## **POTASH**

#### By James P. Searls

Potash is used primarily as an agricultural fertilizer (plant nutrient). Potash is a source of soluble potassium, which is one of the three primary plant nutrients; the others are fixed nitrogen and soluble phosphorus. Mankind's use of these three plant nutrients, in commercial forms, started the "Green Revolution" in agriculture. There are no substitutes for these three plant nutrients, but there are minor sources of plant nutrients, such as animal manure, guano, "tankage" from slaughterhouses, and glauconite. Modern agricultural practice uses these primary nutrients plus additional nutrients, such as boron, calcium, chlorine, copper, iron, magnesium, manganese, molybdenum, sulfur, and zinc. Finally, the farmer needs pesticides, disease-resistant seeds, and mechanization to attain maximum yield of high quality and relatively low-cost food from the limited acreage. The knowledge and use of these ingredients and technologies requires less than 2% of estimated 1994 U.S. working population to be full or part-time farmers. This 2% fed all the United States population while providing substantial export quantities which helped to decrease balance-of-payment deficits. The cost of this food was about 12.5% of average personal income. Modern practices are a decided improvement compared with subsistence farming societies where a high percentage of the population are farmers who struggle to feed their immediate families.

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 resistant to stress.

The term "potash" was originally applied to potassium carbonate-potassium hydroxide crystals that were recovered in iron "pots" from washings of wood (or other plant) "ashes." That product was an industrial product; it was too expensive to use as a fertilizer. Currently, "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<sub>2</sub>SO<sub>4</sub> or sulfate of potash [SOP]), potassium-magnesium sulfate (K<sub>2</sub>SO<sub>4</sub>MgSO<sub>4</sub> or sulfate of potash magnesia), potassium nitrate (KNO<sub>3</sub> or saltpeter), or mixed sodium-potassium nitrate (NaNO<sub>3</sub>+KNO<sub>3</sub> or Chilean saltpeter).

#### **Legislation and Government Programs**

The suspension agreement between the International Trade Administration of the U.S. Department of Commerce and the Canadian potash producers continued for another year. The U.S. Department of Justice, Anti-Trust Division, Cleveland, OH, continued its investigation of several North American potash producers for price fixing. The Bureau of Land Management, the State of Utah, and Reilly Industries signed a joint agreement to restore the surface of the Bonneville Salt Flats, which reportedly has lost as much as 63.5 million tons of interior basin drainage salts this century. The restoration will entail the adding of 0.9 million tons of salt annually for 5 years to the surface of the Salt Flats.

The combined civil lawsuits for collusive pricing, in U.S. Federal District Court in St. Paul, MN, against some Canadian and some U.S. potash producers, continued in 1995. A trial date was announced for January 2, 1996.

#### **Domestic Production**

Production of all types and grades of potash in the United States in 1995 rose slightly from 1.4 million tons to 1.5 million tons. Sales of all types and grades of potash declined slightly from 1994's level to about 1.4 million tons but the marketable potash value, f.o.b. mine, of about \$284 million was unchanged from 1994.

The U.S. Geological Survey developed potash domestic data from voluntary semiannual surveys of U.S. operations. Of the 10 survey requests sent to operations in both the first and second half of the year, 9 responded. Data from the responses are estimated to consist of about 97% of total production shown in table 1.

In 1995, the Carlsbad, NM, potash producers were Eddy Potash Inc., owned by Trans-Resources Inc.; IMC Global Operations Inc., owned by IMC Global Inc.; Mississippi Potash, Inc., owned by Mississippi Chemical Corp.; New Mexico Potash, Inc., owned by Trans-Resources; and Western Ag-Minerals Inc., owned by Rayrock Resources of Toronto, Canada.

In Utah, the producers were Great Salt Lake Minerals Corp. (GSLMC), affiliated with Harris Chemical Group; Moab Salt Inc.; and Reilly-Wendover of Reilly Industries Inc. On April 10, Potash Corp. of Saskatchewan (PCS) purchased Texasgulf Inc. from Elf Aquitaine, Inc. and Williams Acquisition Holding Co., Inc., including the Moab Salt Inc. solution potash mine near Moab, UT. Moab Salt Inc.'s potash capacity was placed at 48,000 tons per year in PCS' Annual Report. Great Salt Lake's agreement to purchase Reilly Industries' Wendover facility was withdrawn in 1995.

In California, North American Chemical Co., managed by Harris Chemical Group, produced KCl and K<sub>2</sub>SO<sub>4</sub>. North American Chemical sold its potash products through the

GSLMC office in Kansas.

In Michigan, Vigoro Corp. announced a \$43 million investment for capacity expansion of the Kalium Chemical Ltd. Hersey solution mine. Capacity was scheduled to rise from 30,000 tons to 90,000 tons, and to be completed by April 1997.

PCS continued to market potash exports for three New Mexico producers as a cost cutting effort for the producers.

Potassium chloride accounted for about 70% of domestic producers' sales tonnage (to both domestic users and exports), but only about 48% of sales by dollars; potassium sulfate was about 18% of sales tonnage by domestic producers but represented about 31% by sales dollar value.

According to the Potash & Phosphate Institute<sup>2</sup> (P&PI), shipments of agricultural potash from Canadian and U.S. producers to U.S. consumers decreased slightly compared with those of 1994. Shipments of nonagricultural potash to U.S. consumers decreased about 6%; total shipments decreased less than 3%.

The largest potash-consuming region in the United States was the Corn Belt (Illinois, Indiana, Iowa, Missouri, and Ohio). This area received about 43% of P&PI reported sales from Canadian and U.S. producers (P&PI sales) or about 2.34 million tons, a decline of 3% from 1994. The second-largest potash consuming region in the United States was the Lake States (Michigan, Minnesota, and Wisconsin) which received about 770,000 tons, 14% of P&PI sales, and a 6% decline from 1994. The third-largest potash consuming region was the southeastern states (Alabama, Florida, Georgia, and South Carolina) which received about 560,000 tons, 10% of P&PI sales, and about 6% increase from 1994.

The major receiving States of domestically produced agricultural potash, in decreasing order, were Texas, Missouri, California, Kansas, Louisiana, Florida, Mississippi, and Arkansas. These eight States received about 65% of the total to the contiguous 48 States. It appears that product from the pilot solution mine in Michigan began to be available in Michigan, Ohio, and Illinois.

#### Consumption

In 1995, relatively lower crop production caused by erratic rainfall in the Corn Belt, and greater exports of grains reduced domestic yearend grain stocks to historically low ratios of stocks to annual consumption. Prices for wheat, corn, rice, and soybeans were relatively high at yearend, causing relatively strong dealer and farmer purchases of potash in the last quarter of the year.

Apparent domestic consumption of potash, including imports and exports, was essentially unchanged in 1995 compared with 1994. Domestic consumption of potash, including imports and exports, shows that potassium chloride was about 96% of total consumption, while potassium sulfate was about 2% of consumption. It is estimated that 10% of total consumption was for nonagricultural end uses. Non-Canadian imports are not tracked by State of consumption or by end use. Nonagricultural (industrial) end uses are in drilling mud, water softener

rejuvenation, highway and sidewalk ice melting, and food grade replacement for table salt. Santa Barbara, CA, announced support for muriate of potash for water softening because the wastewater is recycled into irrigation water where potassium is valuable. Indirect industrial end uses are through the caustic potash industry into the chemicals, drugs, dyes, food-grade chemicals, glass, soaps, and textiles.

#### Stocks

Yearend producers' stocks increased about 34% compared with that of 1994. Yearend stocks represented about 21% of annual production or about 11 weeks of average production.

#### **Prices**

The weighted average annual price for all types and grades, \$202.42 per ton f.o.b. mine, of U.S. potash sales of all types and grades increased about 5% compared with that of 1994. The average price of all types and grades in the first one-half of the year was \$205.55 per ton f.o.b. mine, and \$198.68 per ton f.o.b. mine for the second half of the year. The average annual, weighted price for the three grades of KCl (muriate) was \$137.44 per ton f.o.b. mine, an increase of 5% from 1994. The average annual price for standard grade KCl was \$137.74 per ton, up more than 10% from 1994; coarse grade, \$125.83, down 4%; and granular grade, \$138.38, up 3%.

#### **World Review**

On the supply side, the world's largest potash producers withheld capacity from the world market for another year. The world remained in over-capacity, using about 68% of capacity, slightly above the 66% used in 1994. The two largest producing countries operated at partial capacity to maintain prices while producers in the rest of the producing countries or companies operated from 80% of capacity to full capacity. The Canadian potash industry operated at 68% of 1995 capacity<sup>3</sup> (13.2 million tons per year), including about 49% capacity for the largest producer. The former Soviet Union potash mines appear to have operated at about 50% capacity.

On the demand side, China, which was a net wheat exporter in 1993, returned to net wheat importation in 1995 due to rising incomes and accompanying changing food demand for more meat and vegatables, <sup>4</sup> according to a U.S. Department of Agriculture analyst Another industry analyst has included as additional reasons for the change, reduced crop production was due to adverse weather, and the removal of land from agricultural usage for industrialization.

**Argentina.**—CRA Ltd. of Australia agreed to investigate the muriate of potash resource of Potasio Rio Colorado in the Andean mountains' foothills. The ore zone is reportedly 1,100 meters below the surface. Beneficiation plant target capacity was put at 300,000 tons per year.

*Brazil.*—The Brazilian Government was selling its portion of Companhia Vale do Rio Doce (CVRD). Meanwhile, the

company was expanding the production capacity of the Taquari-Vassouras potash mine to 420,000 tons of muriate of potash per year by 1997. The company planned to enter the world market by exporting first quarter production, a slack sales period in Brazil, rather than storing that quarter's production. There was an unspecified accident<sup>5</sup> during the upgrading of the mine shaft in August.

Canada.—At yearend 1995, five Canadian firms were producing potash; PCS, IMC Global Operations, Inc., Vigoro Corp., Agrium Inc., and Potacan Mining Co. PCS controlled about 56% of that country's capacity. In January, Vigoro completed the acquisition of Central Canada Potash, the former Noranda Inc. potash mine and mill. IMC Global and Vigoro were not prevented from merging by the U.S. Department of Justice, Anti-Trust Division, in December 1995 and are scheduled to merge in early 1996. IMC Global and Vigoro are U.S.-based firms that were the second and third firms, respectively, to enter into the Saskatchewan potash industry<sup>6</sup> and both were relatively successful firms due to profitable production costs. The fertilizer portion of Cominco Ltd. was split away and named Agrium Inc. in early 1995. Late in the year, Agrium announced a 15% capacity increase to 0.95 million tons by early 1997. Potacan is a joint venture of French and German ownership. It is interested only in potash and the supply of potash to Western Europe. In New Brunswick, IMC Global agreed to investigate the Millstream potash resource near Sussex. If developed, this would be a third mine in New Brunswick and would have a transportation advantage over Manitoba to the European market. BP Minerals investigated this resource in the mid-1980's and could not see a profitable market at that time.

Chile.—The Inter-American Investment Corp. secured an equity loan of \$41 million from four banks of the estimated \$78 million total for the Minera Yolanda Project. This project will have a 115,000-metric-ton potassium nitrate, with sodium nitrate, and iodine capacity. Canpotex of Canada signed a supply agreement for muriate of potash to Yolanda for converting the mined sodium nitrate to potassium nitrate. The site is between Sociedad Quimica y Minera de Chile's (Soquimich) caliche reserves for potassium-sodium nitrate and the Salar de Atacama, where Cyprus-Foote Minerals produces potash and lithium carbonate.

Soquimich was developing another site (the former Minsal project site) within the Salar de Atacama to produce muriate of potash, lithium carbonate, and SOP. Late in the year, Soquimich purchased the Chilean Government's portion (18.8%) of the Minsal project, thereby reaching 100% ownership.

Haifa Chemicals Ltd. of Israel, owned by Trans-Resources of the United States, agreed to buy 15% of ACF Minera Ltda. in Chile from DSM N.V. of the Netherlands, which has owned 75% of ACF. The agreement includes a plant to produce sodium and potassium nitrate from iodine process tailings in Chile.

*Europe.*—In a British Sulphur analyst's forecast, six potash mine closures by 2005 would reduce the European potash

production capacity to about two-thirds of European projected demand.<sup>8</sup>

*France.*—Société Commerciale de Potasses et de l'Azote renewed agreements with Arab Potash Co. of Jordan and Dead Sea Works of Israel for continued supply of MOP to France. These two sources will augment France's potash supply from New Brunswick when France's two remaining mines in Alsace close before year 2005.

*Germany.*—A representative of Kali und Salz GmbH in Germany announced Kali und Salz's 1997 capacity for potash production of 3.64 million tons. This national capacity will be down from 6.2 million tons in 1989 owing to a combination of former East German and West German mine and mill closures.

*India.*—The Government of India continued a fertilizer subsidy including about Rupees 1,000 per ton product of potash.

Jordan.—Arab Potash Co. announced a three-step program to expand capacity to 1.2 million tons from the Dead Sea by 1999. The first step would expand carnallite crystallization pond capacity; the second step would add precrystallization pond capacity; the third step requires an investment of \$110 million additional refinery capacity if the first two steps prove to be viable. The total investment for the three steps was estimated at \$170 million.

*Oman.*—Late in the year, the Ministry of Commerce announced a plan to develop a 120,000-ton-per-year MOP site. <sup>10</sup> The potash is contained in a near-surface brine. Solar ponds for concentration to sylvinite and carnallite were mentioned in the plan.

Former Soviet Union.—Potash production was estimated to be rising but was only about 48% of capacity for 1995. Fertilizer consumption was estimated to be about 15% of 1990's consumption, which caused low levels of grain production (approximately 65 million tons of grain for 1995). Potash consumption has been placed at 1.2 million tons. The farmers of the former Soviet Union were never well-paid for their crops, in order to keep food prices down for the city workers, so the farmers never accumulated savings that could be used for purchasing fertilizers, seed, equipment, etc. in the present free market economy.

**Thailand.**—Asian Pacific Resources of Vancouver, B.C., increased its claim of proven ore reserves to 250 million tons for the Udon Thani reserve. Industry sources report rumors of several large mining firms investigating the site. Industry estimates of capital cost were approximately \$300 million for 1.2 million tons, K<sub>2</sub>O, per year of KCl.

*Turkey.*—In Turkey, the firm Alkim Alkali Kimya and the Dead Sea Works from Israel have started construction of a 80,000-ton-per-year plant for SOP; this has been in the pilot plant stage for a year. Israel will supply the MOP for the plant and Alkim Alkali Kimya will supply some form of sulfate.

#### Outlook

In the short term, ending domestic stocks for calendar year 1995 grains are at historically significant lows, and futures

market prices are relatively high. This situation usually indicates increased potash consumption in the next year or two as farmers attempt to grow more grain while the prices are relatively elevated.

In the long term, the domestic potash producers will likely maintain their present portion of the domestic market and the small export market that they service. Trade liberalization 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 crop producer. Imported potash from Canada will likely supply most of this gain in consumption. Generally, world-wide potash consumption will remain loosely tied to long-term population growth, with adjustments for food type preferences.

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 $<sup>^{1}</sup>$ All tonnages are reported in metric tons (tonnes),  $K_{2}$ O equivalent, unless otherwise noted.

<sup>&</sup>lt;sup>2</sup>Anon., Calendar Year Potash Report-Calendar Years 1995 and 1994, Report of Potash Sales by North American Producers by State, both Agricultural and Non-Agricultural, Norcross, GA, Feb., 1996, pp. 4-5.

<sup>&</sup>lt;sup>3</sup>Prud'homme, Michel, 1995 Canadian Potash Review, "www.nrcan.gc.ca/mms" mi ning gopher/nonmetallic minerals/ Potash, 1995.

<sup>&</sup>lt;sup>4</sup>Coyle, Bill, Grain Trade Outlook for China, Agricultural Outlook, Economic Research Service, U.S. Department of Agriculture, Dec 1995, p. 17-19.

<sup>&</sup>lt;sup>5</sup>Anonymous, Bidders line up for CVRD, Fertilizer International, British Sulphur Publishing, London, No. 349, Nov.-Dec. 1995, p. 5.

<sup>&</sup>lt;sup>6</sup>Koepke, W. E., "Structure, Behavior and Performance of the World Potash Industry." Mineral Development Sector, Department of Energy, Mines and Resources, Ottawa, Canada. Mineral Bulletin MR 139, Sept. 1973, p. 29.

<sup>&</sup>lt;sup>7</sup>Anon., Yolanda Progress, Fertilizer International, British Sulphur Publishing, London, No 346, June 1995, p. 14.

<sup>&</sup>lt;sup>8</sup>Freeman, Michael, The European Potash Industry- The Next Hundred Years, Proceedings of the IFA Production and International Trade Committee Meetings, Tampa, FL, Sept. 14-15, 1995.

<sup>&</sup>lt;sup>9</sup>Siemes, Johannes, After the German Potash Merger-K+S on the Right Path, Fertilizer Focus, May 1995, p. 18-19.

<sup>&</sup>lt;sup>10</sup>Anon, Potash From Oman, Fertilizer International, British Sulphur Publishing, London, No. 349, Nov.-Dec. 1995, p.13.

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## TABLE 1 SALIENT POTASH 1/ STATISTICS 2/

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

		1991	1992	1993	1994	1995
United States:						
Production		3,450	3,340	3,070	2,830	3,050
K2O equivalent		1,750	1,710	1,510	1,400	1,480
Sales by producers		3,330	3,470	3,030	2,970	2,880
K2O equivalent		1,710	1,770	1,480	1,470	1,400
Value 3/		\$305,000	\$334,000	\$286,000	\$284,000	\$284,000
Average value per ton of product	dollars	\$91.52	\$96.45	\$94.36	\$95.94	\$98.61
Average value per ton of K2O equivalent	do.	\$178.20	\$189.36	\$192.72	\$193.32	\$202.43
Exports 4/		1,260	1,330	935	997	938
K2O equivalent		624	663	415	464 r/	409
Value 5/		NA	NA	NA	NA	NA
Imports for consumption 4/6/		6,860	7,010	7,200	7,920	7,960
K2O equivalent		4,160	4,250	4,360	4,800 r/	4,820
Customs value		\$550,000	\$580,000	\$578,000	\$642,000	\$602,000
Consumption, apparent 7/		8,930	9,150	9,300	9,890	9,900
K2O equivalent		5,240	5,350	5,430	5,810 r/	5,820
Yearend producers' stocks, K2O equivalent		343	283	305	234	312
World: Production, marketable K2O equivalent		26,100	23,900	20,300	22,500	NA

r/ Revised. NA Not available.

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

<sup>2/</sup> Data are rounded to three significant digits, except prices.

<sup>3/</sup> F.o.b. mine.

<sup>4/</sup> Excludes potassium chemicals and mixed fertilizers.

<sup>5/</sup> F.a.s. U.S. port.

<sup>6/</sup> Includes nitrate of potash.

<sup>7/</sup> 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)

		Proc	duction				Sol	d or used				Stocks, end	of period	
	Gross v	veight	K2O equ	ivalent	Gross v	weight	K2O equi	valent	Value	e/ 2/	Gross v	veight	K2O equ	ivalent
Type and grade	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995
January-June:														
Muriate of potash, 60% K2O														
minimum:														
Standard	299	187	182	114	292	216	178	132	21,000	18,500	151	62	92	26
Coarse	64	45	39	28	68	57	42	35	5,340	4,200	9	9	6	4
Granular	406	490	247	298	529	483	321	294	42,700	41,900	52	122	32	71
Chemical	5	5	3	3	6	5	4	3	W	W	(3/)	3	(3/)	
Potassium sulfate	238	327	123	167	252	296	130	152	41,500	49,100	66	116	34	59
Other potassium salts 4/	441	485	118	137	471	512	130	147	W	W	207	171	50	37
Total	1,450	1,540	713	747	1,620	1,570	806	763	152,000	157,000	485	483	213	198
July-December:														
Muriate of potash, 60% K2O														
minimum:														
Standard	192	273	118	167	251	267	153	163	20,400	22,200	92	68	56	41
Coarse	62	43	38	26	50	26	30	16	4,120	2,230	22	26	13	16
Granular	461	457	281	278	399	412	243	251	33,400	33,400	115	167	70	102
Chemical	8	4	5	3	6	6	4	4	W	W	2	1	2	1
Potassium sulfate	250	250	129	128	230	185	118	94	38,200	37,600	86	182	44	93
Other potassium salts 4/	401	484	116	132	411	414	116	111	W	W	197	241	49	59
Total	1,370	1,510	686	733	1,350	1,310	664	639	132,000	127,000	514	685	234	312
Grand total	2,830	3,050	1,400	1,480	2,970	2,880	1,470	1,402	284,000	284,000	XX	XX	XX	XX

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

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

<sup>2/</sup> F.o.b. mine.

<sup>3/</sup> Less than 1/2 unit.

<sup>4/</sup> Includes soluble muriate, manure salts, and potassium magnesium sulfate.

## ${\bf TABLE~3} \\ {\bf PRODUCTION~AND~SALES~OF~POTASH~IN~NEW~MEXICO~1/} \\$

(Thousand metric tons and thousand dollars)

			Marketable potassium salts						
	Crude	salts 2/			•				
	(mine pr	oduction)	Prod	uction	Sold or used				
	Gross	K2O	Gross	K2O	Gross	K2O			
Period	weight	equivalent	weight	equivalent	weight	equivalent	Value 3/		
1994:									
January-June	6,400	814	1,200	570	1,370	670	120,000		
July-December	6,220	762	1,110	539	1,070	513	97,800		
Total	12,600	1,580	2,300	1,110	2,450	1,180	218,000		
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		

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

 ${\small \mbox{TABLE 4}} \\ {\small \mbox{SALIENT U.S. SULFATE OF POTASH STATISTICS 1/2/}} \\$ 

(Thousand metric tons of K2O equivalent and thousand dollars)

1994	1995
252	295
248 r/	246
\$75,700 r/	\$86,700
139	177
NA	NA
36	32
\$19,000	\$10,900
145	101
44	93
_	NA 36 \$19,000 145

r/ Revised. NA Not available.

<sup>2/</sup> Sylvinite and langbeinite.

<sup>3/</sup> F.o.b. mine.

<sup>1/</sup> Excluding potassium magnesium sulfate.

<sup>2/</sup> Data are rounded to three significant digits.

<sup>3/</sup> F.o.b. mine.

<sup>4/</sup> Bureau of the Census.

<sup>5/</sup> F.a.s. U.S. port.

<sup>6/</sup> C.i.f. to U.S. port.

<sup>7/</sup> Calculated from sales plus imports minus exports.

 ${\bf TABLE~5}$  SALES OF NORTH AMERICAN POTASH, BY STATE OF DESTINATION 1/

(Metric tons of K2O equivalent)

	A	gricultural potash	Nonagrio	cultural potash
State	1994	1995	1994	1995
Alabama	91,800	101,000	201,000	214,000
Alaska	657	276	717	1,430
Arizona	4,760	4,890	1,100	523
Arkansas	73,700	79,700	939	1,120
California	93,600	79,600	9,010	8,980
Colorado	14,200	16,000	3,270	3,020
Connecticut	3,450	2,990	1,520	1,030
Delaware	21,400	23,700	40,800	47,700
Florida	159,000	179,000	2,560	2,330
Georgia	163,000	165,000	1,850	2,000
Hawaii	4,380	5,330	57	11
Idaho	40,300	37,800	964	1,020
Illinois	607,000	609,000	8,960	11,900
Indiana	403,000	380,000	4,640	3,610
Iowa	455,000	459,000	7,280	4,640
Kansas	51,600	54,200	7,760	4,490
	_			
Kentucky	_ 118,000	135,000	943	800
Louisiana	_ 139,000	154,000	3,330	3,640
Maine	5,630	4,910	1,030	392
Maryland	_ 33,600	28,700	564	888
Massachusetts	4,540	6,200	876	548
Michigan	_ 198,000	202,000	7,330	8,180
Minnesota	_ 305,000	282,000	6,960	6,110
Mississippi	62,300	91,100	53,300	36,000
Missouri	_ 263,000	247,000	4,510	3,900
Montana	_ 17,500	17,200	114	115
Nebraska	_ 40,000	36,400	2,070	1,500
Nevada	_ 302	479	112	131
New Hampshire	_ 738	854	184	64
New Jersey	7,120	4,750	1,120	683
New Mexico	_ 6,480	6,830	15,800	19,900
New York	_ 60,900	64,900	1,310	1,310
North Carolina	109,000	110,000	1,210	1,370
North Dakota	32,400	32,800	29	34
Ohio	447,000	424,000	86,800	72,100
Oklahoma	33,600	23,900	2,760	1,650
Oregon	35,400	38,000	1,320	1,720
Pennsylvania	71,500	54,300	4,260	4,250
Rhode Island	742	399	1,550	542
South Carolina	64,100	63,100	295	1,150
South Dakota	17,900	13,000	312	271
Tennessee	122,000	96,100	397	583
Texas	177,000	155,000	22,600	17,000
Utah	4,380	8,940	3,740	4,860
Vermont	5,610	4,880	171	127
Virginia	81,600	87,400	232	162
Washington	47,000	64,200	2,390	1,810
West Virginia	2,820	2,800	1,160	876
Wisconsin	239,000	216,000	69,800	56,300
Wyoming	3,490	2,500	828	725
Total	4,940,000	4,880,000	592,000	557,000
10101	+,540,000	4,000,000	392,000	337,000

<sup>1/</sup> 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	1994	1995
Agricultural:		
Standard	257	225
Coarse	2,340	2,300
Granular	1,680	1,680
Soluble	467	444
Total	4,750	4,650
Nonagricultural:		
Soluble	97	98
Other	490	454
Total	587	552
Grand total	5,340	5,200

 $<sup>1/\</sup>operatorname{Data}$  are rounded to three significant digits; may not add to totals shown.

Source: Potash & Phosphate Institute.

 $\label{eq:table 7} {\it TABLE~7}$  PRICES 1/ OF U.S. POTASH, BY TYPE AND GRADE

(Dollars per metric ton of K2O equivalent)

1	994	199	95
January-	July-	January-	July-
June	December	June	December
117.78	132.90	139.25	136.49
127.86	135.13	120.01	138.47
132.62	137.43	142.76	133.23
127.37	135.64	140.03	134.67
318.84	321.70	323.77	398.08
	January- June 117.78 127.86 132.62 127.37	June         December           117.78         132.90           127.86         135.13           132.62         137.43           127.37         135.64	January- June         July- December         January- June           117.78         132.90         139.25           127.86         135.13         120.01           132.62         137.43         142.76           127.37         135.64         140.03

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

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

		Quantity (metric tons)			
	Approximate average		K2O		
	K2O content (percent)	Product	equivalent		
1994:					
Potassium chloride, all grades	61	419,000	256,000		
Potassium sulfate	51	273,000	139,000		
Potassium magnesium sulfate	22	298,000	65,500 r/		
Potassium nitrate	45	6,510	2,930		
Total	XX	997,000	464,000 r/		
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		

r/ Revised. XX Not applicable.

Source: Bureau of the Census.

<sup>2/</sup> Excluding soluble and chemical muriates.

 $<sup>1/\,\</sup>mbox{Data}$  are rounded to three significant digits; may not add to totals shown.

## TABLE 9 U.S. EXPORTS OF POTASH, BY COUNTRY 1/

#### (Metric tons of product)

			Potassiun	n sulfate,				
	Potassium o	chloride	all gra	des 2/	Potassium	nitrate	Tot	tal
Country	1994	1995	1994	1995	1994	1995	1994	1995
Argentina	98	3,880	3,290	9,610			3,380	13,500
Australia	140	3,030	10,800	8,070	20	40	10,900	11,100
Belgium	208	25,800	4,450	649	14	434	4,680	26,900
Brazil	15,500	25,900	12,600	15,400		3	28,100	41,200
Canada	4,680	4,960	71,400	62,900	5,240	4,610	81,300	72,500
Chile	50,300	48,200	22,300	22,300			72,600	70,600
China			132,000	130,000			132,000	130,000
Colombia	23,000	3,540	3,500	6,510			26,500	10,000
Costa Rica	24,100	24,200	44,500	39,200			68,700	63,400
Dominican Republic	23,600	19,800	3,330	5,200	9	7	26,900	25,000
Ecuador	29,400	5,700		3,600	4	737	37,900	10,000
France	25,300			16,700			25,300	16,700
Guatemala	11,100	9,720	4,500	8,310			15,600	18,000
Honduras	9,960	5,900	8,230	7,360		61	18,200	13,300
Italy	33,400	14,200	7	660			33,400	14,900
Japan	20,700	6,440	136,000	161,000	1	2	156,000	168,000
Korea, Republic of	3,850	2,590	6,070	6	4	279	9,930	2,880
Malaysia	27,300		43	9,700		880	27,300	10,600
Mexico	40,000	38,400	59,000	42,200	1,190	4,270	100,000	84,900
Peru	22,200	6,340	5,420	11,000		25	27,700	17,400
Philippines	8,670	17	55	459			8,720	476
Thailand	10,300		3,560	20,300	4		13,800	20,300
Venezuela	97	6,430	13,700	26,100	6		13,800	32,600
Zimbabwe			5,000	9,610			5,000	9,610
Other	35,500	42,000	13,500	11,700	24	243	49,100	54,000
Total	419,000	297,000	563,000	629,000	6,510 r/	11,600	997,000	938,000

r/ Revised.

Source: Bureau of the Census.

 ${\bf TABLE~10} \\ {\bf U.S.~IMPORTS~FOR~CONSUMPTION~OF~POTASH,~BY~TYPE~1/}$ 

		•	uantity tric tons)	Valu (thousar	
	Approximate average K2O content (percent)	Product	K2O equivalent e/	Customs	C.i.f.
1994:	T. C.		1		
Potassium chloride	61	7,790,000	4,750,000 r/	\$614,000	\$716,000
Potassium sulfate	51	70,900	36,200	17,300	19,000
Potassium nitrate	45	16,400	7,360	4,280	5,240
Potassium sodium nitrate mixture	14	45,700	6,400	6,180	6,810
Total	XX	7,920,000	4,800,000 r/	642,000	747,000
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

e/ Estimated. r/ Revised. XX Not applicable.

Source: Bureau of the Census.

 $<sup>1/\,\</sup>mbox{Data}$  are rounded three significant digits; may not add to totals shown.

<sup>2/</sup> Includes potassium magnesium sulfate.

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

 $\label{eq:table 11} \textbf{U.S. IMPORTS FOR CONSUMPTION OF POTASH, BY COUNTRY } 1/$ 

												Total v	alue	
					Metric tons	of product						(thousa	ınds)	
	Potas	sium	Potass	ium	Potass	ium	Potass	ium						
	chlo	ride	sulfa	ite	nitra	te	sodium	nitrate	Tot	al	Cust	oms	C.i.i	f
Country	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995
Belarus	302,000	93,600							302,000	93,600	\$24,000	\$6,740	\$28,600	\$8,030
Belgium	2,500	3,080	8,720	4,630		1			11,200	7,710	1,960	1,250	2,280	1,480
Canada	7,230,000	7,460,000	11,100	5,390	1	150	20,300	12,900	7,260,000	7,480,000	577,000	553,000	671,000	640,000
Chile					10,200	23,800	25,300	25,600	35,500	49,400	5,530	9,260	6,330	10,600
Denmark				3	2,070	2,060		18	2,070	2,090	651	617	867	842
Dominican Republic					226	102			226	102	88	48	97	52
France			6,760						6,760		3,000		3,060	
Germany	49,000	3,410	42,800	39,800	19	137			91,800	43,400	10,800	7,010	12,700	8,180
Israel	61,100	54,000			3,610	9,760			64,700	63,700	6,930	8,540	7,990	9,860
Japan		4	307	1	45	518	118		470	523	129	180	177	216
Jordan	5,000	19,700							5,000	19,700	425	1,420	521	1,470
Latvia	33,000	16,300							33,000	16,300	2,480	1,180	3,050	1,520
Liberia		13,700								13,700		1,270		1,290
Mexico			73	756				21	73	777	24	54	25	57
Netherlands			1,150	1,160		1	46		1,200	1,160	219	220	257	251
Poland					91	54			91	54	49	27	58	32
Russia	109,000	167,000			51				109,000	167,000	8,290	11,300	9,780	14,000
United Kingdom	428	170					11		439	170	137	169	165	195
Other	31	1			10	2			41	3	18	6	21	6
Total	7,790,000	7,830,000	70,900	51,700	16,400	36,600	45,700	38,500	7,920,000	7,960,000	642,000	602,000	747,000	698,000

<sup>1/</sup> 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 K2O equivalent)

Country	1991	1992	1993	1994	1995 e/
Belarus	XX	3,310	1,950	3,020 r/	3,210 3/
Brazil	101	85	173	240 e/	223
Canada	7,410	7,270	6,840	8,040	9,010
Chile e/ 4/	55	55	55	50 r/	50
China e/	32	21	25	74 r/	80
France	1,130	1,140	890	870	802
Germany	3,860	3,460	2,860	3,290	3,280
Israel	1,320	1,300	1,310	1,260	1,330
Italy	31	86	20 r/e/		
Jordan	818	794 r/	822	930	1,070
Russia	XX	3,470 r/	2,630 r/	2,500 r/	2,800
Spain	585	594	661	684	650
Ukraine	XX	98	88 e/	168 r/	110
U.S.S.R. 5/	8,560 e/	XX	XX	XX	XX
United Kingdom	495	529	555 r/	580	582
United States	1,750	1,710	1,510	1,400	1,480 3/
Total	26,100	23,900	20,400 r/	23,100 r/	24,700

e/ Estimated. r/ Revised. XX Not applicable.

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

<sup>2/</sup> Table includes data available through May 29, 1996.

<sup>3/</sup> Reported figure.

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

<sup>5/</sup> Dissolved in Dec. 1991.