

POTASH

By James P. Searls

Potash is used primarily as an agricultural fertilizer (plant nutrient) because it is a source of soluble potassium, one of the three primary plant nutrients; the others are fixed nitrogen and soluble phosphorus. Potash and phosphorus are mined products, and fixed nitrogen is produced from the atmosphere by using industrial processes. Modern agricultural practice uses these primary nutrients in large amounts, as well as other nutrients, such as boron, calcium, chlorine, copper, iron, magnesium, manganese, molybdenum, sulfur, and zinc, to assure plant health and proper maturation. These three major plant nutrients have no substitutes, but minor alternative sources of plant nutrients, such as animal manure, bone meal, compost, glauconite, guano, and “tankage” from slaughterhouses are available.

Potash denotes a variety of mined and manufactured salts, all containing the element potassium in water-soluble form. Potash can be potassium chloride [KCl, or muriate of potash (MOP)], potassium sulfate [K₂SO₄, or sulfate of potash (SOP), a manufactured product], potassium/magnesium sulfate [K₂SO₄·MgSO₄, or sulfate of potash magnesia (SOPM)], potassium nitrate (KNO₃, or saltpeter, a manufactured product), or mixed sodium/potassium nitrate (NaNO₃+KNO₃, or Chilean saltpeter).

The term “potash” was originally applied to potassium carbonate/potassium hydroxide crystals that were recovered in iron “pots” from leaching wood “ashes” with water. Arabian chemists first produced mostly sodium carbonate/sodium hydroxide crystals from plants and named them “alkalis.” Experience taught that hardwood tree ashes provided the highest potassium-to-sodium ratio, softwood ashes had less potassium, and reeds from saltwater marshes provided the highest sodium-to-potassium ratio. That spectrum of alkalis, ranging from mostly potassium to mostly sodium, provided the variety of glasses—thick-walled and viscous glasses from potassium alkalis made from wood ashes from the forests of Germany and Bohemia to thin-walled and workable glasses made in Venice, Italy, from sodium alkalis made from salt marsh plant ashes. Those alkali materials also were considered to be an industrial product for medicine.

The discovery of the mineral carnallite near Stassfurt, Germany, in 1851 enabled Justus von Liebig to identify a mined soluble potassium fertilizer in 1858. (The Stassfurt potash mine was depleted and closed in 1972.) Years of research has shown that, as a fertilizer, potassium in water-soluble form is beneficial to plants—activates many plant enzymes, maintains cell-wall shape through interior fluid pressure, aids photosynthesis in the leaves, helps transport sugars and starches up and down the plant stem, and aids nitrogen uptake and protein synthesis. Potash helps grow bigger plants and more fruit or seeds, strengthens plant stems, increases disease resistance, and increases plant resistance to stress from drought. In the plant kingdom,

potassium is more of a “regulator” than a building block, such as carbon or nitrogen, but in the animal kingdom, it is an essential building block for all nervous systems, and is ingested as a minor constituent of many foods.

Domestic Production

Reported production and sales were less accurate in 1997 because two companies purchased independent mines and mills, causing difficulties in reconciling bookkeeping styles for stocks, production, sales figures, and MOP used as a feed for SOP production. Sales of all types and grades of U.S.-produced potash was about 1.4 million tons,¹ K₂O equivalent, with an estimated value of about \$320 million.

The U.S. Geological Survey developed domestic potash data from voluntary semiannual surveys of U.S. operations. Of the 10 survey requests per half year sent to operations, 9 responded for the first half of the year, and 8 responded for the second half of the year. Those three missing surveys were estimated from previous responses and industry trends. Data from returned surveys were estimated to represent about 98% of the total production shown in table 1.

At the beginning of 1997, there were six potash-producing companies in the United States, IMC Kalium Carlsbad, Inc., Mississippi Potash, Inc.; Harris Chemical Group, Inc.; Potash Corporation of Saskatchewan Inc. (PCS), Reilly Chemical, Inc., and Western Ag-Mineral Company. At the end of the year, there were five potash-producing companies owing to IMC Kalium’s purchase of Western Ag-Mineral (IMC Global, 1997), the other SOPM production site in New Mexico.

In New Mexico, Mississippi Potash, Inc., of Mississippi Chemical Corp. had two mine and mill sites in the Carlsbad area plus a third site that is a compaction plant. Unofficially they are known as Mississippi Potash East (the former New Mexico Potash Mine and mill, and even earlier as the Kerr-McGee Mine and mill), Mississippi Potash West (the former U.S. Potash Co. Mine), and Mississippi Potash North (the former National Potash Mill). Compactors at the Mississippi Potash North site manufacture granular MOP from standard MOP produced at the Mississippi Potash West Mine and mill. The Eddy Potash, Inc., mine and mill (the former Potash Corporation of America Mine and mill) was permanently shut down in December after reserves were depleted. All above-ground traces of the former Horizon (AMAX) Mine and mill have been removed. PCS continued to handle the export sales for the Mississippi Potash Co. IMC Kalium’s finalization of the purchase of Western Ag-Mineral reduced the number of potash producers in New Mexico, the State with the largest volume of production in the United States, to two.

¹All tonnages are reported in metric tons, K₂O equivalent, unless otherwise noted.

Consequently, that State's production reveals proprietary information and will no longer be reported.

At the end of the year, IMC Kalium owned the IMC Mine and mill, the former Western Ag-Minerals Mine and mill, and the solution mine near Hersey, MI. IMC Kalium produced MOP, SOP, and SOPM at the IMC Kalium Carlsbad Mine and mill, SOPM at the Western AG-Mineral Co. Mine and mill, and MOP in Michigan. At the end of the year, IMC Kalium was also in the process of purchasing Harris Chemical Group, which includes the SOP production site of Great Salt Lake Minerals, a brine operation near Ogden, UT. When this purchase is completed, IMC Kalium will own all the SOP and SOPM (known collectively as the sulfates) production sites in the United States. Potash production at Searles Lake, CA, formerly a MOP and SOP production site, had been closed completely by North American Chemical before being purchased by IMC Kalium and is not likely to be reopened.

In Utah, Great Salt Lake Minerals Corp. of Harris Chemical North America continued to produce SOP, but Harris Chemical had agreed to be purchased by IMC Global Inc. late in the year. The Reilly-Wendover near-surface brine operation of Reilly Industries, Inc., continued production of MOP and manure salts. The Moab Salt Inc. solution mine continued production of MOP for PCS.

In Michigan, "During 1997, IMC Kalium completed the construction phase of its \$60.0 million expansion of the Hersey, MI, facility and full operations commenced. The plant's current annual potash production capacity is approximately 90,000 (160,000 short) tons, and salt capacity is approximately 270,000 (300,000 short) tons per year. These reserves are estimated to be sufficient to yield 62 million tons of concentrate from sylvinitite with an average grade of 60.0% K₂O. At current rate of production, these reserves are estimated to be sufficient to support operations for more than 300 years." (IMC Global, 1998, p. 10).

Environment

There was an allegation of heavy metals in fertilizers on the West Coast by a Seattle, WA, newspaper during the year. This allegation was not against potash producers or potash fertilizers. It was alleged that a certain source of zinc, a necessary micronutrient added to zinc deficient soil in mixed fertilizers, contained lead and cadmium in harmful amounts. Zinc aids in the production of certain amino acids.

Consumption

Owing to continued, abnormally low end-of-season grain stocks, favorable weather conditions, and reduction of government direction of planting following the passage of the Federal Agriculture Improvement and Reform Act, farmers planted approximately 16 million more acres than 1996. Estimated potash apparent consumption rose by about 10% to 6.4 million tons, second only to the 1979 calculated historic high of 6.9 million tons and just above the 1980 calculated 6.3 million tons.

According to the Potash & Phosphate Institute, shipments of agricultural potash from Canadian and U.S. producers increased by more than 21% compared with those of 1996, and shipments

of nonagricultural (industrial) potash shipments increased by more than 11% for a merged increase of 20%. The States receiving the largest shipments of agricultural and industrial potash from Canadian and U.S. producers were, in decreasing order, Illinois, Iowa, Ohio, Indiana, Missouri, Minnesota, Alabama, and Wisconsin. These eight States received about 58% of the total North American producers' total shipments to U.S. consumers. Of these States, the U.S. producers supplied 4% to Alabama, 2% to Illinois, 2% to Indiana, 1% to Iowa, 1% to Minnesota, 25% to Missouri, 4% to Ohio, and 1% to Wisconsin. The States receiving the largest shipments of agricultural and industrial potash from U.S. producers were, in decreasing order, Texas, California, Missouri, Mississippi, Kansas, Michigan, Florida, and Arkansas. These eight States received about 62% of domestic producers' sales to U.S. consumers, U.S. producers supplied about 91% to Texas, about 81% to California, about 26% to Missouri, about 39% to Mississippi, about 79% to Kansas, about 18% to Michigan, about 21% to Florida, and about 48% to Arkansas.

The States receiving the largest shipments of agricultural potash from Canadian and U.S. producers were, in decreasing order, Illinois, Iowa, Indiana, Ohio, Missouri, Minnesota, Wisconsin, and Michigan. These eight States received about 58% of the total North American producers' shipments to U.S. consumers. The States receiving the largest shipments of industrial potash from Canadian and U.S. producers were, in decreasing order, Alabama, Ohio, Wisconsin, and Delaware. These four States received about 64% of the total North American producers' total shipments to U.S. consumers, where the largest end use was most likely to be caustic potash manufacture. The next two States were Texas and Mississippi, which had nearly equal total shipments; the end use was most likely to be petroleum well drilling.

According to Johnson (1997), caustic potash (KOH) had several very important end uses. The largest was in potassium carbonate manufacture; video glass (television and computer monitors) accounted for 60% to 65% of that end use and is growing at a rate of 4% to 5% per year. Another end use of KOH is in the manufacture of potassium acetate; this is used for airport runway deicing and does not harm surrounding grass (or metallic airplane parts).

Stocks

Yearend stocks decreased more than 10% compared those of with 1996.

Transportation

Flooding on the Ohio River in the middle of March and on the lower Mississippi River near Baton Rouge, LA, in the second week of April was caused by the melting of heavy snow in the upper Midwest. Traffic upstream was halted by closed locks on the Ohio River due to heavy rains and a capsized barge and loose barges near Baton Rouge. March and April is often the field warehouse refill time for imported or domestic potash. Considering the 10% increase in apparent consumption for the year, the river traffic disruption did not do great damage to potash

consumption.

A joint venture between Canpotex Ltd. and Hall-Buck Terminals Marine Inc. known as Portland Bulk Terminals L.L.C. opened in March at the Port of Portland, OR, as an alternative to Vancouver, British Columbia. The site was a coal export pier that had never been used. The facility has a 100,000-ton capacity, as product, of potash storage, a 275-meter concrete dock with panamax depth, and twin unit-train rail tracks, triple rail car dumper, and conveyor belt loading.

Prices

The weighted average price per ton K₂O equivalent f.o.b. mine for all types and grades of U.S. potash was about \$ 227 for the full year. That price was \$222 in the first half of the year and \$232 for the second half of the year.

Foreign Trade

Total potash exports of the United States decreased by about 5%, by product tonnage, as reported by the Bureau of the Census. By K₂O tonnage, MOP was about 48% of total export, SOP about 31%; SOPM, was about 19%; and potassium nitrate, was about 2%. Latin America received about 57% of all U.S. exports and that included about 82% of MOP and about 51% of SOPM. Asia-Pacific received 32% of all U.S. potash exports and that included about 74% of SOP and about 30% of SOPM. Latin America total shipments declined by about 12%, because of the decline of MOP, while exports to Asia Pacific rose by about 30% with increases in MOP and SOP.

As reported by the U.S. Bureau of the Census, potash imports for consumption into the United States increased by about 8% to support the increase in estimated apparent consumption. About 99% of the total potash imports were MOP, and Canada provided about 95% of total MOP imports, or about 94% of total potash imports. Russia supplied about 5% of the total potash imports, also as MOP.

World Review

The estimate of world production for 1997 was up strongly from the revised 1996 production. The 1996 revised production was 23.4 million tons, and 1997 potash production was estimated to have risen to 25.7 million tons, or about a 10% increase. This included a 1.2-million-ton increase in Canada, increases of about 800,000 tons in Russia and 530,000 tons in Belarus, and some minor declines in other countries.

Consumption in Asia increased by about 1.65 million tons, with China increasing by about 1 million tons and India increasing by about 650,000 tons. Consumption in the United States increased by about 1 million tons. Latin America, primarily Brazil, increased consumption by about 400,000 tons. Western Europe was down slightly, as was Central Europe. Russia and Belarus rose slightly.

Asia.—This area, which includes Bangladesh, China, India, Indonesia, Japan, Malaysia/Singapore, Pakistan, the Philippines, the Republic of Korea, Sri Lanka, Taiwan, Thailand, and Vietnam, has started to take center stage in fertilizer world

(Phosphorus & Potassium, 1997a) Isherwood, K.F., June 1997, Global fertilizer consumption trends, accessed April 21, 1998, at URL <http://www.fertilizer.org/CROPS/FERTDEM/trends1.htm>. With more than 50% of the world's population and 28% of the world's arable land, the region has developing economies and changing tastes that include more meat and less grain. To grow more grain since meat production requires grain feeding, the region will have to bring potash application into better balance with applied nitrogen and phosphorus. Asia consumed 0.15 kilogram of K₂O to 1 kilogram of contained N in 1995 compared with a 1988 (Food and Agriculture Organization of the United Nations, 1989) ratio of 0.49 kilogram of K₂O to 1 kilogram of N for the developed market economies. The ratio suggested for China is 0.25 kilogram of K₂O to 1 kilogram of N. A second reason for more potassium involves a concern that a few countries in this region may be applying too much nitrogen, allowing nitrates to leach into the water supplies. On the positive side, studies showed that potash helps plants take up and use nitrogen more efficiently (Potash & Phosphate Institute, 1990).

Brazil.—The National Development Bank (of Brazil) was responsible for privatizing Companhia Vale do Rio Doce (CVRD) by auctioning a portion of the voting shares in April. There were demonstrations in the streets of Rio de Janeiro, but 45% of the stock was sold. CVRD continues to lease the mine from Petróleo Brasileiro S.A. and continues to operate the mine. (CVRD Annual Report at URL <http://www.cvrd.com.br/cvrd/cvrd-ing/ra98i/index.htm>).

Canada.—Canadian production increases brought their capacity utilization up to about 70%, with PCS operating at 53% average capacity for the year (Potash Corporation of Saskatchewan, 1998).

The final result of the partial purchase of K&S A.G. European property by PCS is discussed below under Germany.

The Potacan Mine at Clover Hill, New Brunswick, developed a serious leak in mid-June and was permanently closed at the end of October. PCS agreed to buy the Potash Company of Canada Ltd. (Potacan) with its mine and mill from the joint owners, K&S AG and Enterprise Minière et Chimique of France, reportedly for its compaction capacity, at the end of the year.

At the end of the year, there were only three potash producers in Canada, Agrium Inc., IMC Global's IMC Kalium Canada Ltd., and PCS.

Chile.—After receiving the final basic engineering report, Atacama Minerals Corp. of Canada continued its program development of the Aquas Blancas Project near Antofagasta [Chemical Market Reporter, 1997; Atacama Minerals Corp., Atacama Minerals announces completion of basic engineering, accessed October 7, 1997, through PointCast Industries (Mining/Metals)]. This report projects the production of 31,500 tons of potassium nitrate.

Kap Resources reported that initial iodine production which began in July at its Chilean unit, Minera Yolanda, was progressing well. Potassium nitrate production may have started in September (Green Markets, 1997).

Ethiopia.—Norsk Hydro signed a potash exploration agreement with the Ethiopian Ministry of Mines and Energy in September (Phosphorus & Potassium, 1997e). The agreement granted an exclusive license and exclusive right to explore for potash in the

Dallol region of Eritrea. At the beginning of the Second World War II, an Italian company had mined "niccoli salts" at this location, (Hedges, 1940).

Germany.—PCS began a partial purchase (51%) of the K&S AG of Hanover, Germany, from the Guano-Werke GmbH of BASF AG of Ludwigshafen, Germany early in the year. In February, the German Federal Cartel Office issued an order prohibiting the PCS partial purchase. PCS and K&S AG appealed to the German Ministry of Economics after the German Monopolies Commission, an advisory panel, recommended, in early June, that the Government not approve the purchase. The German Minister of Economic Affairs denied approval to the purchase in July, and PCS and K & S AG dropped the effort. In December, BASF AG of Germany reduced its stock ownership in less than 50% by selling a further 25% of its shares to private investors.

India.—India announced a reduction of the governmental subsidy to the farmers for the purchase of nitrogen and an increase in the subsidy for the purchase of potash (Fertilizer Focus, 1997). This action reinforced the move towards a higher ratio of potash to nitrogen.

Israel.—The shutdown at the Haifa Chemicals 135,000-ton-capacity potassium nitrate plant in Haifa ended in March with a wage cut and layoffs (Fertilizer Markets, 1997). The Dead Sea Works, a MOP operation, was considering spending \$20 million for a 150,000-ton MOP expansion (Chemical Week, 1997). Israel Chemical Ltd. announced a cessation of potassium sulfate production from the 25,000 ton capacity Manheim furnace owned by Fertilizer & Chemicals Ltd. during the year (Phosphorus & Potassium, 1997b). It was regarded as not core business.

Spain.—The Subiza Mine in Navarra closed in early May for lack of profitable ore reserves. The Government of Spain announced that it would privatize Grupo Potasas, which operated the country's two potash mines, Suria K SA and Potasas del Llobregat SA (Phosphorus & Potassium, 1997c; Phosphorus & Potassium, 1997d). There was no information on this privatization at the end of the year.

Thailand.—Asia Pacific Resources Ltd. continued its development of the Somboon deposit, one of two deposits in the Udon Thani concession. Asia Pacific Resources Ltd. held a 62.5% equity interest, Metro Resources Ltd., 27.5% interest, and the Government of the Kingdom of Thailand, a 10% interest in Asia Pacific Potash Corp., which held the concession (Asia Pacific Resources Limited, 1997).

Outlook

Early in 1998, after IMG Global completes its purchase of Harris Chemical Group there will be only four potash companies in the United States; IMC Global, Mississippi Potash, Moab Salt of PCS, and Reilly Chemicals (Wendover, UT).

Domestic potash prices increased slightly in the second half of 1997 and will continue to increase into the first half of 1998. Domestic and, most likely, foreign potash producers will show larger profits or smaller losses. If the worldwide crop production for 1997-98 brings the end-of-season stocks up to normal levels, crop prices should drop and there may be a decrease in potash demand starting in the last half of 1998. There have been several

years of steady or increasing potash market demand. By withholding production capacity, two leading international producers were able to keep potash inventory levels below values that would trigger price-lowering pressure. The price-taking potash producers have had no problem selling their product. There may even be some new entrants into the ranks of potash producers, believing in the security of capacity withholding. Then, if there is a reduction in potash demand, however, there may be period of increased competition among market leaders or between market leaders and price takers, ending in lower prices to the consumers of potash, before production levels decrease owing to producer losses.

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TABLE 1
SALIENT POTASH STATISTICS 1/ 2/

(Thousand metric tons and thousand dollars, unless otherwise specified)

	1993	1994	1995	1996	1997	
United States:						
Production	3,070	2,830	3,050	2,890	2,900 3/	
K ₂ O equivalent	1,510	1,400	1,480	1,390	1,400 3/	
Sales by producers	3,030	2,970	2,880	2,960	3,000 3/	
K ₂ O equivalent	1,480	1,470	1,400	1,430	1,400 3/	
Value 4/	dollars	\$286,000	\$284,000	\$284,000	\$299,000	\$320,000
Average value per ton of product	do.	\$94.36	\$95.93	\$98.58	\$101.08	\$108.00
Average value per ton of K ₂ O equivalent	do.	\$192.72	\$193.50	\$202.43	\$208.57 r/	\$227.00
Exports 5/	935	997	938	1,100	1,070	
K ₂ O equivalent	415	464	409	481	466	
Imports for consumption 5/ 6/	7,200	7,930	7,960	8,140	9,030	
K ₂ O equivalent	4,360	4,800	4,820	4,940	5,490	
Customs value	do.	\$578,000	\$642,000	\$602,000	\$563,000	\$610,000
Consumption, apparent 7/	9,300	9,890	9,900	10,000	11,000 3/	
K ₂ O equivalent	5,430	5,810	5,820	5,890	6,500 3/	
Yearend producers' stocks, K ₂ O equivalent	305	234	312	265	W	
World: Production, marketable K ₂ O equivalent	20,400	23,100	24,700	23,400 r/	25,700 e/	

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data.

1/ Includes muriate and sulfate of potash, potassium magnesium sulfate, and some parent salts. Excludes other chemical compounds containing potassium.

2/ Data are rounded to three significant digits, unless otherwise specified, except prices.

3/ Data rounded to two significant digits.

4/ F.o.b. mine.

5/ Excludes potassium chemicals and mixed fertilizers.

6/ Includes nitrate of potash.

7/ Calculated from sales plus imports minus exports.

TABLE 2
PRODUCTION CRUDE ORE IN NEW MEXICO 1/

(Thousand metric tons)

Period	Crude salts 2/ (mine production)	
	Gross weight	K ₂ O equivalent
1996		
January-June	6,790	835
July-December	6,320	756
Total	13,100	1,590
1997		
January-June	6,730	807
July-December	6,570	799
Total	13,300	1,610

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Sylvinite and langbeinite.

TABLE 3
SALES OF NORTH AMERICAN POTASH, BY STATE OF DESTINATION 1/

(Metric tons of K₂O equivalent)

State	Agricultural potash		Nonagricultural potash	
	1996	1997	1996	1997
Alabama	98,200	103,000	230,000	231,000
Alaska	582	719	1,530	2,830
Arizona	6,020	5,380	707	1,290
Arkansas	80,700	81,900	1,150	383
California	116,000	129,000	12,200	13,700
Colorado	14,500	18,400	2,070	1,790
Connecticut	1,910	3,450	1,120	1,450
Delaware	22,800	32,300	49,100	58,200
Florida	194,000	186,000	5,390	8,810
Georgia	167,000	195,000	1,680	1,990
Hawaii	7,180	5,770	44	11
Idaho	39,500	43,200	1,140	1,090
Illinois	552,000	690,000	17,100	21,000
Indiana	284,000	412,000	3,780	17,100
Iowa	421,000	512,000	6,560	8,410
Kansas	53,300	61,100	4,510	7,470
Kentucky	132,000	172,000	1,200	1,380
Louisiana	124,000	93,700	4,020	4,620
Maine	6,910	6,330	756	437
Maryland	32,200	35,600	743	868
Massachusetts	3,830	4,230	661	1,010
Michigan	184,000	216,000	7,370	8,460
Minnesota	312,000	354,000	7,530	6,250
Mississippi	117,000	115,000	8,160	24,100
Missouri	208,000	375,000	7,370	10,100
Montana	17,600	19,600	103	154
Nebraska	42,500	55,200	1,720	2,460
Nevada	619	851	142	814
New Hampshire	641	539	76	79
New Jersey	5,190	8,330	1,340	2,000
New Mexico	6,740	6,470	22,400	20,500
New York	57,500	81,100	1,470	2,450
North Carolina	125,000	166,000	1,180	1,120
North Dakota	30,700	34,700	120	5,280
Ohio	334,000	409,000	73,500	85,800
Oklahoma	18,300	24,000	3,790	7,090
Oregon	37,300	50,200	1,740	1,550
Pennsylvania	57,400	64,200	12,600	10,700
Rhode Island	915	438	198	586
South Carolina	70,100	80,900	1,370	1,510
South Dakota	17,000	17,400	434	495
Tennessee	92,700	106,000	8,720	1,740
Texas	150,000	155,000	19,200	24,400
Utah	5,120	7,890	6,950	6,110
Vermont	5,030	6,210	234	95
Virginia	88,500	108,000	225	672
Washington	43,800	63,400	1,360	1,250
West Virginia	2,630	3,600	1,080	872
Wisconsin	215,000	261,000	75,900	60,300
Wyoming	5,030	8,070	588	10,300
Total	4,610,000	5,590,000	612,000	682,000

1/ Data are rounded to three significant digits; may not add to totals shown.

Source: Potash & Phosphate Institute.

TABLE 4
SALES OF NORTH AMERICAN MURIATE OF POTASH
TO U.S. CUSTOMERS, BY GRADE 1/

(Thousand metric tons of K₂O equivalent)

Grade	1996	1997
Agricultural:		
Standard	272	289
Coarse	1,940	2,520
Granular	1,700	2,010
Soluble	484	531
Total	4,400	5,350
Nonagricultural:		
Soluble	75	63
Other	525	601
Total	600	664
Grand total	5,000	6,010

1/ Data are rounded to three significant digits; may not add to totals shown.

Source: Potash & Phosphate Institute.

TABLE 5
PRICES OF U.S. POTASH, BY TYPE AND GRADE 1/

(Dollars per metric ton of K₂O equivalent)

Type and grade	1996		1997 2/	
	January- June	July- December	January- June	July- December
Muriate, 60% K ₂ O minimum:				
Standard	131.82	136.31	137.00	139.00
Granular	131.11	135.39	145.00	153.00

1/ Average prices, f.o.b. mine, based on sales.

2/ Data rounded to nearest dollar.

TABLE 6
U.S. EXPORTS OF POTASH, BY TYPE 1/

	Approximate average K ₂ O content (percent)	Quantity (metric tons)	
		Product	K ₂ O equivalent
1996			
Potassium chloride, all grades	61	393,000	239,000
Potassium sulfate	51	283,000	144,000
Potassium magnesium sulfate	22	411,000	90,500
Potassium nitrate	45	14,300	6,430
Total	XX	1,100,000	481,000
1997			
Potassium chloride, all grades	61	365,000	223,000
Potassium sulfate	51	288,000	147,000
Potassium magnesium sulfate	22	404,000	88,900
Potassium nitrate	45	15,900	7,140
Total	XX	1,070,000	466,000

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

Source: Bureau of the Census.

TABLE 7
U.S. EXPORTS OF POTASH, BY COUNTRY 1/

(Metric tons of product)

Country	Potassium chloride		Potassium sulfate, all grades 2/		Potassium nitrate		Total	
	1996	1997	1996	1997	1996	1997	1996	1997
Argentina	1,980	41	17,800	13,100	--	--	19,800	13,200
Australia	165	39	115	4,040	36	10	316	4,090
Belgium	66	--	1,940	12	275	--	2,280	12
Brazil	59,800	55,000	7,380	9,780	--	154	67,100	64,900
Canada	11,800	3,730	75,600	78,900	4,730	5,150	92,200	87,700
Chile	26,400	16,700	39,400	36,300	--	--	65,700	53,000
China	--	--	91,800	185,000	--	--	91,800	185,000
Colombia	9,370	1,040	10,500	20,300	62	--	20,000	21,300
Costa Rica	28,000	46,700	39,500	56,200	--	--	67,500	103,000
Dominican Republic	35,800	24,600	6,400	6,440	19	19	42,200	31,000
Ecuador	24,700	7,070	4,450	16,400	17	6	29,100	23,400
France	16,500	9	9	--	--	--	16,500	9
Guatemala	7,620	7	3,000	8,850	--	1	10,600	8,860
Honduras	2,130	457	4,240	5,650	--	155	6,370	6,260
Italy	16,100	30,800	--	11	--	--	16,100	30,900
Japan	3,010	13,000	174,000	129,000	17	111	177,000	142,000
Korea, Republic of	1,380	9,370	21,600	5,600	--	226	23,000	15,200
Malaysia	--	--	94	204	2,010	2,070	2,100	2,280
Mexico	115,000	82,900	84,300	75,300	3,220	6,870	203,000	165,000
Peru	6,170	95	24,500	10,200	--	--	30,700	10,300
Philippines	--	18	35	5,530	--	--	35	5,540
Thailand	8	--	12,900	600	--	--	12,900	600
Venezuela	919	16,800	33,900	12,900	30	17	34,800	29,700
Zimbabwe	--	--	21,000	--	--	--	21,000	--
Other	25,700	56,800	20,000	12,100	3,880	1,070	49,500	70,000
Total	393,000	365,000	694,000	692,000	14,300	15,900	1,100,000	1,070,000

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes potassium magnesium sulfate.

Source: Bureau of the Census.

TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF POTASH, BY TYPE 1/

	Approximate average K ₂ O content (percent)	Quantity (metric tons)		Value (thousands)	
		Product	K ₂ O equivalent e/	Customs	C.i.f.
1996:					
Potassium chloride	61	8,030,000	4,900,000	\$539,000	\$630,000
Potassium sulfate	51	60,400	30,800	11,300	12,900
Potassium nitrate	45	30,400	13,700	8,690	9,990
Potassium sodium nitrate mixture	14	21,900	3,070	3,430	3,930
Total	XX	8,140,000	4,940,000	563,000	657,000
1997:					
Potassium chloride	61	8,940,000	5,450,000	590,000	685,000
Potassium sulfate	51	56,300	29,700	11,400	12,900
Potassium nitrate	45	19,200	8,640	5,430	6,190
Potassium sodium nitrate mixture	14	19,900	2,790	3,060	3,520
Total	XX	9,030,000	5,490,000	610,000	707,000

e/ Estimated. XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

Source: Bureau of the Census.

TABLE 9
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 1/ (metric tons)		Total value (thousands)			
											Customs		C.i.f.	
	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997
Belarus	--	6,800	--	--	--	--	--	--	--	6,800	--	\$607	--	\$709
Belgium	2,800	--	4,600	42	40	--	--	--	7,440	42	\$1,180	13	\$1,450	14
Canada	7,540,000	8,450,000	6,600	7,750	--	4	1,340	571	7,540,000	8,460,000	504,000	556,000	589,000	646,000
Chile	--	--	80	20	15,600	14,300	20,600	19,400	36,200	33,700	7,420	6,820	8,380	7,700
Denmark	--	--	--	2	1,470	357	--	4	1,470	363	495	129	658	161
Dominican Republic	--	--	160	--	--	--	--	--	160	--	53	--	59	--
Germany	5,120	5,500	48,700	48,200	275	143	--	--	54,100	53,900	9,320	9,660	10,700	11,100
Israel	33,900	2	--	--	12,500	3,930	--	--	46,400	3,930	7,360	1,100	8,370	1,350
Japan	--	82	28	219	440	387	--	--	468	688	177	575	195	656
Jordan	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Latvia	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Liberia	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mexico	--	--	1	--	--	--	--	--	1	--	4	--	4	--
Netherlands	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poland	18,700	--	--	--	36	69	--	--	18,700	69	2,060	40	2,380	46
Russia	427,000	472,000	50	--	--	--	--	--	427,000	472,000	29,800	34,900	35,100	39,500
United Kingdom	1,310	109	--	1	--	--	--	--	1,310	110	295	105	340	117
Other	140	207	120	46	60	16	--	--	320	269	173	91	195	113
Total	8,030,000	8,940,000	60,400	56,300	30,400	19,200	21,900	19,900	8,140,000	9,030,000	563,000	610,000	657,000	707,000

1/ Data are rounded to three significant digits; may not add to totals shown.

Source: Bureau of the Census.

TABLE 10
MARKETABLE POTASH: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Thousand metric tons of K₂O equivalent)

Country	1993	1994	1995	1996 e/	1997 e/
Belarus	1,947	3,021	3,211	2,720 r/	3,250
Brazil	168 r/	234 r/	215 r/	243 r/ 3/	243
Canada	6,836	8,037	8,855	8,120 r/ 3/	9,301 p/
Chile	55 4/	50 4/	50 e/	180 r/	240
China e/	25	74	80	110	115
France	890	870	799	751 r/	665 3/
Germany	2,861	3,286	3,278	3,332 r/ 3/	3,423 3/
Israel	1,309	1,259	1,330 r/ e/	1,500 r/	1,488 3/
Italy	20 e/	--	--	--	--
Jordan	822	930	1,112 r/	1,060 r/	849 3/
Russia	2,628	2,498	2,800	2,620 r/	3,400
Spain	661	684	760 r/	680 r/	640
Ukraine	88 e/	168	110	100	100
United Kingdom	555	580	582 e/	618 r/	565
United States	1,510	1,400	1,480	1,390 3/	1,400 p/
Total	20,400	23,100	24,700	23,400 r/	25,700

e/ Estimated. p/ Preliminary. r/ Revised.

1/ World totals, U.S. data, and estimated data are rounded to three significant digits; may not add to totals shown.

2/ Table includes data available through April 24, 1998.

3/ Reported figure.

4/ Data from Comisión Chilena del Cobre. This is the sum of potassium chloride production and exports of mixed sodium-potassium nitrates.