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POTASH [ADVANCE RELEASE]

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Potash

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In 2015, domestic consumption, production, and sales of potash were all lower than those in 2014, mainly because The Mosaic Company (Mosaic) stopped production of muriate of potash (MOP) at the end of 2014, owing to diminishing reserves. Mosaic only produced potassium-magnesium sulfate (SOPM) from its mine in New Mexico. Also, Intrepid Potash Inc. (Intrepid) closed one of its mines temporarily for emergency maintenance. Domestic production decreased by 13% to 740,000 metric tons (t) of potassium oxide (K_2O) equivalent[2] from 850,000 t of K_2O equivalent in 2014. U.S. sales of potash were 33% lower in 2015 compared with those in 2014 and apparent consumption decreased by 5% to 5.5 million metric tons (Mt) of K_2O in 2015 from 5.8 Mt of K_2O in 2014 (table 1). In 2015, world potash production decreased slightly to 40.7 Mt from 40.8 Mt in 2014 (tables 1, 5). Global consumption of all forms of potash was estimated to be 38.8 Mt of K_2O in 2015, compared with 38.0 Mt of K_2O in 2014 (Prud'homme, 2016).

Potash denotes a variety of mined and manufactured salts, all of which contain the element potassium in water-soluble form. The majority of domestic potash was produced near Carlsbad, NM, with most of the potash coming from the mineral sylvite. In agriculture, the term potash refers to potassic fertilizers, which are potassium chloride (KCl or sylvite), potassium sulfate [K_2SO_4 or sulfate of potash (SOP), usually a manufactured product], and SOPM [$K_2SO_4 \bullet 2MgSO_4$ or langbeinite or double sulfate of potash magnesia]. 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 of the 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 adjusted to avoid disclosing the proprietary data. Three companies produced potash from seven operations in three States. Most production was from southeastern New Mexico, where Intrepid produced MOP and SOPM from one solution and two underground mines and Mosaic produced SOPM from one underground mine.

In late 2015, Intrepid announced that it would stop production of MOP at its East underground mine in 2016 and only produce higher-value SOPM from that facility. The company cited increased foreign competition, market oversupply, and weak prices as factors in ceasing MOP production (Intrepid Potash, Inc., 2016, p. 3). This follows Mosaic's announcement in December 2014 that it would stop production of MOP in favor of SOPM at its mine in New Mexico in 2015 (Green Markets, 2014).

IC Potash Corp. (ICP) (Toronto, Ontario, Canada) continued drilling and permitting activities at its Ochoa project east of Carlsbad in Lea County, NM. ICP planned to produce SOP from a polyhalite deposit. The project was to consist of an underground mine and surface processing facilities. ICP planned to begin production in 2017 and reach full capacity of 650,000 metric tons per year (t/yr) of SOP after 2018 (IC Potash Corp., 2016).

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. Compass began an expansion of the Ogden facility that would increase its production capacity from 290,000 t/yr of SOP to 500,000 t/yr of SOP by using both brine and purchased MOP. The $90 million project was expected to be completed in 2017 (Green Markets, 2015d).

Consumption

Domestic apparent consumption of all forms of potash in 2015 decreased by 5% from that of 2014. Fertilizer consumption was affected by adverse weather conditions in some regions and industrial use was down because of lower use of potash in oil-well drilling mud. North American oil rig counts decreased by 60% in 2015 because of lower oil prices (Intrepid Potash Inc., 2016, p. 3). 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 others are fixed nitrogen and soluble phosphorus. Potash and phosphorus are mined products, and fixed nitrogen is produced from the atmosphere using industrial processes. Modern agricultural practice uses 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 have no cost-effective substitutes. Low-nutrient-content alternative potash sources, such as animal manure and guano, bone meal, compost, glauconite, and "tankage" from slaughterhouses, are available, but the cost of transportation per metric ton of nutrient beyond relatively short distances can reduce their desirability.

[1]Deceased.

[2]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 is 60%; sulfate of potash, 51%; and double sulfate of potash magnesia products, 22%. All tonnages are reported in metric tons, K_2O equivalent, unless otherwise specified. All percentages are computed on rounded K_2O equivalent values.

In addition to its use as a fertilizer, potassium chloride is used in refining secondary aluminum, producing potassium hydroxide, electroplating, oil-well drilling mud, snow and ice melting, steel heat-treating, and water softening.

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

Prices

The price of standard-grade MOP, in terms of K_2O, produced in the United States, averaged $610 per metric ton in the first half of 2015, $585 per ton in the second half, and $595 per ton for the entire year compared with $580 per ton in 2014, 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 is the benchmark price for North American potash shipments, began the year at $318 per ton and ended the year at $292 per ton (CRU International, 2015).

Foreign Trade

Total U.S. imports of all forms of potash (K_2O equivalent) increased slightly over those of 2014. Potassium chloride accounted for 98% of the import tonnage. Canada was the leading source for imports, accounting for 84% of all types of potash. Russia was a distant second with 8% of total potash imports. Total customs import value increased by 14% over that of 2014, owing to higher international potash prices in the first half of the year (table 4).

The United States is not a significant exporter of potash. In 2014, exports of all forms of potash (K_2O equivalent) increased by 5% over those of 2014, owing to a 65% increase in potassium sulfate exports that offset a 62% decrease in potassium chloride exports (table 3).

World Review

World production of potash decreased to 40.7 Mt in 2015 from 40.8 Mt in 2014. Canada, Russia, Belarus, and China were the leading producing countries, by order of output, accounting for 76% of total production (table 5). Global potash capacity increased to 53.0 Mt in 2015 from 52.2 Mt in 2014 (Prud'homme, 2016).

Belarus.—JSC Belaruskali continued with two projects in 2015: a 500,000-t/yr expansion to its processing facilities at Soligorsk and a new mine in the Petrikov district. The new mine was planned to have an initial production capacity of 1.5 million metric tons per year (Mt/yr) of MOP. The projects were expected to be completed by 2020 and increase the company's capacity to 15.1 Mt/yr of MOP in 2020 (Prud'homme, 2016).

Slavkaliy Co. began construction of a new potash mining complex in the Nezhinsky section of the Staroinskoye potash deposit near Minsk. The facility was to include a 1.8-Mt/yr underground mine and processing plant, and was projected to begin production in 2020. Construction was being financed primarily by the China Development Bank and China would purchase all output for the first 10 years of production. The Belarusian Potash Co., which handles export sales for Belaruskali, was expected to be the marketing agent (Green Markets, 2015b).

Canada.—Canada was the leading potash producer in the world and had the leading production capacity. Annual production capacity was projected to increase incrementally to 37.0 Mt of MOP in 2020 from 30.0 Mt in 2015, owing to one new mine and expansions at three other mines.

Potash Corp. of Saskatchewan Inc. (PotashCorp), the world's leading potash producer, planned to complete a 3.0-Mt/yr-of-MOP expansion at its Rocanville, Saskatchewan, mine in 2017. In 2015, PotashCorp began production at is new underground mine near Picadilly, New Brunswick, and permanently closed its Penobquis, New Brunswick, mine in November because of declining reserves, brine inflows to the underground mine, and economic conditions. Also in November, the Picadilly Mine was placed on an inventory adjustment shutdown. In early January 2016, the Picadilly Mine was closed indefinitely because of poor market conditions. PotashCorp planned to increase its annual production capacity to 19.1 Mt of MOP by 2018 from 16.1 of MOP in 2015 (Potash Corp. of Saskatchewan Inc., 2016, p. 3).

Mosaic planned to complete a 1.0-Mt/yr expansion to its Esterhazy, Saskatchewan, mine by 2018, which would increase its total production capacity in Canada to 12.9 Mt/yr of MOP (Green Markets, 2015c). Agrium Inc., another producer in Canada, completed a 1.0-Mt/yr expansion to its Vanscoy, Saskatchewan, mine in late 2015 that increased its capacity to 3.0 Mt/yr of MOP (Fertilizer International, 2016).

German potash producer, K+S Aktiengesellschaft, remained on schedule to commission its new Legacy solution mine in Saskatchewan in 2017. The mine was designed with an annual production capacity of 2.0 Mt of MOP, with further expansion of 0.9 Mt by 2023 (Fertilizer International, 2016).

BHP Billiton Group continued development of the Jansen project in Saskatchewan. The new underground mine was designed to have up to 10 Mt/yr of MOP production capacity. The company expected to complete two mine shafts in 2016, but the commissioning of the mine would be contingent on market conditions after 2020 (Green Markets, 2015a).

China.—China was the fourth-ranked potash producer in the world in 2015. Potash is produced by about 30 companies in Qinghai Province and Xinjiang Uyghur Autonomous Region; however, most of the capacity was held by three companies. China's production capacity was projected to increase to 7.6 Mt of K_2O in 2020 from 5.9 Mt of K_2O in 2015, owing to a planned 1.1-Mt/yr of K_2O expansion of MOP capacity in Qinghai and a 0.6-Mt/yr of K_2O expansion of SOP capacity in Xinjiang (Fertilizer International, 2016).

Russia.—In late 2014, the OJSC Uralkali Solikamsk-2 underground mine was closed because of partial flooding. The

company announced in early 2015 that it would build a new underground mine at Solikamsk-2 by 2020 to recover the ore from the section of the mine that was not flooded. Uralkali continued to work on incremental increases to annual production capacity at its other mines in Berezniki and Solikamsk-3. It also was developing new underground mines at Polovodovsky and Ust Yayvinsky that were planned to be operational after 2020. The company planned to increase capacity to 14.4 Mt/yr of MOP in 2020 from 11.5 Mt/yr of MOP in 2015 (OJSC Uralkali, 2016, p. 30–31).

EuroChem MCC, OJSC had two mines under development in 2015. The VolgaKaliy Project, which would mine potash ore from the Gremyachinskoe deposit, 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 open by 2018, and the second phase was expected to be completed after 2020. The Usolskiy project, which would exploit the Verkhnekamskoe deposit, also was planned to be completed in two phases. The first 2.3-Mt/yr phase was expected to begin production of MOP in 2017. The opening of the 1.4-Mt/yr second phase was scheduled for after 2020 (Fertilizer International, 2016).

JSC Acron Group continued development of its Talitsky Mine project through its subsidiary, Verkhnekamsk Potash Co. The mine was planned to have an initial capacity of 1.3 Mt/yr of MOP and then increase to full capacity of 2.0 Mt/yr of MOP several years later. Acron delayed commissioning of its mine until 2021, and it was expected to reach full capacity in 2023 (Fertilizer International, 2016).

Turkmenistan.—Belaruskali and two other Belarus companies continued with construction of a new potash mine in Lebap Oblast, which will be operated in a joint venture with state-owned Turkmenkhiya State Concern. Turkmenkhiya signed an agreement with JSC Belgorkhimprom for construction of the new mine in 2010, and work on the facility began in late 2014. In 2015, the first ton of ore was mined, but completion of the 1.4-Mt/yr-of-MOP underground mine and processing plant were not expected until after March 2017 (Fertilizer International, 2016; Renaud, 2016).

Outlook

Potash is an essential fertilizer nutrient that cannot be substituted. 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.

According to the International Fertilizer Industry Association, world potash consumption for all uses is projected to increase to 43 Mt of K_2O in 2020 from 38.8 Mt of K_2O in 2015. Asia and South America are projected to be the regions with the largest growth, accounting for 75% over the next 5 years (Heffer and others, 2016; Prud'homme, 2016).

Potash exploration and development is expected to remain very active over the next decade., About 25 potash-mining projects, totaling potential capacity of 11.5 Mt/yr of K_2O, that were expected to be completed between 2016 and 2020 were in progress worldwide in 2015. The majority of the new capacity would be from projects in Belarus, Canada, China, Russia, and Turkmenistan. Other projects in various stages of development in Argentina, Australia, Brazil, Canada, Congo (Brazzaville), Eritrea, Ethiopia, Kazakhstan, Laos, Peru, Thailand, and the United Kingdom were not expected to be completed until after 2021 (Prud'homme, 2016).

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TABLE 1
SALIENT POTASH STATISTICS[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

		2011	2012	2013	2014	2015
United States:						
Production:[3]						
Gross weight		2,300	2,100	2,200	1,800	1,800
K_2O equivalent		1,000	900	960	850	740
Sales by producers:						
Quantity:[3]						
Gross weight		2,300	2,200	2,000	2,000	1,500
K_2O equivalent		990	980	880	930	620
Value[3, 4]		740,000	750,000	630,000	680,000	550,000
Average value:[5]						
Gross weight	dollars per metric ton	320	340	315	345	350
K_2O equivalent	do.	745	765	715	735	880
Exports:						
Gross weight		575	565	610	290	385
K_2O equivalent		175	200	255	100	105
Imports for consumption:[6, 7]						
Quantity:						
Gross weight		8,210	7,010	7,660	8,200	8,250
K_2O equivalent		4,980	4,240	4,650	4,970	5,000
Value, customs		3,400,000 r	289,000 r	2,750,000 r	2,390,000 r	2,720,000
Consumption, apparent:[3, 8]						
Gross weight		9,900	8,700	9,100	9,900	9,400
K_2O equivalent		5,800	5,000	5,300	5,800	5,500
World, production, marketable K_2O equivalent		35,800 r	32,800 r	35,600	40,800 r	40,700 e

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

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

(Dollars per metric ton of K_2O equivalent)

Type and grade	2014			2015		
	January–June	July–December	Yearly average	January–June	July–December	Yearly average
Muriate, 60% K_2O minimum:						
Standard	565	595	580	610	585	595
Granular	555	555	555	610	530	570

[1]Average prices, free on board mine, based on sales.
[2]Data rounded to nearest $5.

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

Type	Approximate average K_2O equivalent content (percentage)	Quantity (metric tons)		Principal destinations, by gross weight
		Gross weight	K_2O equivalent[e]	
2014:				
Potassium chloride	61	73,400	44,800	Brazil, 35%; Mexico, 32%; Chile, 13%.
Potassium sulfate[2]	24	210,000	51,400	Colombia, 20%; Canada, 13%, Peru, 13%.
Potassium nitrate	45	8,690	3,910	Mexico, 73%; Canada, 13%; Republic of Korea, 3%.
Total	XX	292,000	100,000	Mexico, 19%; Colombia, 15%; Canada, 13%.
2015:				
Potassium chloride	61	27,700	16,900	Mexico, 67%; Canada, 18%; China, 3%.
Potassium sulfate[2]	24	350,000	84,700	Canada, 25%; Colombia, 16%; Mexico, 13%.
Potassium nitrate	45	8,810	3,970	Mexico, 72%; Canada, 10%; Netherlands, 6%.
Total	XX	387,000	106,000	Canada, 24%; Mexico, 18%; Colombia, 15%.

[e]Estimated. XX Not applicable.
[1]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]

Type	HTS[2] code	Approximate average K_2O equivalent content (percentage)	Quantity (metric tons) Gross weight	Quantity (metric tons) K_2O equivalent[e]	Value (thousands) Customs	Value (thousands) C.i.f.[3]	Principal sources, by gross weight
2014:							
Potassium chloride	3104.20.0000	61	7,990,000	4,870,000	$2,260,000 [r]	$2,320,000 [r]	Canada, 87%; Russia, 7%; Israel, 1%.
Potassium sulfate	3104.30.0000	51	104,000	53,000	54,200 [r]	57,600 [r]	Germany, 60%; Canada, 35%; Netherlands, 2%.
Potassium nitrate	2834.21.0000	45	108,000	48,700	77,900 [r]	81,000 [r]	Chile, 84%; Germany, 13%; India, 1%.
Potassium sodium nitrate mixture	3105.90.0010	14	1,850	259	817 [r]	835 [r]	Canada, 78%; Israel, 16%; Chile, 3%.
Total		XX	8,200,000	4,970,000	2,390,000 [r]	2,460,000 [r]	Canada, 86%; Russia, 7%; Israel, 4%.
2015:							
Potassium chloride	3104.20.0000	61	7,990,000	4,870,000	2,570,000	2,630,000	Canada, 86%; Russia, 9%; Israel, 2%.
Potassium sulfate	3104.30.0000	51	134,000	68,400	63,000	66,400	Germany, 49%; Canada, 34%; Egypt, 9%.
Potassium nitrate	2834.21.0000	45	122,000	55,100	88,400	92,000	Chile, 85%; Germany, 12%; China, 1%.
Potassium sodium nitrate mixture	3105.90.0010	14	1,830	256	534	563	Canada, 65%; Mexico, 48%; Chile, 7%.
Total		XX	8,240,000	5,000,000	2,720,000	2,790,000	Canada, 84%; Russia, 8%; Israel, 4%.

[e]Estimated. [r]Revised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Harmonized Tariff Schedule of the United States.
[3]Cost, insurance, and freight.

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

TABLE 5
MARKETABLE POTASH: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons of K_2O equivalent)

Country	2011	2012	2013	2014	2015[e]
Belarus	5,306	4,840	4,243	6,306 [r]	6,468 [3]
Brazil	395	347	311	311	293 [3]
Canada	10,686	8,976	10,196	10,818	11,420 [3]
Chile	832 [r]	1,018 [r]	1,153 [r]	1,130 [r]	1,200
China[e]	3,800	3,770	5,300	6,110	6,200
Germany	3,215	3,149	3,075	3,127	3,100
Israel	1,610	1,830	1,824	1,842 [r]	1,260
Jordan	1,355	1,094	1,046	1,255	1,413 [3]
Laos	NA	43	86	211 [e]	200
Russia	6,498	5,563	6,100	7,439	6,993 [3]
Spain[e]	521	632	711	685 [r]	690
United Kingdom	470	549	549 [r]	610 [e]	610
United States[4]	1,000	900	960	850	740
Uzbekistan	110	112	85	110	100
Total	35,800 [r]	32,800 [r]	35,600	40,800 [r]	40,700

[e]Estimated. [r]Revised. NA Not available.
[1]Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes data available through August 1, 2016.
[3]Reported figure.
[4]Rounded to no more than two significant digits.