2009 Minerals Yearbook

POTASH [ADVANCE RELEASE]

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POTASH

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In 2009, the world potash market collapsed owing to the global economic downturn and a drop in demand. High potash prices in the first half of 2009 contributed to the drop in consumption as farmers delayed purchases until prices fell. This led to high inventories and the temporary closure of many potash mines. World production was less than 50% of rated capacity in 2009; its lowest level since 1993. In the United States, about 1.7 million metric tons (Mt) of minerals was mined to produce 720,000 metric tons (t) of potassium oxide (K_2O) equivalent. U.S. production was at its lowest point since 1943. U.S. potash production was 35% less in 2009 than in 2008, and the total value of sales decreased by 32% from that of 2008. The unit value for potash increased from $300 per metric ton in 2008 to $335 per ton in 2009, although this was because of high prices in the first half of the year, which had decreased substantially by yearend. Apparent consumption of potash decreased by 62% from that of 2008, to reach its lowest point since 1962. Imports of potash decreased 62% from those of 2008, while exports increased by 36% (table 1).

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. 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 potassium-magnesium sulfate [$K_2SO_4 \cdot 2MgSO_4$ or langbeinite or double sulfate of potash magnesia (SOPM or K-Mag)]. 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 and is neither the crude ore sylvinite nor pure sylvite.

This publication has historically included potassium nitrate [KNO_3 or saltpeter or nitrate of potash (NOP), a mostly manufactured product] and mixed sodium nitrate and potassium nitrate ($NaNO_3$ and KNO_3 or Chilean saltpeter, a natural product) because these materials function as potassic plus nitrogenous fertilizers. Saltpeter and Chilean saltpeter are still included in the import tables (tables 5, 6).

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 semiannual production data responded to the surveys.

Three companies produced potash from seven operations in three States. Most domestic production was from southeastern New Mexico, where Intrepid Potash, Inc. operated two mines and The Mosaic Company operated one mine. Mosaic also operated a deep-solution mine in Michigan. The third State with potash production was Utah, where Intrepid produced potash from a solution mine in Moab and from a solar evaporation facility in Wendover, and Great Salt Lake Minerals Corp. (a subsidiary of Compass Minerals International, Inc.) operated a solar evaporation facility in Ogden.

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 of companies that produce SOP and SOPM, which together are known as sulfates.

Intrepid continued with its plans to reopen the underground HB Mine, which is located near the company's existing mines in Carlsbad, NM, as a solution potash mine. The HB Mine was closed in 1996 by the previous owner. The facility would increase annual production by 200,000 metric tons of MOP. Intrepid expects the mine to be fully permitted by mid-2011, and production could start about 1 year after that (Intrepid Potash, Inc., 2010, p. 5).

In 2009, domestic consumption of K_2O equivalent was 62% lower compared with that of 2008, owing to the economic recession, high potash prices in the first half of the year, and the subsequent drop in demand. The principal use of potash is as an agricultural fertilizer (plant nutrient) because it is 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 amounts 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. In addition to its use as a fertilizer, potassium chloride is important in industrialized economies, where it is used in aluminum recycling, by the chloralkali industry to produce potassium hydroxide, in metal electroplating, oil-well drilling mud, snow and ice melting, steel heat-treating, and water softening.

Potassium hydroxide is used for industrial water treatment and is the precursor of potassium carbonate, several forms of potassium phosphate, many other potassic chemicals, and soap manufacturing. Potassium carbonate is used to produce animal feed supplements, cement, fire extinguishers, food products, photographic chemicals, 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.

Foreign Trade

U.S. exports of potash (gross weight) increased slightly in 2009 from those of 2008, owing to increased sales of MOP. Exports of 705,000 t were reported, of which 49% was MOP, 44% was SOPM, 6% was SOP, and 1% was NOP (table 3). Brazil, Mexico, and Canada in declining order, received 54% of the total exports of potash from the United States (table 4). Total potash exports, reported by K_2O content, increased by 36% in 2009 compared with those of 2008.

Potash imports (gross weight) into the United States for 2009 decreased by 62% to 3.67 Mt compared with 9.56 Mt in 2008 (table 5). The leading source of all potash imports was Canada with 88% of the total (table 6).

World Industry Structure

Estimated 2009 world potash production decreased by 40% to 20.8 Mt, with decreased output from all major producing countries, except for China (table 7). The collapse of global trade in response to reduced world demand and the global economic downturn resulted in high producers' stocks and temporary mine closures. Only 13 countries are notable potash producers, with Belarus, Canada, China, Germany, Israel, Jordan, and Russia accounting for about 90% of global production capacity. World potash production in 2009 was at 48% of rated annual capacity (Heffer and Prud'homme, 2010).

World Review

Argentina.—Companhia Vale de Rio Doce (Vale) of Brazil purchased the Rio Colorado potash project from Rio Tinto Plc in early 2009. Vale planned to develop a 4.3-million-metric-ton-per year (Mt/yr) MOP solution mine in Malargue in Mendoza Province beginning in 2011 for completion by 2017 and a solution mine in Neuquen Province in the longer term (Green Markets, 2009).

Canada.—The effects of the world economic downturn and the global drop in potash demand were the main factors in a 60% decrease in Canadian potash production in 2009 compared with 2008. All three major producers— Agrium, Inc., Mosaic, and Potash Corp. of Saskatchewan (PotashCorp)—drastically reduced output in 2009. Despite the economic conditions, potash expansion and exploration projects by major producers and other companies continued during the year, although completion of most of the projects was delayed.

In Saskatchewan, PotashCorp planned to expand and debottleneck its Allan and Cory plants and replace existing mines and expand processing plants in Rocanville, as well at its operation in Sussex, New Brunswick. The projects would increase the company's annual production capacity to 17.1 Mt MOP sometime in 2015 (Stone, 2010).

Mosaic planned to add 300,000 t of annual capacity at its Colonsay and Esterhazy Mines in Saskatchewan by the end of 2011. Agrium planned to expand its potash production capacity at its Vanscoy Mine by 40% by the end of 2015 (Stone, 2010).

Vale acquired the Rio Tinto Regina potash deposit in Saskatchewan in early 2009. Vale planned to develop a 2.8-Mt/yr MOP solution mine sometime after 2015 (Green Markets, 2009).

Outlook

In late 2008, the effects of the global economic recession, combined with high potash prices and weak demand, led to a collapse in the world potash market. The weak market conditions that followed the collapse of the potash market continued throughout 2009. Producers' stocks remained high, and many buyers waited for prices to fall before reentering the market. Early in 2009, most leading world producers announced indefinite reductions in production, which amounted to about one-half of world production capacity. The leading consuming countries, including Brazil, China, India, and the United States, were all projected to have major decreases in consumption in 2010.

Beginning in 2010, world potash production was expected to rebound to close to that of 2008, as producer stocks decreased gradually as consumption recovered. Potash applications will be needed to replenish soil nutrient levels in most regions after the drop in consumption in 2009. According to the International Fertilizer Industry Association (IFA), world potash production was forecast to increase from 20.8 Mt in 2009 to 31.1 Mt in 2010, and consumption was forecast to increase from 24.9 Mt in 2009 to 30.0 Mt in 2010 (Heffer and Prud'homme, 2010). Potash capacity expansion plans remained on schedule, with the expected completion of projects in Canada, Chile, Jordan, and Uzbekistan in 2011 and in Argentina, Belarus, Brazil, Laos, and Russia by 2015.

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TABLE 1

SALIENT POTASH STATISTICS[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

		2005	2006	2007	2008	2009
United States:						
Production:[3]						
Gross weight		2,500	2,400	2,600	2,500	1,700
K_2O equivalent		1,200	1,100	1,100	1,100	720
Sales by producers:						
Quantity:[3]						
Gross weight		2,500	2,400	2,600	2,400	1,500
K_2O equivalent		1,200	1,100	1,200	1,100	630
Value[3, 4]		410,000	410,000	480,000	740,000	500,000
Average value:[5]						
Gross weight	dollars per metric ton	$165	$170	$185	$300	$330
K_2O equivalent	do.	$350	$375	$400	$670	$800
Exports:						
Gross weight		569	809	510	694	705
K_2O equivalent		200	332	199	222	303
Imports for consumption:[6, 7]						
Quantity:						
Gross weight		8,110	7,380	8,190	9,560	3,670
K_2O equivalent		4,920	4,470	4,970	5,800	2,220
Value, customs		1,170,000	1,150,000	1,310,000	3,260,000	2,210,000
Consumption, apparent:[3, 8]						
Gross weight		10,000	9,000	10,000	11,000	4,500
K_2O equivalent		5,900	5,200	5,900	6,700	2,500
World, production, marketable K_2O equivalent		33,800	30,400 r	35,700 r	34,500 r	20,800

[r]Revised. 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	2008 January–June	2008 July–December	2008 Yearly average	2009 January–June	2009 July–December	2009 Yearly average
Muriate, 60% K_2O minimum:						
Standard	445	865	640	1,300	650	870
Granular	440	620	470	775	545	620

[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]

	Approximate average K_2O equivalent content (percentage)	Quantity (metric tons) Gross weight	Quantity (metric tons) K_2O equivalent[e]
2008:			
Potassium chloride, all grades	61	104,000	63,400
Potassium sulfate	51	94,800	48,300
Potassium magnesium sulfate	22	490,000	108,000
Potassium nitrate	45	5,090	2,290
Total	XX	694,000	222,000
2009:			
Potassium chloride, all grades	61	342,000	208,000
Potassium sulfate	51	42,400	21,600
Potassium magnesium sulfate	22	313,000	68,800
Potassium nitrate	45	8,450	3,800
Total	XX	705,000	303,000

[e]Estimated. XX Not applicable.

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

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

TABLE 4

U.S. EXPORTS OF POTASH, BY COUNTRY[1]

(Metric tons of product)

Country	Potassium chloride		Potassium sulfates, all grades[2]		Potassium nitrate		Total	
	2008	2009	2008	2009	2008	2009	2008	2009
Angola	4,730	123	--	--	--	--	4,730	123
Australia	3	--	30,000	8	65	534	30,100	542
Barbados	98	107	7	--	10	39	115	146
Brazil	13,000	225,000	9,520	15,000	--	--	22,500	240,000
Canada	6,110	5,520	76,000	51,800	943	1,350	83,100	58,700
Chile	--	4,630	62,600	37,000	--	--	62,600	41,700
China	6	3	36,400	379	52	2	36,400	384
Colombia	46	12,200	37,700	32,900	25	--	37,700	45,000
Costa Rica	--	19,700	39,700	27,300	1	1	39,700	47,000
Cote D'Ivoire	--	--	5,470	--	--	--	5,470	--
Czech Republic	10	--	--	--	--	--	10	--
Dominican Republic	--	4,230	5,800	1,880	--	--	5,800	6,100
Ecuador	435	4,140	8,640	8,600	--	--	9,070	12,700
El Salvador	--	3,860	6,300	1	13	--	6,310	3,860
Equatorial Guinea	105	19	--	--	--	--	105	19
Gabon	1,460	--	--	--	--	--	1,460	--
Germany	138	72	2	11	1	2	141	85
Ghana	--	3,130	14,400	8,190	--	--	14,400	11,300
Guadeloupe	--	1,200	--	715	--	--	--	1,910
Guatemala	12	6,100	7,800	3,770	--	--	7,810	9,870
Honduras	--	3,930	7,700	11,300	--	6	7,700	15,300
India	--	8	16,700	19,700	--	1	16,700	19,700
Indonesia	12	--	667	143	--	--	679	143
Japan	6,660	591	64,400	44,100	--	--	71,000	44,700
Korea, Republic of	2,010	102	30	6,460	45	79	2,080	6,640
Martinique	8,810	1,000	2,910	825	--	--	11,700	1,830
Mexico	53,000	36,400	79,500	40,300	2,750	2,550	135,000	79,200
Netherlands	478	39	19	--	366	3,200	863	3,230
New Zealand	--	--	9,950	7,050	28	--	9,970	7,050
Nicaragua	36	--	4,500	2,070	--	--	4,540	2,070
Nigeria	5,510	--	--	--	--	--	5,510	--
Peru	66	7,200	18,100	6,010	--	--	18,200	13,200
Russia	206	--	--	--	--	--	206	--
Switzerland	188	250	--	--	--	--	188	250
Thailand	200	140	2,530	--	12	204	2,740	344
Trinidad and Tobago	590	1,840	--	32	--	--	590	1,870
United Kingdom	8	11	40	5,420	--	--	48	5,430
Venezuela	--	--	37,200	23,600	--	--	37,200	23,600
Other	130 r	170	474 r	376	781	492	1,390 r	1,040
Total	104,000	342,000	585,000	355,000	5,090	8,450	694,000	705,000

[r]Revised. -- Zero.

[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 5

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

	Approximate average K_2O equivalent content (percentage)	Quantity (metric tons)		Value (thousands)	
		Gross weight	K_2O equivalent[e]	Customs	C.i.f.[2]
2008:					
Potassium chloride[3]	61	9,350,000	5,700,000	$2,950,000	$3,020,000
Potassium sulfate	51	73,800	37,600	56,600	59,900
Potassium nitrate	45	133,000	59,700	75,800	80,200
Potassium sodium nitrate mixture	14	234	33	189	191
Total	XX	9,560,000	5,800,000	3,080,000	3,160,000
2009:					
Potassium chloride[3]	61	3,510,000	2,140,000	1,610,000	1,630,000
Potassium sulfate	51	87,600	44,700	63,700	65,900
Potassium nitrate	45	74,100	33,300	106,000	107,000
Potassium sodium nitrate mixture	14	658	92	265	274
Total	XX	3,670,000	2,220,000	1,780,000	1,810,000

[e]Estimated. XX Not applicable.

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

[2]Cost, insurance, and freight.

[3]Contains imports listed under Harmonized Tariff Schedule of the United States code 3104.10.0000.

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

TABLE 6

U.S. IMPORTS FOR CONSUMPTION OF POTASH, BY COUNTRY[1]

Country	Potassium chloride (metric tons)		Potassium sulfate (metric tons)		Potassium nitrate (metric tons)		Potassium sodium nitrate (metric tons)		Total Quantity (metric tons)		Total Value (thousands) Customs		Total Value (thousands) C.i.f.[2]	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
Australia	227	--	--	--	--	--	--	--	227	--	$22	--	$23	--
Belarus	145,000	--	--	--	--	--	--	--	145,000	--	60,600	--	64,100	--
Belgium	13	2	59	5,200	--	10	--	--	72	5,210	105	$3,910	115	$4,110
Canada	8,130,000	3,220,000	20,400	21,000	--	--	233	199	8,150,000	3,240,000	2,140,000	1,490,000	2,150,000	1,500,000
Chile	1,740	11,200	293	5,630	86,200	64,400	--	--	88,200	81,200	62,500	114,000	65,600	115,000
China	2	48,800	16	6	61	399	1	1	80	49,200	95	23,400	104	24,500
Denmark	--	--	--	--	397	--	--	--	397	--	117	--	127	--
France	--	--	1,620	1,650	22	43	--	--	1,640	1,690	273	347	320	376
Germany	5,500	23,300	51,200	54,100	3,180	5,260	--	432	59,900	83,100	47,600	44,800	50,600	46,500
India	100	50	28	2	159	32	--	--	287	84	156	78	183	85
Ireland	--	--	--	--	139	7	--	--	139	7	49	9	57	10
Israel	19,200	9,210	--	--	32,900	1,820	--	--	52,100	11,000	13,300	1,700	16,000	1,960
Italy	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Japan	--	--	99	48	1,790	1,900	--	--	1,890	1,940	631	630	704	662
Jordan	291	--	--	--	7,370	61	--	--	7,660	61	2,200	28	2,490	28
Lativa	64,500	--	--	--	--	--	--	--	64,500	--	49,400	--	50,800	--
Mexico	500	--	--	1	14	107	--	--	514	108	488	46	500	48
Netherlands	--	--	--	--	--	--	--	5	--	--	--	5	--	7
Poland	--	--	--	--	346	--	--	--	346	--	102	--	110	--
Russia	970,000	194,000	--	--	--	--	--	--	970,000	194,000	702,000	104,000	745,000	110,000
Singapore	--	--	--	--	1	--	--	--	1	--	3	--	3	--
Switzerland	13	4	--	--	--	1	--	--	13	5	10	11	11	11
United Kingdom	1,870	2,270	--	--	1	42	--	21	1,870	2,340	118	239	118	245
Venezuela	11,600	--	--	--	--	--	--	--	11,600	--	5,780	--	6,280	--
Other	--	--	--	56	--	1	--	--	--	62	--	100	--	108
Total	9,350,000	3,510,000	73,800	87,600	133,000	74,100	234	658	9,560,000	3,670,000	3,080,000	1,780,000	3,160,000	1,810,000

-- Zero.

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

[2]Cost, insurance, and freight.

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

TABLE 7

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

(Thousand metric tons of K_2O equivalent)

Country	2005	2006	2007	2008	2009
Belarus	4,844	4,605	4,972	4,968	2,485
Brazil	405	403	424 r	383 r	385 p
Canada	10,140	8,518	11,085	10,455	4,318
Chile	547 r	496 e	515	559	692
China[e]	1,500	1,800	2,600	2,750	3,000 e
Germany	3,664	3,625	3,637	3,280	1,800
Israel	2,224	2,187	2,182	2,170 r	2,100 e
Jordan	1,115	1,036	1,096	1,223	683
Russia[3]	7,131	3,720	7,275	6,730	3,727
Spain[e]	575	435 3	435	435	435 e
Ukraine	13	8	12	12 r, e	12 e
United Kingdom	439	420	427	427 e	427 e
United States[4]	1,200	1,100	1,100	1,100	700
Total	33,800	30,400 r	35,700 r	34,500 r	20,800

[e]Estimated. [p]Preliminary. [r]Revised.

[1]World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Table includes data available through October 15, 2010.

[3]Reported figure.

[4]Rounded to no more than two significant digits.