

# POTASH

By James P. Searls

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 [ $K_2SO_4$ , or sulfate of potash (SOP)], potassium-magnesium sulfate ( $K_2SO_4 \cdot MgSO_4$ , or sulfate of potash magnesia), potassium nitrate ( $KNO_3$ , or saltpeter), or mixed sodium-potassium nitrate ( $NaNO_3 + KNO_3$ , or Chilean saltpeter).

The term "potash" was originally applied to potassium carbonate/potassium hydroxide crystals that were recovered in iron "pots" from leaching wood (or other plant) "ashes" with water. That material was considered to be an industrial product, because it was too expensive to use as a fertilizer. As a fertilizer, potassium in water-soluble form activates 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, aids in nitrogen uptake and protein synthesis, strengthens plant stems, increases disease resistance, and increases plant resistance to stress.

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. There are no substitutes for these three plant nutrients, but there are minor sources of plant nutrients, such as animal manure, bone meal, guano, "tankage" from slaughterhouses, and glauconite. Modern agricultural practice uses these primary nutrients in large amounts plus additional nutrients, such as boron, calcium, chlorine, copper, iron, magnesium, manganese, molybdenum, sulfur, and zinc, to assure plant health and proper maturation.

## Legislation and Government Programs

In 1987, there was an antidumping investigation of the Canadian potash producers resulting in a suspension of the antidumping duty investigation agreement in early 1988 (U.S. Department of Commerce, International Trade Agency, Import Administration, 1988). In January 1993, this agreement was extended by the U.S. Department of Commerce for an indefinite period (IMC Global Inc., 1996, p. 21), with one domestic company responsible for continuing the suspension. That one domestic company now includes the three original petitioners. The intent of the agreement is to prevent the sale of Canadian potash into the United States at no less than "fair value."

In 1993, the Antitrust Division of the U.S. Department of Justice initiated a grand jury investigation into allegations that

the North American potash producers acted together to fix the price of potash sold in the United States between 1987 and 1994. In June 1996, the companies remaining under investigation were advised that the investigation had been concluded, and a spokesperson for the Antitrust Division stated that no action would be taken (IMC Global Inc., 1996, p. 9).

The consolidated class action suit against most of the North America potash producers filed by the direct purchasers in Federal District Court in St. Paul, MN, alleging actions to fix the price of potash sold in the United States received a setback in September. The Federal Magistrate overseeing the case formally recommended to the presiding judge dismissal of the suit by summary judgment. Indirect purchasers residing in California have filed in California State courts for the same allegations. At the end of the year, the California suits were still preliminary with no discovery proceedings having occurred (IMC Global Inc., 1996, p. 9).

## Production

Production of all types and grades of potash in the United States in 1996 declined from 1.5 million metric tons,  $K_2O$  equivalent<sup>1</sup>, to 1.4 million tons. Sales of all types and grades of U.S. produced potash were unchanged from 1995's level of about 1.4 million tons and the marketable potash value, f.o.b. mine, of about \$299 million increased less than 8% from 1995.

The U.S. Geological Survey developed potash domestic data from voluntary semiannual surveys of U.S. operations. Of the 10 survey requests per half year sent to operations, nine responded. Data from the responses are estimated to consist of about 98% of total production shown in Table 1.

In the beginning of 1996, the Carlsbad, NM, potash producers were Eddy Potash Inc. (EP), owned by Trans-Resources, Inc.; IMC Global Operations Inc., owned by IMC Global Inc.; Mississippi Potash, Inc. (MP), owned by Mississippi Chemical Corp.; New Mexico Potash, Inc. (NMP), owned by Trans-Resources; and Western Ag-Minerals Inc., owned by Rayrock Resources of Toronto, Canada. In the first quarter of 1996, IMC Global Inc. and The Vigoro Corp. merged into a single company. The potash portion of the company was named IMC Kalium and includes two domestic operations, one in Carlsbad and the other in Hersey, Michigan. The Carlsbad operation produces muriate of potash, sulfate of potash, and sulfate of potash-magnesia. In the third quarter of 1996,

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<sup>1</sup>All tonnages are reported in metric tons,  $K_2O$  equivalent, unless otherwise noted.

Mississippi Chemical completed negotiations with Trans-Resources to purchase EP and NMP. The purchase was valued at \$45 million plus an adjustment for current working capital of about \$11 million. EP became a wholly owned subsidiary of MP, and NMP was merged into MP (Mississippi Chemical Corp., 1997). MP annual capacity was reported to be about 232,000 tons, and the combined annual capacity of EP and NMP was placed at 481,000 tons. These three operations produce only muriate of potash. Western Ag-Mineral reported that it had brought a continuous miner into its langbeinite mine (Green Markets, 1996c) and the miner was working well. This mine has traditionally been an undercut-drill-blast-load operation because the ore was thought to be too hard for mechanical miners. At the end of the year, only three companies, IMC Kalium, MP, and Western Ag-Mineral, were operating in Carlsbad, NM. Potash Corporation of Saskatchewan Inc. (PCS) of Canada continued to market potash exports for three New Mexico operations, now in a single company owned by Mississippi Chemical, as a cost-cutting effort for the producers.

In Utah, producers were Great Salt Lake Minerals Corp. (GSLMC), affiliated with Harris Chemical North America Inc.; Moab Salt Inc., owned by PCS; and Reilly-Wendover of Reilly Industries Inc. GSLMC has increased its production above the 1984 capacity of 100,000 tons per year but has not reached the target capacity of 200,000 tons per year (Fertilizer Markets, 1996c; Green Markets, 1996a). The company announced a further capacity target of 280,000 tons per year by September 1997. Reilly-Wendover signed an agreement with the U.S. Bureau of Land Management and the State of Utah School and Institutional Trust Lands Administration to add salt to parts of the surface of the Bonneville Salt Flats over a 5-year period beginning on September 1, 1995 (Barrett, 1995). Reilly will annually flood the international raceway area with saturated salt (NaCl) water, the salt coming from an evaporation pond. The natural evaporation of salt-saturated water will cause crystals of salt to form, thickening the surface of the Salt Flats by 1.1 centimeters per year. The flooding will supply more than 900,000 tons per year of salt. Reilly Industries has set aside a fund of \$800,000 to fund the salt-surface replenishment. There had been concern by the operators of the international raceway area that the salt layer had become dangerously thin for speeding vehicles.

In California, North American Chemical Co., managed by Harris Chemical North America Inc., produced soda ash, salt cake, borax pentahydrate, muriate of potash, and sulfate of potash. Beginning in April 1996, the muriate of potash and sulfate of potash circuits were permanently shut down (Fertilizer Markets, 1996d; Green Markets, 1996b). From April on, North American Chemical sold SOP from GSLMC and was a dealer for a Canadian MOP producer to its historical domestic customers.

In Michigan, IMC Kalium produced MOP from a deep solution mine at the Hersey mine. Capacity was scheduled to rise from 30,000 tons per year to 90,000 tons per year, and to be completed by April 1997.

MOP accounted for 61% by tonnage of total domestic sales but only 39% of sales by dollars, and SOP accounted for about 21% of tonnage and 31% of sales by dollars. The "Other" category accounted for 18% of tonnage and 30% of sales by dollars.

## Consumption

The poor harvest of 1995 with the resulting reduction of potash removal from the soil by harvesting the crop left a higher-than-normal residual potash in the soil for the beginning of 1996. This type of situation usually causes a reduced level of potash consumption in the ensuing year. Also, the floods and the droughts in spring 1996 prevented some fertilizer application. Futures market prices for grains, however, climbed through March and April, reaching 20-year highs in May and June. Extraordinary price expectations usually stimulate increased planting and fertilizer application. These strong, opposing stimuli canceled each other and potash consumption was only slightly above the 1995 level.

Apparent consumption of potash in the United States increased about 1% or 70,000 tons from that of 1995. Domestic sales in the domestic market decreased by about 4%, or 42,000 tons, and imports from Canada increased about 1% or 48,000 tons. Imports from other countries increased by about 25%, or 120,000 tons. Imports for Belarus fell from 94,000 tons to zero, and imports from Russia increased from 100,000 tons to 260,000 tons.

According to the Potash & Phosphate Institute, shipments of agricultural potash from Canadian and U.S. producers decreased by about 6%, and those of nonagricultural potash increased by 10% for a total decrease of 4% from 1995. The States receiving the largest shipments of agricultural potash from Canadian and U.S. producers were, in decreasing order, Illinois, Iowa, Ohio, Minnesota, Indiana, Wisconsin, and Missouri. These seven States received about 50% of the total North American producers' agricultural shipments to U.S. consumers. Coarse muriate of potash was 55% of the 3-muriates of potash received from Canada. Coarse muriate of potash was 3% of the domestic producer's 3-muriates of potash sales in 1996. Domestic producers accounted for about 1% of the shipments to Illinois, 11% to Iowa, 5% to Ohio, about 1% to Minnesota, 2% to Indiana, about 1% to Wisconsin, and about 50% to Missouri. The States receiving the largest portion (62%) of domestically produced agricultural potash were, in decreasing order, Texas, Missouri, California, Mississippi, Kansas, and Florida.

The States receiving the most (70% of the total) shipments of nonagricultural potash from Canadian and U.S. producers were, in decreasing order, Alabama, Wisconsin, Ohio, and Delaware.

## Stocks

Yearend stocks decreased about 15% compared with those of 1995. Yearend stocks represented about 19% of annual production, or about 10 weeks of average production.

## Prices

The weighted average price per ton K<sub>2</sub>O equivalent f.o.b. mine for all types and grades of U.S. potash sales was \$208.80 for the full year, an increase of about 3% compared with that of 1995, and \$203.70 for the first half of the year, and \$215 for the second half of the year. The weighted average annual prices for standard grade muriate of potash per ton f.o.b. mine was \$133.53, down 3% from 1995; coarse grade, \$128.34, up 2% from 1995; and granular grade, \$133.15, down 4% from 1995. The weighted average annual price for the three muriates of potash per ton f.o.b. mine was \$133.10, a decrease of 3% from 1995.

## Foreign Trade

Total potash exports of the United States increased by about 18%, by tonnage, as reported by the Bureau of Census. Muriate of potash was about 50% of exports, sulfate of potash was about 30%, sulfate of potash-magnesia was 19%, and nitrate of potash was 1%. Muriate of potash exports increased by 33%, and sulfate of potash exports decreased slightly compared with those of 1995. The major destinations for U.S. potash exports were countries in Latin America and the Pacific Basin. Latin America received about 62% of total potash exports, including 87% of muriate of potash, 36% of sulfate of potash, and 43% of sulfate of potash-magnesia. Muriate of potash to Latin America increased by about 64% to 206,000 tons. The Pacific Basin received about 24% of total potash exports, including 53% of sulfate of potash and 37% of sulfate of potash-magnesia.

Potash imports for consumption into the United States increased slightly, as reported by the U.S. Bureau of the Census. Ninety-three percent of potash imports came from Canada.

## World Review

The estimate of world production for 1996 is 23.9 million tons, about 800,000 tons below that of 1995 and based on lower sales to India and China. Those two countries may have bought more potash than they needed in 1995 and used the spare tonnage in 1996 as leverage to either force down the price or arrest price increases.

**Argentina.**—In Argentina, the CRA Ltd., now Dual Listed Company with The RTZ Corporation PLC, withdrew from the Potasio Rio Colorado project after a feasibility study judged the project insufficiently promising (Fertilizer International, 1996b, Fertilizer Markets, 1996j).

**Brazil.**—The Government of Brazil began the privatization of the Companhia Vale do Rio Doce, the present lessee of the potash mine at the Tarquari-Vassouras Mine. There has been public opposition to the privatization so the outcome of this effort was unforeseeable.

**Belarus.**—In 1996, Belarus potash operations operated at about 50% capacity to maintain product stocks below levels that would trigger downward pressure on prices. This was difficult for the miners, because the mining operations often support the

schools, hospitals, and other town facilities in their areas.

**Canada.**—PCS operated at 46% capacity in 1996, [in the Province of Saskatchewan, not including the Patience Lake Mine] (Potash Corporation of Saskatchewan, 1997), by temporarily shutting down mines and mills to control the size of their stocks of finished products. Other Canadian producers operated at larger fractions of their capacity.

PCS reached an agreement with the German corporation BASF AG to purchase 51% of Kali und Salz Beteiligungs AG (K&S AG) of Hanover, Germany for deutsche marks (DM) 250 million (Potash Corporation of Saskatchewan Inc., 1996). K&S AG owns 51% of the operating company Kali und Salz GmbH of Kassel, Germany, while the German Government entity Beteiligungs-Management Gesellschaft BerlinmbH, which contributed DM 1.5 billion in 1993, owns 49%. The contribution was through Treuhandanstalt to finance the merger of former East and West German potash producers including the costs of downsizing, modernization, and retirement for redundant workers. K&S AG also owns 50% of Potacan, Ltd. in Toronto, Canada, the operator of the Clover Hill Potash Mine near Sussex, New Brunswick. Potacan was owned in equal parts by Entreprise Minière et Chimique (EMC) of Paris, France, and K&S AG.

PCS, purchased the Texasgulf fertilizer lines (phosphate and potash), White Springs Phosphate (from Occidental Chemical Corp. for phosphate capacity) in 1995, and Arcadian Corp. of Memphis, TN, in 1996, giving PCS a significant portion of the world's nitrogen capacity.

At the end of the year, the four potash producers in Canada were Agrium, IMC Global, Potacan, and PCS. Potacan produces only potash and the others are integrated fertilizer producers. Canpotex Ltd. is the exporting company for all the Saskatchewan potash producers; it does not export New Brunswick mined potash.

**Chile.**—In Chile, Kap Resources Ltd. projected that the Yolanda Project, which will produce potassium nitrate and iodine, will be ready in summer 1997 (Fertilizer Markets, 1996g). Sociedad Quimica Y Minera de Chile S.A. reported that its Minsal Project began producing potassium chloride at the beginning of 1996 (Fertilizer Markets, 1996e). This potassium chloride was used for converting sodium nitrate to potassium nitrate at the Maria Elena Plant in the caliche ore region of Antafagosta Province and displaced imported Canadian potassium chloride. Boron Chemicals International Ltd. of Canada was reported to be developing a potassium nitrate (with iodine and sodium sulfate) resource known as the Aquas Blancas property, which is about 95 kilometers to the southeast of Antafagosta in a caliche deposit. (Industrial Minerals, 1996a)

**Germany.**—BASF AG was withdrawing to "core" business by selling its magnetic tape subsidiary and potash subsidiaries. See the Canadian discussion above for the companies and situation of the proposed potash purchase. The German Government Cartel Agency announced its intention to investigate the purchase carefully (Fertilizer Markets, 1996b).

**Israel.**—In January, Haifa Chemical Ltd. of Trans-Resources

Inc. of the United States reopened its second potassium nitrate circuit at the Haifa site after repairing the damage of the 1994 fire. Potassium nitrate capacity at Haifa returned to about 140,000 tons (Phosphorus & Potassium, 1996c). In early 1995, Haifa Chemical had started a new, 50,000 tons potassium nitrate circuit at Mishor Rotem.

**Italy.**—The regional government of Sicily began a search for a private partner to purchase 51% of the potassium sulfate production site in Sicily (Phosphorus & Potassium, 1996e). This site closed during 1992 as a result of water inflows into the mine (Industrial Minerals, 1996b).

**Jordan.**—Having successfully followed Israel's lead in producing potassium chloride from the Dead Sea, Jordan began a program during the summer to follow Belgium's Tessenderlo Chemie by producing potassium sulfate (and dicalcium phosphate) (Phosphorus & Potassium, 1996d; Fertilizer International, 1996a). Jordan has also begun a review of the magnesium and bromine markets for future development.

**Russia.**—In 1996, Russian potash operations operated at about 50% capacity to maintain product stocks below levels that would trigger downward pressure on prices. This was difficult for the miners, because the mining operations often support the schools, hospitals, and other town facilities in their areas.

**Spain.**—Since 1992, the Spanish potash industry has modernized to compete in the European Single Market, to make a profit, and to be ready for the cessation of production from the French potash mines in 2004 (Phosphorus & Potassium, 1996a). It improved particle-size production facilities to meet the market's expectations of sizes for blending, upgraded their transportation facilities for rail and truck loading to reach beyond the Spanish borders, and added sales offices in southern France. Also, the European Union's competition agency allowed the former East and West German potash mines to form a single management entity (Kali & Salz AG) only if that entity withdrew from the German-French potash marketing agency in France to allow more competition.

**Thailand.**—The Government of Thailand restarted investigations of possible ways to mine the carnallite deposit at Bamnet Narong [the Association of South-east Asian Nations (ASEAN) potash mine] and began the development of the salt portion of the mine (Bangkok Post, 1996). Also, Asian Pacific Resources of Canada was hunting for committed partners for the Udon Thani sylvinitic resource (Fertilizer Markets, 1996a).

**United Kingdom.**—Cleveland Potash Ltd. production has been increasing at a steady pace for many years, primarily under the North Sea. Recently the company has begun producing under the North York Moors National Park, which they would like to continue for the remainder of the Boulby Mine's lifetime (Phosphorus & Potassium, 1996b).

## Outlook

In the long term, the domestic potash producers will likely maintain their present position in the domestic market and the export market to the Caribbean and west coast of South

America. Trade liberalization owing to the Uruguay Round of GATT should increase potash consumption in the United States through expected increased crop exports, since the U.S. farm industry has traditionally been a relatively efficient and low-cost producer of major crops. Imported potash from Canada will likely supply most of this gain in consumption.

With the amount of overcapacity in evidence in Canada and the former Soviet Union, the prospect for adding new capacity, outside of niche locations in the Pacific Basin, seem futile unless the product is other than muriate of potash and has some natural advantage, in the sense that f.o.b. mine plus transportation cost to a large consuming area is less than the present supplier's total cost to that same area. Until consumption increases around the world, especially Asia and Latin America, and the farmers of Central Europe and the former Soviet Union are able to invest in potash, other fertilizers, and modern farming technology, there will be overcapacity in the worldwide potash industry. Realizing those facts, it becomes a simple exercise in not driving down the price of potash so that present producers leave the industry, only to resurrect old capacity or invest in new capacity 10 years in the future with the ensuing increased demand. Generally, world-wide potash consumption will remain loosely tied to long-term population growth, with adjustments for food type preferences, choices between food and non-food consumer goods, choices between "guns and butter," and present consumption and investment.

## References Cited

- Bangkok Post, 1996, Potash mine to begin salt production soon: Bangkok Post, November 25, p. 2.
- Barrett, Jennifer, 1995, Reilly offers \$800K for salt replacement: Tooele Transcript-Bulletin, Tooele, UT, USA, v. 102, no. 39, October 12, p. 1-2.
- Fertilizer International, 1996a, A springboard for growth: Fertilizer International, no. 353, July-August, p. 46-48.
- 1996b, CRA drops potash venture: Fertilizer International, no. 353, July-August, p. 17.
- Fertilizer Markets, 1996a, Asia Pacific says Thai potash mine would produce product at \$30/mt: Fertilizer Markets, v. 7, no. 3, August 12, p. 3.
- 1996b, German cartel office says it, not EC will review K&S stock sale to PCS: Fertilizer Markets, September 2, p. 2.
- 1996c, Great Salt Lake to increase potash output by 35%: Fertilizer Markets, v. 7, no. 2, August 5, p. 3-4.
- 1996d, HCNA's potash earnings lag behind overall performance: Fertilizer Markets, v. 6, no. 44, June 3, p. 2.
- 1996e, Minsal MOP output to rise 200,000 mt/y: Fertilizer Markets, v. 6, no. 44, June 3, p. 1.
- 1996f, RTZ-CRA pulls out of Argentine potash mine: Fertilizer Markets, v. 6, no. 40, May 6, p. 2-3.
- 1996g, SA Minera Yolanda SA started mining operations: Fertilizer Markets, v. 7, no. 8, September 16, p. 4.
- Green Markets, 1996a, Great Salt Lake to increase potash capacity: Green Markets, v. 20, no. 32, August 5, p. 11.
- 1996b, Harris reports improved results, despite lower potash sales: Green Markets, v. 20, no. 23, June 3, p. 8-9.
- 1996c, Potash, Carlsbad, N.M.: Green Markets, v. 20, no. 30, July 22, p. 7.
- IMC Global Inc., 1996, 10-K: Securities and Exchange Commission, September 27, 160 p.
- Industrial Minerals, 1996a, Early '98 for new iodine/sodium sulfate mine: Industrial Minerals, no. 347, August, p. 8-9.
- 1996b, Italy—Italkali equity sale: Industrial Minerals, March, no. 342, p. 17.

Mississippi Chemical Corp., 10-Q— 2d quarter of 1997, ending December 31, 1996, Securities and Exchange Commission, February 14, 1997, p. 14.

Phosphorus & Potassium, 1996a, A new strategy for a Single Market: Phosphorus & Potassium, no.202, March-April, p. 15-20.

———1996b, UK—Cleveland Potash applies to extend mining area: Phosphorus & Potassium, no. 205, September-October, p.11.

———1996c, Israel—Second potassium nitrate unit on-stream at Haifa: Phosphorus & Potassium, March-April, no.202, p. 10.

———1996d, Jordan—Bids invited for country's first SOP plant: Phosphorus & Potassium, no. 204, July-August, p. 12.

———1996e, Sicily—Sicily plans to reactivate potassium sulphate production: Phosphorus & Potassium, March-April, no.202, p. 9.

Potash Corporation of Saskatchewan Inc., 1996, Potash Corporation of Saskatchewan Inc., Announces German Potash Industry Investment : Saskatoon, Saskatchewan, press release, December 9, 1996, 2 p.

Potash Corporation of Saskatchewan, 1997, Table at bottom of p.10 titled "1996 Production" (excluding New Brunswick, Patience Lake, and Moab): PCS Annual Report 1996, Saskatoon, Saskatchewan, Canada, 65 p.

U.S. Dept of Commerce., International Trade Administration, Import Administration, 1988, Suspension of Antidumping Duty Investigation—Potassium Chloride From Canada: Federal Register, v.53, no. 11, January 19, p. 1393-1395.

## SOURCES OF INFORMATION

### U.S. Geological Survey Publications

Evaporites and Brines. Ch. in United States Mineral Resources, U.S. Geological Survey Professional Paper 820.

Potash. Ch. in Mineral Commodity Summaries, annual.<sup>1</sup>

Potash. Reported for the Crop Year in Mineral Industry Surveys.<sup>1</sup>

### Other

Annual Fertilizer Review, annual. United Nations, Food and Agricultural Organization.

European Chemical News, weekly.

Fertilizer Focus, monthly.

Fertilizer International, Monthly.

Fertilizer Markets, weekly.

Green Markets, weekly.

Industrial Minerals, monthly.

Phosphorus & Potassium, bimonthly.

Potash Ch., Canadian Minerals Yearbook, annual.

Supply-Disappearance Statistics, monthly, quarterly, and annually. Potash & Phosphate Institute.

Williams-Stroud, Sherilyn C., Searls, J. P. and Hite, R. J., Potash Resources, 1994, in Industrial Minerals and Rocks, 6th ed., Carr, D. Sr. ed., AIME, Society of Mineral, Metallurgy, and Exploration, Inc., p. 783-802.

World Fertilizer Review, monthly.

<sup>1</sup>Prior to January 1996, published by the U.S. Bureau of Mines.

TABLE 1  
SALIENT POTASH 1/ STATISTICS 2/

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

	1992	1993	1994	1995	1996	
United States:						
Production	3,340	3,070	2,830	3,050	2,890	
K2O equivalent	1,710	1,510	1,400	1,480	1,390	
Sales by producers	3,470	3,030	2,970	2,880	2,960	
K2O equivalent	1,770	1,480	1,470	1,400	1,430	
Value 3/	dollars	\$334,000	\$286,000	\$284,000	\$284,000	\$299,000
Average value per ton of product	do.	\$96.45	\$94.36	\$95.93 r/	\$96.49 r/	\$101.08
Average value per ton of K2O equivalent	do.	\$189.36	\$192.72	\$193.50 r/	\$198.13 r/	\$208.86
Exports 4/	1,330	935	997	938	1,100	
K2O equivalent	663	415	464	409	481	
Imports for consumption 4/ 5/	7,010	7,200	7,930	7,960	8,140	
K2O equivalent	4,250	4,360	4,800	4,820	4,940	
Customs value	do.	\$580,000	\$578,000	\$642,000	\$602,000	\$563,000
Consumption, apparent 6/	9,150	9,300	9,890	9,900	10,000	
K2O equivalent	5,350	5,430	5,810	5,820 r/	5,890	
Yearend producers' stocks, K2O equivalent	283	305	234	312	265	
World: Production, marketable K2O equivalent	23,900	20,400	23,100	24,700	23,900 e/	

e/ Estimated. r/ Revised.

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

2/ Data rounded to three significant digits, except prices.

3/ F.o.b. mine.

4/ Excludes potassium chemicals and mixed fertilizers.

5/ Includes nitrate of potash.

6/ Calculated from sales plus imports minus exports.

TABLE 2  
 PRODUCTION, SALES, AND INVENTORY OF U.S. PRODUCED POTASH, BY TYPE AND GRADE 1/

(Thousand metric tons and thousand dollars)

Type and grade	Production				Sold or used						Stocks, end of 6-month period			
	Gross weight		K2O equivalent		Gross weight		K2O equivalent		Value e/ 2/		Gross weight		K2O equivalent	
	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996
<b>January-June:</b>														
Muriate of potash,														
60% K2O minimum:														
Standard	187	239	114	147	216	255	132	156	18,500	20,600	62	50	26	31
Coarse	45	17	28	10	57	16	35	10	4,200	1,220	9	27	4	17
Granular	490	464	298	283	483	547	294	333	41,900	43,700	122	84	71	52
Chemical	5	7	3	4	5	6	3	4	W	W	3	2	--	1
Potassium sulfate	327	W	167	W	296	W	152	W	49,100	W	116	W	59	W
Other potassium salts 3/	485	W	137	W	512	W	147	W	W	W	171	W	37	W
Total	1,540	1,480	747	715	1,570	1,630	763	784	157,000	159,000	483	530	197 r/	243
<b>July-December:</b>														
Muriate of potash,														
60% K2O minimum:														
Standard	273	238	167	146	267	184	163	113	22,200	15,400	68	104	41	63
Coarse	43	(4/)	26	(4/)	26	26	16	16	2,230	2,000	26	2	16	1
Granular	457	443	278	269	412	407	251	248	33,400	33,600	167	120	102	73
Chemical	4	6	3	4	6	5	4	3	W	W	1	3	1	2
Potassium sulfate	250	W	128	W	185	W	94	W	32,300 r/	W	182	W	93	W
Other potassium salts 3/	484	W	132	W	414	W	111	W	W	W	241	W	59	W
Total	1,510	1,410	734 r/	673	1,310	1,330	639	650	127,000	140,000	685	609	312	265
Grand total	3,050	2,890	1,480	1,390	2,880	2,960	1,400	1,430	284,000	299,000	XX	XX	XX	XX

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

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

2/ F.o.b. mine.

3/ Includes soluble muriate, manure salts, and potassium magnesium sulfate.

4/ Less than 1/2 unit.

TABLE 3  
PRODUCTION AND SALES OF POTASH IN NEW MEXICO 1/

(Thousand metric tons and thousand dollars)

Period	Crude salts 2/ (mine production)		Marketable potassium salts				
	Gross weight	K2O equivalent	Production		Sold or used		Value 3/
			Gross weight	K2O equivalent	Gross weight	K2O equivalent	
1995							
January-June	6,560	834	1,230	578	1,270	599	114,000
July-December	6,710	840	1,240	582	1,060	502	95,300
Total	13,300	1,670	2,460	1,160	2,330	1,100	209,000
1996							
January-June	6,790	835	1,210	572	1,380	648	124,000
July-December	6,320	1,150	1,200	558	1,060	501	101,000
Total	13,100	1,980	2,400	1,130	2,430	1,150	225,000

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

2/ Sylvinite and langbeinite.

3/ F.o.b. mine.

TABLE 4  
SALIENT U.S. SULFATE OF POTASH STATISTICS 1/ 2/

(Thousand metric tons of K2O equivalent and thousand dollars)

	1992	1993	1994	1995	1996
Production	243	251	252	295	W
Sales by producers	267	245	248	246	W
Value 3/	\$87,900	\$80,800	\$75,700	\$81,400 r/	W
Exports 4/	158	114	139	148 r/	144
Imports 4/	35	45	36	26 r/	31
Value 5/	\$13,600	\$17,300	\$19,000	\$10,900	\$12,900
Consumption, apparent 6/	144	176	145	124 r/	W
Yearend producers stocks	34	40	44	93	W

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

1/ Excluding potassium magnesium sulfate.

2/ Data rounded to three significant digits.

3/ F.o.b. mine.

4/ Bureau of the Census.

5/ C.i.f. to U.S. port.

6/ Calculated from sales plus imports minus exports.



TABLE 5  
SALES OF NORTH AMERICAN POTASH, BY STATE OF DESTINATION 1/

(Metric tons of K<sub>2</sub>O equivalent)

State	Agricultural potash		Nonagricultural potash	
	1995	1996	1995	1996
Alabama	101,000	98,200	214,000	230,000
Alaska	276	582	1,430	1,530
Arizona	4,890	6,020	523	707
Arkansas	79,700	80,700	1,120	1,150
California	79,600	116,000	8,980	12,200
Colorado	16,000	14,500	3,020	2,070
Connecticut	2,990	1,910	1,030	1,120
Delaware	23,700	22,800	47,700	49,100
Florida	179,000	194,000	2,330	5,390
Georgia	165,000	167,000	2,000	1,680
Hawaii	5,330	7,180	11	44
Idaho	37,800	39,500	1,020	1,140
Illinois	609,000	552,000	11,900	17,100
Indiana	380,000	284,000	3,610	3,780
Iowa	459,000	421,000	4,640	6,560
Kansas	54,200	53,300	4,490	4,510
Kentucky	135,000	132,000	800	1,200
Louisiana	154,000	124,000	3,640	4,020
Maine	4,910	6,910	392	756
Maryland	28,700	32,200	888	743
Massachusetts	6,200	3,830	548	661
Michigan	202,000	184,000	8,180	7,370
Minnesota	282,000	312,000	6,110	7,530
Mississippi	91,100	117,000	36,000	8,160
Missouri	247,000	208,000	3,900	7,370
Montana	17,200	17,600	115	103
Nebraska	36,400	42,500	1,500	1,720
Nevada	479	619	131	142
New Hampshire	854	641	64	76
New Jersey	4,750	5,190	683	1,340
New Mexico	6,830	6,740	19,900	22,400
New York	64,900	57,500	1,310	1,470
North Carolina	110,000	125,000	1,370	1,180
North Dakota	32,800	30,700	34	120
Ohio	424,000	334,000	72,100	73,500
Oklahoma	23,900	18,300	1,650	3,790
Oregon	38,000	37,300	1,720	1,740
Pennsylvania	54,300	57,400	4,250	12,600
Rhode Island	399	915	542	198
South Carolina	63,100	70,100	1,150	1,370
South Dakota	13,000	17,000	271	434
Tennessee	96,100	92,700	583	8,720
Texas	155,000	150,000	17,000	19,200
Utah	8,940	5,120	4,860	6,950
Vermont	4,880	5,030	127	234
Virginia	87,400	88,500	162	225
Washington	64,200	43,800	1,810	1,360
West Virginia	2,800	2,630	876	1,080
Wisconsin	216,000	215,000	56,300	75,900
Wyoming	2,500	5,030	725	588
Total	4,880,000	4,610,000	557,000	612,000

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

Source: Potash & Phosphate Institute.

TABLE 6  
SALES OF NORTH AMERICAN MURIATE OF POTASH  
TO U.S. CUSTOMERS, BY GRADE 1/

(Thousand metric tons of K2O equivalent)

Grade	1995	1996
Agricultural:		
Standard	225	272
Coarse	2,300	1,940
Granular	1,680	1,700
Soluble	444	484
Total	4,650	4,400
Nonagricultural:		
Soluble	98	75
Other	454	525
Total	552	600
Grand total	5,200	5,000

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

Source: Potash & Phosphate Institute.

TABLE 7  
PRICES 1/ OF U.S. POTASH, BY TYPE AND GRADE

(Dollars per metric ton of K2O equivalent)

Type and grade	1995		1996	
	January- June	July- December	January- June	July- December
Muriate, 60% K2O minimum:				
Standard	139.49 r/	136.49	131.82	136.31
Coarse	120.02 r/	138.47	126.50	144.40
Granular	142.67 r/	133.23	131.11	135.39
All muriate 2/	140.04 r/	134.66 r/	131.24	135.36
Sulfate, 50% K2O minimum	323.77	342.29	W	W

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

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

2/ Excluding soluble and chemical muriates.

TABLE 8  
U.S. EXPORTS OF POTASH, BY TYPE 1/

	Approximate average K2O content (percent)	Quantity (metric tons)	
		Product	K2O equivalent
1995			
Potassium chloride, all grades	61	297,000	181,000
Potassium sulfate	51	290,000	148,000
Potassium magnesium sulfate	22	339,000	74,600
Potassium nitrate	45	11,600	5,220
Total	XX	938,000	409,000
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

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. EXPORTS OF POTASH, BY COUNTRY 1/

(Metric tons of product)

Country	Potassium chloride		Potassium sulfate, all grades 2/		Potassium nitrate		Total	
	1995	1996	1995	1996	1995	1996	1995	1996
Argentina	3,880	1,980	9,610	17,800	--	--	13,500	19,800
Australia	3,030	165	8,070	115	40	36	11,100	316
Belgium	25,800	66	649	1,940	434	275	26,900	2,280
Brazil	25,900	59,800	15,400	7,380	3	--	41,200	67,100
Canada	4,960	11,800	62,900	75,600	4,610	4,730	72,500	92,200
Chile	48,200	26,400	22,300	39,400	--	--	70,600	65,700
China	--	--	130,000	91,800	--	--	130,000	91,800
Colombia	3,540	9,370	6,510	10,500	--	62	10,000	20,000
Costa Rica	24,200	28,000	39,200	39,500	--	--	63,400	67,500
Dominican Republic	19,800	35,800	5,200	6,400	7	19	25,000	42,200
Ecuador	5,700	24,700	3,600	4,450	737	17	10,000	29,100
France	--	16,500	16,700	9	--	--	16,700	16,500
Guatemala	9,720	7,620	8,310	3,000	--	--	18,000	10,600
Honduras	5,900	2,130	7,360	4,240	61	--	13,300	6,370
Italy	14,200	16,100	660	--	--	--	14,900	16,100
Japan	6,440	3,010	161,000	174,000	2	17	168,000	177,000
Korea, Republic of	2,590	1,380	6	21,600	279	--	2,880	23,000
Malaysia	--	--	9,700	94	880	2,010	10,600	2,100
Mexico	38,400	115,000	42,200	84,300	4,270	3,220	84,900	203,000
Peru	6,340	6,170	11,000	24,500	25	--	17,400	30,700
Philippines	17	--	459	35	--	--	476	35
Thailand	--	8	20,300	12,900	--	--	20,300	12,900
Venezuela	6,430	919	26,100	33,900	--	30	32,600	34,800
Zimbabwe	--	--	9,610	21,000	--	--	9,610	21,000
Other	42,000	25,700	11,700	20,000	243	3,880	54,000	49,500
Total	297,000	393,000	629,000	694,000	11,600	14,300	938,000	1,100,000

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 10  
U.S. IMPORTS FOR CONSUMPTION OF POTASH, BY TYPE 1/

	Approximate average K2O content (percent)	Quantity (metric tons)		Value (thousands)	
		Product	K2O equivalent e/	Customs	C.i.f.
1995:					
Potassium chloride	61	7,830,000	4,780,000	577,000	670,000
Potassium sulfate	51	51,800	26,400	9,530	10,900
Potassium nitrate	45	36,600	16,400	9,170	10,700
Potassium sodium nitrate mixture	14	38,600	5,400	6,180	6,870
Total	XX	7,960,000	4,820,000	602,000	698,000
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

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 11  
U.S. IMPORTS FOR CONSUMPTION OF POTASH, BY COUNTRY 1/

Country											Total value (thousands)			
	Potassium chloride (metric tons)		Potassium sulfate (metric tons)		Potassium nitrate (metric tons)		Potassium sodium nitrate (metric tons)		Total 1/ (metric tons)		Customs		C.i.f.	
	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996
Belarus	93,600	--	--	--	--	--	--	--	93,600	--	\$6,740	--	\$8,030	--
Belgium	3,080	2,800	4,630	4,600	1	40	--	--	7,710	7,440	1,250	\$1,180	1,480	\$1,450
Canada	7,460,000	7,540,000	5,390	6,600	150	--	12,900	1,340	7,480,000	7,540,000	553,000	504,000	640,000	589,000
Chile	--	--	--	80	23,800	15,600	25,600	20,600	49,400	36,200	9,260	7,420	10,600	8,380
Denmark	--	--	3	--	2,060	1,470	18	--	2,090	1,470	616 r/	495	843 r/	658
Dominican Republic	--	--	--	160	102	--	--	--	102	160	48	53	52	59
Germany	3,410	5,120	39,800	48,700	137	275	--	--	43,400	54,100	7,010	9,320	8,180	10,700
Israel	54,000	33,900	--	--	9,760	12,500	--	--	63,700	46,400	8,540	7,360	9,860	8,370
Japan	4	--	1	28	518	440	--	--	523	468	180	177	216	195
Jordan	19,700	--	--	--	--	--	--	--	19,700	--	1,420	--	1,470	--
Latvia	16,300	--	--	--	--	--	--	--	16,300	--	1,180	--	1,520	--
Liberia	13,700	--	--	--	--	--	--	--	13,700	--	1,270	--	1,290	--
Mexico	--	--	756	1	--	--	21	--	777	1	54	4	56 r/	4
Netherlands	--	--	1,160	--	1	--	--	--	1,160	--	220	--	251	--
Poland	--	18,700	--	--	54	36	--	--	54	18,700	27	2,060	32	2,380
Russia	167,000	427,000	--	50	--	--	--	--	167,000	427,000	11,300	29,800	14,000	35,100
United Kingdom	170	1,310	--	--	--	--	--	--	170	1,310	169	295	195	340
Other	1	140	--	120	2	60	--	--	3	320	6	173	6	195
Total	7,830,000	8,030,000	51,800 r/	60,400	36,600	30,400	38,600 r/	21,900	7,960,000	8,140,000	602,000	563,000	698,000	657,000

r/ Revised.

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

Source: Bureau of the Census.

TABLE 12  
MARKETABLE POTASH: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Thousand metric tons of K<sub>2</sub>O equivalent)

Country	1992	1993	1994	1995	1996 e/
Belarus	3,311	1,947	3,021	3,211	3,200
Brazil	85	173	242 r/	370 r/	375
Canada	7,270	6,836	8,037	8,855 r/	8,170
Chile e/ 3/	55	55	50	50	50
China e/	21	25	74	80	110
France	1,141	890	870	799 r/	800
Germany	3,461	2,861	3,286	3,280 e/	3,200
Israel	1,296	1,309	1,259	1,320 e/	1,320
Italy	86	20 e/	--	--	--
Jordan	794	822	930	1,070 e/	1,200
Russia	3,470	2,628	2,498	2,800 e/	2,800
Spain	594	661	684	650 e/	600
Ukraine	98	88 e/	168	110	100
United Kingdom	529	555	580	582 e/	580
United States	1,710	1,510	1,400	1,480	1,390 4/
Total	23,900	20,400	23,100	24,700	23,900

e/ Estimated. 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 Apr. 24, 1997.

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

4/ Reported figure.