross weight		9,400	8,600	11,000	11,000 r	9,100
K_2O equivalent		5,500	5,000	6,200	6,100	5,300
World, production, marketable K_2O equivalent		40,400	38,700	41,900	44,000 r	41,300

rRevised. do. Ditto.
[1]Table includes data available through June 8, 2020. Data are rounded to no more than three significant digits unless otherwise specified.
[2]Includes muriate of potash, sulfate of potash, potassium magnesium sulfate, and some parent salts. Excludes other chemical compounds that contain potassium.
[3]Data are rounded to two significant digits.
[4]Free on board mine.
[5]Rounded to the nearest $5 to avoid disclosing company proprietary data.
[6]Excludes potassium chemicals and mixed fertilizers.
[7]Defined as sales plus imports minus exports.

TABLE 2
PRICES OF U.S. POTASH, BY TYPE AND GRADE[1, 2, 3]

(Dollars per metric ton of K_2O equivalent)

	2018			2019		
Type and grade	January–June	July–December	Yearly average	January–June	July–December	Yearly average
Muriate, 60% K_2O minimum:						
Standard	485	495	490	545	520	530
Granular	390	465	420 r	490	460	480

rRevised.
[1]Table includes data available through June 8, 2020.
[2]Average prices, free on board mine, based on sales.
[3]Rounded to the nearest $5 to avoid disclosing company proprietary data.

TABLE 3
U.S. EXPORTS OF POTASH, BY TYPE[1]

	Approximate average K_2O equivalent content (percentage)	Quantity (metric tons)		Value (thousands)	Principal destinations, by gross weight
		Gross weight	K_2O equivalent[e]		
2018:					
Potassium chloride	61	25,500	15,600	$14,100	Mexico, 59%; Canada, 24%; Malaysia, 4%.
Potassium sulfate[2]	25	346,000	86,000 r	96,600	Canada, 29%; Brazil, 13%; Japan, 13%.
Potassium nitrate	45	7,350	3,310 r	5,910	Mexico, 68%; Canada, 22%; Republic of Korea, 3%.
Total	XX	379,000	105,000 r	117,000	Canada, 27%; Mexico, 17%; Malaysia, 13%.
2019:					
Potassium chloride	61	36,300	22,100	$19,200	Dominican Republic, 40%; Mexico, 35%; Malaysia, 6%.
Potassium sulfate[2]	25	464,000	121,000	122,000	Canada, 26%; China, 15%; Brazil, 10%.
Potassium nitrate	45	6,060	2,720	5,200	Mexico, 61%; Canada, 20%; India, 11%.
Total	XX	506,000	145,000	147,000	Canada, 25%; China, 13%; Mexico, 12%.

[e]Estimated. [r]Revised. XX Not applicable.
[1]Table includes data available through May 14, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes potassium magnesium sulfate.

Source: U.S. Census Bureau; data adjusted by the U.S. Geological Survey.

TABLE 4
U.S. IMPORTS FOR CONSUMPTION OF POTASH, BY TYPE[1]

	Approximate average K_2O equivalent content (percentage)	Quantity (metric tons)		Value (thousands)		Principal sources, by gross weight
		Gross weight	K_2O equivalent[e]	Customs	C.i.f.[2]	
2018:						
Potassium chloride[3]	61	9,220,000	5,620,000	$1,960,000	$1,990,000	Canada, 84%; Russia, 7%; Belarus, 6%.
Potassium sulfate[4]	51	69,300	35,300	35,200	36,700	Germany, 60%; Canada, 30%.
Potassium nitrate[5]	45	91,300	41,100	53,500	55,500	Chile, 75%; Germany, 13%; Jordan, 6%.
Potassium sodium nitrate mixture[6]	14	46,200 r	6,460 r	11,900 r	13,000 r	Israel, 63%; Russia, 13%; Czechia, 8%.
Total	XX	9,430,000 r	5,710,000 r	2,060,000 r	2,100,000 r	Canada, 82%; Russia, 6%; Belarus, 6%.
2019:						
Potassium chloride[3]	61	7,920,000	4,830,000	1,960,000	2,010,000	Canada, 80%; Belarus, 9%; Russia, 7%.
Potassium sulfate[4]	51	74,500	38,000	42,700	45,200	Canada, 41%; Germany, 35%; Belgium, 15%.
Potassium nitrate[5]	45	111,000	49,900	71,800	74,900	Chile, 73%; Germany, 13%; China, 8%.
Potassium sodium nitrate mixture[6]	14	125,000	17,500	45,900	49,900	Russia, 79%; Israel, 19%.
Total	XX	8,230,000	4,940,000	2,120,000	2,180,000	Canada, 77%; Belarus, 9%; Russia, 9%.

[e]Estimated. [r]Revised. XX Not applicable.
[1]Table includes data available through May 14, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Cost, insurance, and freight.
[3]Harmonized Tariff Schedule of the United States (HTS) code 3104.20.0000.
[4]HTS code 3104.30.0000.
[5]HTS code 2834.21.0000.
[6]HTS code 3104.90.0010.

Source: U.S. Census Bureau; data adjusted by the U.S. Geological Survey.

TABLE 5
MARKETABLE POTASH: WORLD PRODUCTION, BY COUNTRY OR LOCALITY[1]

(Thousand metric tons, K_2O equivalent)

Country or locality	2015	2016	2017	2018	2019
Belarus	6,468	6,180	7,102	7,346 r	7,348
Brazil	304	316 r	306	201 r	247
Canada	11,462	10,790	12,563	13,835	12,270
Chile	1,200	1,200	1,100 e	1,200 e	840 e
China	5,710	5,780	5,510	5,450 r	5,000 e
Germany	3,110	2,800	2,900	3,200	3,000 e
Israel	1,540	2,068	1,900	2,200 e	2,040 e
Jordan	1,413	1,202	1,392	1,486 r	1,516
Laos	250	195	300	335 r	400 e
Russia	6,954	6,588	7,320	7,168	7,340
Spain	668	667	675	700 e	500 e
Turkmenistan	--	--	25 e	19 e	20 e
United Kingdom	384	287	200	150 e	89
United States[2]	740	510	480	520	510
Uzbekistan	158	138	168	182	200 e
Total	40,400	38,700	41,900	44,000 r	41,300

[e]Estimated. [r]Revised. -- Zero.

[1]Table includes data available through June 2, 2020. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Rounded to two significant digits.