

# POTASH

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Potash denotes a variety of mined and manufactured salts, all containing the element potassium in water-soluble form. At the end of the 19th century, potash was made from hardwood trees and was a mixture of potassium carbonate and potassium hydroxide, both of which are caustic. Lye meant sodium hydroxide, and potash lye was potassium hydroxide, a higher grade product that made a better (softer, facial) grade of soap. Since approximately 1950, the term potash has been used to indicate potassium chloride (KCl, sylvite), potassium sulfate [ $K_2SO_4$  or sulfate of potash (SOP), usually a manufactured product and sometimes known in Russia and China as Lemery salt], and potassium-magnesium sulfate [ $K_2SO_4 \cdot 2MgSO_4$  or langbeinite or sulfate of potash magnesia (SOPM or K-Mag)]. Muriate of potash (MOP) is an acceptable mix of potassium chloride (95% or greater) and sodium chloride that includes minor amounts of other nontoxic minerals of the mined ore for fertilizer use and is neither the crude ore sylvinite nor pure sylvite. This publication has historically included potassium nitrate ( $KNO_3$  or saltpeter, a manufactured product) and mixed sodium-potassium nitrate ( $NaNO_3 + KNO_3$  or Chilean saltpeter, a natural product) because it functions as a potassic fertilizer. Saltpeter and Chilean saltpeter are still noted in the import tables (tables 8, 9). Alunite, feldspar, and muscovite are potassium-bearing minerals that are quite insoluble in water and are considered to be neither potassic fertilizers nor ores for price-competitive potassic fertilizers.

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 large amounts of these primary nutrients plus additional nutrients, such as boron, calcium, chlorine, copper, iron, magnesium, manganese, molybdenum, sulfur, and zinc, to ensure plant health and proper maturation. The three major plant nutrients have no substitutes, but low nutrient content alternative sources of plant nutrients, such as animal manure and guano, bone meal, compost, glauconite, and "tankage" from slaughterhouses, can be used. In addition, KCl is important in industrialized economies where it is used in oil-well drilling mud, aluminum recycling processes, a steel heat-treating process, metal electroplating, snow and ice melting, and water softening. Potassium chloride is used by the chlor-alkali industry to produce potassium hydroxide. The alkali potassium hydroxide is used for industrial water treatment and is the precursor of potassium carbonate, several forms of potassium phosphate, many other potassic chemicals, and in soap manufacture. The alkaline salt potassium carbonate is used in the glass for television and computer monitor tube production, alkaline batteries, food products, pharmaceutical preparations,

photography, some fire extinguishers, animal feed supplements, and as a catalyst for synthetic rubber manufacture. Generally, these uses have accounted for no more than about 10% of annual consumption in the United States.

## Production

Production of all types and grades of potash in the United States could not be accurately published in 2001 owing to proprietary data constraints. Production decreased by less than 10% compared with that of 2000 (table 1).

The U.S. Geological Survey (USGS) developed domestic potash data from voluntary semiannual surveys of U.S. operations. Of the seven survey requests sent to operations for both semiannual surveys, six operations responded. Data were estimated for the nonrespondent for both surveys. Data from the responding sites were estimated to represent about 98% of the total production listed in table 1.

At the beginning of the year, there were four U.S. companies producing potash in three States, and there were five U.S. companies producing potash at the end of the year. Most of the domestic production was from southeastern New Mexico, where two companies operated three mines. The other two States with potash production were Michigan and Utah. One New Mexico producer also owned a deep solution mine in Michigan and, at the beginning of the year, a surface brine operation in Utah. Potash producers in the United States produced KCl, SOP, and SOPM. Potassium nitrate was manufactured in the United States; output is not reported in this publication because it is a manufactured material. Because four companies produced standard and granular MOP, prices for those products can be reported. All domestic production of SOP and SOPM, together known as sulfates, came from a single company at the beginning of the year, which prevents publishing data that could reveal or allow calculation of sulfates production, sales, or stocks.

Domestic potash sales (as  $K_2O$ ) were down from those of 2000 as indicated by a moderate decline in apparent consumption, a slight decline in imports, and steady exports.

IMC Potash Carlsbad Inc. (a subsidiary of IMC Global Inc.) produced MOP, SOP, and SOPM in Carlsbad, NM, at the operation that started in 1940 and now includes the former Western Ag-Mineral Mine property. It also produces MOP from the Hersey, MI, solution-mine. Mississippi Potash, Inc. (a subsidiary of Mississippi Chemical Corp.), produced MOP from two potash operations near Carlsbad, NM, known as Mississippi Potash East and Mississippi Potash West. Mississippi Potash, Inc., also operated the augmented compacting facility at the former National Potash Co. mill site, known as Mississippi Potash North, to convert standard MOP to granular MOP.

In Utah, Reilly-Wendover Division's near-surface brine operation of Reilly Industries, Inc., continued production of

MOP and manure salts. The Moab Salt, LLC, solution mine and mill continued production of MOP and table salt for Intrepid Mining, LLC, of Denver, CO. The IMC Potash Kalium Ltd. SOP-producing plant that used the brines of Great Salt Lake near Ogden, UT, was sold to Apollo Management, LP, with completion of sale at the end of November. A later announcement about the sale mentioned Compass Minerals Group, Inc., of Overland Park, KS, the former home office of North American Chemical Co. (North American Minerals News, 2002). The Ogden plant continued to produce SOP from brines of the Great Salt Lake through the use of solar evaporation ponds and some beneficiation in the adjacent plant.

In Michigan, the IMC Potash Hersey solution mining operation used mechanical evaporators and crystallizers to produce white MOP. The IMC Global Inc. annual report reported the reserves at this site as in two beds and "...sufficient to yield 62 million [short] tons of concentrate [MOP] from sylvinite..." equaling more than 300 years of production at the present capacity of approximately 160,000 short tons [MOP] per year (IMC Global Inc., 2002, p. 4).

### Consumption

The apparent consumption of potash for 2001 in the United States was estimated to have decreased by about 10% from that of 2000 to about 5.3 million metric tons (Mt). In 2001, as in several other years, the variation in demand for potash in the United States was controlled by forces other than the direct demand for domestic or exported farm crops, especially grain crops or the relatively moderate price of potash. The price of natural gas declined to the normal price range, but the United States slumped into a mild recession with decreased demand and employment so that, even with normal prices for ammonia and its derivatives, fertilizer consumption was down. The consumption of potash declined as farmers wisely reduced spending on crop inputs, thereby conserving their capital for more promising days.

Domestic corn, rice, sorghum, soybeans, and wheat prices were relatively lower in relation to the 1992 to 1994 unweighted average prices, while oats and rye were relatively higher (Agricultural Statistics Board, 2002, p. A38-A39).

According to Potash & Phosphate Institute data, agricultural plus nonagricultural MOP shipments from Canadian and United States producers, in decreasing order of tonnage, were to the following major U.S. consuming States: Illinois, Ohio, Iowa, Indiana, Wisconsin, Missouri, Alabama, and Minnesota. These eight States received about 60% of MOP sales from Canadian and United States producers for 2001. For agricultural only MOP shipments from Canadian and United States producers, in decreasing order of tonnage, were to the following major receiving States: Illinois, Iowa, Indiana, Ohio, Missouri, Minnesota, and Wisconsin. These seven States received about 58% of agricultural MOP sales for 2001. For nonagricultural only MOP shipments from Canadian and United States producers, the major receiving States, in decreasing order, were Alabama, Ohio, Wisconsin, Mississippi, Delaware, Texas, New Mexico, and Illinois. These eight States received about 76% of nonagricultural MOP sales for 2001.

Agricultural plus nonagricultural MOP shipments from U.S. producers, in decreasing order of tonnage, were to the following

major U.S. consuming States: Texas, Missouri, Michigan, Illinois, New Mexico, California, Louisiana, and Nebraska. These eight States received about 71% of agricultural plus nonagricultural MOP sales for 2001. Agricultural MOP shipments from U.S. producers to the major receiving States, in decreasing order, were shipped to Missouri, Texas, Michigan, Illinois, California, Nebraska, and Louisiana. These seven States consumed about 74% of the agricultural MOP from the domestic producers. Nonagricultural MOP sales from U.S. producers to the major receiving States, in decreasing order, were to New Mexico, Texas, Mississippi, Utah, Wyoming, Colorado, Louisiana, and Kansas. These eight States received about 79% of U.S.-produced nonagricultural MOP.

### Foreign Trade

Based on U.S. Census Bureau data, as modified by the USGS, the exports of all types and grades of potash were essentially unchanged from last year at 366,000 metric tons (t) in 2001 from about 367,000 t in 2000 (table 6). Exports of MOP totaled about 49% of total potash exports; SOP, about 26%; SOPM, about 24%; and potassium nitrate, about 1%. Latin America received about 61% of total potash exports, while the Pacific basin received about 31%, with the other 8% distributed among Africa, Canada, Europe, and the Middle East. Latin America received about 89% of all MOP exports, and MOP to Latin America was the largest category with 44% of total potash exports. The Asia Pacific region received about 72% of all SOP exports, and SOP to Asia Pacific was the second largest category with about 19% of total exports. SOP to Asia Pacific for 2001 was a 58% increase from 2000; it was not clear if this was a quality or an availability issue in that region. Latin America received about 27% of SOP exports, a decline of about 26%, and SOP to Latin America was the third largest category with about 7% of total exports. Latin America received about 40% of SOPM exports, and SOPM to Latin America was about 9% of total exports; Asia Pacific received about 33% of SOPM exports, and SOPM to Asia Pacific was about 8% of total exports.

Relative to the year 2000, U.S. MOP exports were essentially unchanged at 181,000 t for the year 2001 from 180,000 t. MOP exports increased by 5% to Latin America and 35% to Europe, and declined by 2% to the Pacific basin. The total SOP exports increased by about 21% to 95,000 t from 78,000 t, with a decline of 26% to Latin America; but SOP exports to the Asia Pacific region rose by 58% to 68,000 t. Total exports of SOPM declined by about 14% from 2000, with Canadian imports decreasing by 23%, Latin America imports decreasing by about 28%, and Pacific basin imports increasing by about 7%.

Potash imports into the United States decreased by about 2% relative to those of 2000 to about 4.5 Mt (tables 8, 9). MOP imports from Canada declined by less than 4%, while imports from Belarus increased by 42% to 115,000 t, and imports from Russia increased by 11% to 197,000 t. SOP imports from Canada declined slightly, while SOP imports from Chile and Germany increased. Potassium nitrate imports from Chile increased by about 24%, while smaller shipments entered the United States from China, Denmark, Germany, India, Israel, Japan, and Poland. MOP was nearly 98% of total imports, and Canada supplied about 93% of the MOP imports.

## Transportation

Canadian National Railway Co., Grand Trunk Western Railroad Inc., and Illinois Central Railroad Co. purchased Wisconsin Central Transportation Corp. during the period from January through October (Canadian National Railway Co., 2002, p. 40).

The new bulk fertilizer terminal in the seaport of St. Petersburg, Russia, known as the Baltic bulk terminal, commenced shiploading in December. Future dredging to Panamax depth and installation of five storage units amounting to 150,000 t of capacity have been proposed by the Joint Stock Corp. Uralkali of Berezniki City, Perm, Russia (Fertilizer Week, 2001e). The Ukrainian port Nikolaev, located on the Black Sea and northeast of Odessa, opened a potash terminal in June without noting the track gauge from mine to docksides (International Potash Co., 2001§<sup>1</sup>). This port is accessible from both Perm and Soligorsk. It was opened for shipments to Asia through the Suez Canal and South America through the Strait of Gibraltar.

Domestic rail tariff rates for agricultural products appeared to have remained relatively unchanged owing to a decline in the economy and lower demand for fertilizers.

Blue water freight rates returned to the 1999 tariff ranges of just above covering interest payments on loans. A worldwide economic slowdown and an oversupply of capacity took place as a result of the 1999 effort by ship builders to maintain production with sales of new capacity with very low profit (Hayley-Bell, 2001).

## World Review

Estimated world potash production declined by about 2% from 2000 (table 10). European production was estimated to have declined slightly with production in France and Spain decreasing, production in Germany increasing, and the United Kingdom production estimated unchanged. The former Soviet Union (FSU) production is estimated to have increased by about 7% compared with 2000, mostly in Russia. North America showed about a 10% decrease, primarily a production decrease in Canada. Israel and Jordan reported increases in production totaling less than 2% combined from the 1999 production level.

**Belgium.**—On the first day of 2002, Tessenderlo Group will commence marketing the SOP that Tessenderlo Chemie NV has been producing for France's Société Commerciale des Potasses d'Alsace (SCPA) for many years (Green Markets, 2001c). SCPA will be selling only MOP for 2 more years because the sylvinite mines of France will cease production in 2003.

**Brazil.**—Farmers in Brazil called for port stevedores to not unload Canadian potash owing to the Canadian suspension of meat imports from Brazil. The Canadian suspension of meat imports was a protest concerning Brazilian subsidies to its aviation manufacturing industry.

Cia. Vale do Rio Doce (CVRD) announced a capacity increase to the MOP mine at Taquari-Vassouras to 510,000 metric tons per year (t/yr) in 2006 from the current 480,000 t/yr (Fertilizer Week, 2001b). CVRD was also breaking its

connection with the large steel producer Companhia Siderúrgica Nacional. In November, a Brazilian antitrust authority approved the privatization of CVRD (Fertilizer Markets, 2001a).

**Canada.**—Potash Corp. of Saskatchewan (PCS) purchased 18% of Sociedad Química y Minera de Chile S.A. (SQM) in the October public auction in Chile (Potash Corp. of Saskatchewan, 2002, p. I-2). SQM produces potassium nitrate, potassium sulfate, sodium nitrate, iodine, and lithium carbonate. PCS also wholly owns PCS Yumbres SCM, a potassium nitrate and iodine operation in Chile, and owns 9% of Israel Chemical Ltd. (ICL), a MOP, phosphate, and bromine producer in Israel.

**Chile.**—In 2001, SQM commenced negotiations to purchase another potassium nitrate producer, Compania de Salitre y Yodo (Cosayach), which already has a mine and mill at Pozo Almonte in northern Chile. Cosayach had started production in December 2000 (Fertilizer Markets, 2001c). SQM and Norsk Hydro ASA agreed to cooperate in sales and marketing of each other's specialty fertilizers using their own home markets (Green Markets, 2001b). Then, SQM Nitratos SA (SQN) (the nitrates subsidiary of SQM), Norsk Hydro, and Rotem Amfert Negev (a subsidiary of ICL) signed a joint marketing agreement (Fertilizer Week, 2001d). SQN and Rotem have a joint blending plant in Belgium, while Norsk Hydro has a blending plant in the Netherlands. ICL owns about 12% of SQM, while PCS owns about 18% of SQM (Fertilizer Week, 2001d). PCS Yumbres apparently started up late in 2000 with about 120,000 t/yr of potassium nitrate capacity.

**China.**—China joined the World Trade Organization on December 11. This step should benefit the U.S. fertilizer and agriculture industries by providing a major source of demand.

The Qarhan Lake potash project in the Qaidam Basin of Qinghai Province had been a joint venture between unnamed Chinese companies and Dead Sea Works Ltd. and United Development Inc. of Israel since 1993, but Israel has withdrawn completely. In 2001, Qinghai Yanhu Potash Fertilizer Co., which is based in Golmud, China, took control of development at this site with a 180,000-t/yr-planned-capacity MOP project. The firm has nearly the equivalent of a \$60 million loan from the Commercial and Industrial Bank of China to start development. There is also a mention of an agreement between the Government of China and the Government of Laos to develop a potash mine in Laos (China Nonferrous Metal News, 2001).

**France.**—The last two potash mines of France, Berrwiller Mine and Amélie Mine, were previously slated to be closed by the end of 2004. Owing to employees leaving for or taking training for their next jobs, Berrwiller Mine closed in April 2001, and Amélie Mine will close in July 2003. This potash region was discovered in 1904 while drilling for oil and was the first sylvinite region seen, adding a new type of potash ore to the list of possible potash sources.

**Israel.**—ICL finished purchasing Grupo Potassas of Spain by buying out the two partners and renaming the firm Iberpotash S.A. ICL commenced the purchase of Cleveland Potash Ltd. from Anglo American plc in November.

**Jordan.**—Arab Potash Co. earned a \$50 million net profit for the year 2000, demonstrating a strong business organization with successful leadership. The Government of Jordan started to consider partial privatization of its 55% ownership (Fertilizer

<sup>1</sup>A reference that includes a section twist (§) is found in the Internet Reference Cited section.

Markets, 2001b).

**Russia.**—A small Lemery salt plant was proposed in the Blagoveschensk region and would use sodium sulfate from two lakes and purchased MOP. Capacity was set at 50,000 t/yr (Industrial Minerals, 2001). This seems to follow China's efforts to develop nonchlorine potassium fertilizer sources using sodium sulfate from lakes.

**Spain.**—Iberpotash announced plans to close the Suria mineshaft by the end of 2002 and to increase the capacity of Suria's other mine, Cabanasas Mine, which is on the other side of the Tordell Fault (Instituto Geológico y Minero de España, 2001). The combined Sallent and Cabanasas Mines and mills are expected to total 750,000 t/yr capacity by 2004 (Fertilizer Week, 2001c).

**Thailand.**—Asia Pacific Resources Ltd. has continued its effort to develop the Samboon Mine and mill after both Norsk Hydro (Asia) Pte. Ltd. and Bechtel/United Infrastructure Co. International, Ltd., declined to purchase stakes in the project. The year was spent working with a debt-to-equity conversion effort. The Government of Thailand "...had not been able to provide the guarantees needed to underwrite the loan" (Fertilizer Week, 2001a).

**United Kingdom.**—Cleveland Potash Ltd. brought more compaction capacity online in the spring and provided 400,000 t/yr granular MOP, about 180,000 t/yr standard MOP, and about 85,000 t/yr soluble MOP from the crystallizer circuit. At the end of the year, ICL signed an agreement to purchase Cleveland Potash for \$45 million (Green Markets, 2001a). ICL believes its total capacity to be 3 million metric tons per year between England, Israel, and Spain.

## Outlook

Potash consumption in the United States will stay about the same as the past 4 years because grain prices will remain low. With natural gas prices declining to 1999 levels, fixed nitrogen and nitrogen-phosphate production should lead to balanced fertilizer application and a relatively normal domestic market. For crop exports, other countries around the world also will see the same low prices for nitrogen-phosphate fertilizers, but certain countries may have a transportation or subsidy advantage over U.S. farmers in the competition for the fertilizer or grain exports demand.

There may be more expansion of FSU potash production and exports to the detriment of the Canadian potash producers and some contention between Israeli potash companies and the FSU in Western Europe.

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TABLE 1  
SALIENT POTASH STATISTICS 1/ 2/

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

	1997	1998	1999	2000	2001
<b>United States:</b>					
<b>Production: 3/</b>					
Gross weight	2,900	3,000	2,500	2,600	2,500
K <sub>2</sub> O equivalent	1,400	1,300	1,200	1,300	1,200
<b>Sales by producers:</b>					
Gross weight 3/	3,000	2,900	2,500	2,600	2,400
K <sub>2</sub> O equivalent 3/	1,400	1,300	1,200	1,200	1,100
Value 4/ 5/	\$320,000	\$330,000	\$280,000	\$290,000	\$260,000
<b>Average value: 6/</b>					
Gross weight dollars per metric ton	\$110.00	\$115.00	\$110.00	\$110.00	\$110.00
K <sub>2</sub> O equivalent do.	\$230.00	\$250.00	\$230.00	\$230.00	\$230.00
<b>Exports:</b>					
Gross weight	1,070	1,130	1,080	922 r/	883
K <sub>2</sub> O equivalent	466	477	459	367	366
<b>Imports for consumption: 7/ 8/</b>					
Gross weight	9,030	7,870	7,360	7,580	7,480
K <sub>2</sub> O equivalent	5,490	4,780	4,470	4,600	4,540
Customs value	\$610,000	\$648,000	\$566,000	\$554,000 r/	\$537,000
<b>Consumption, apparent: 9/</b>					
Gross weight	11,000 3/	9,700 10/	8,700 10/	9,400 10/	9,000 10/
K <sub>2</sub> O equivalent	6,500 3/	5,600 10/	5,100 10/	5,600 10/	5,300 10/
World, production, marketable K <sub>2</sub> O equivalent	25,200	25,800 r/	26,900 r/	26,500 r/	26,000 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 are rounded to no more than three significant digits, unless otherwise specified, except prices.

3/ Data rounded to within 100,000 tons to avoid disclosing proprietary data.

4/ F.o.b. mine.

5/ Data are rounded to no more than two significant digits.

6/ Rounded to the nearest \$5 to avoid disclosing proprietary data.

7/ Excludes potassium chemicals and mixed fertilizers.

8/ Includes nitrate of potash.

9/ Calculated from sales plus imports minus exports.

10/ Data rounded to within 200,000 tons to avoid disclosing proprietary data.

TABLE 2  
PRODUCTION OF CRUDE ORE IN  
NEW MEXICO

(Thousand metric tons)

Period	Crude salts 1/ (mine production)	
	Gross weight	K <sub>2</sub> O equivalent
<b>2000:</b>		
January-June 2/	6,000	700
July-December 2/	6,000	700
Total	12,000	1,400
<b>2001:</b>		
January-June 2/	6,000	700
July-December 2/	5,000	700
Total	11,000	1,400

1/ Sylvinite and langbeinite.

2/ Data are rounded to no more than one significant digit.

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

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

State	Agricultural potash		Nonagricultural potash	
	2000	2001	2000	2001
Alabama	86,400	84,700	220,000	202,000
Alaska	986	1,170	5,020	3,050
Arizona	3,700	2,320	1,950	3,170
Arkansas	84,100	76,400	183	115
California	75,700	59,700	15,400	10,600
Colorado	15,300	12,200	1,820	7,850
Connecticut	1,890	1,210	1,590	1,000
Delaware	21,700	20,600	46,800	40,800
Florida	153,000	135,000	12,900	13,600
Georgia	131,000	118,000	1,100	887
Hawaii	370	1,580	--	--
Idaho	38,000	32,100	748	808
Illinois	591,000	586,000	25,000	24,500
Indiana	369,000	352,000	11,100	12,400
Iowa	386,000	418,000	4,490	4,910
Kansas	35,200	24,500	8,270	9,270
Kentucky	115,000	121,000	8,750	9,210
Louisiana	110,000	68,700	6,090	7,010
Maine	3,380	3,250	225	348
Maryland	28,200	26,600	1,830	1,840
Massachusetts	1,990	1,660	7,270	9,010
Michigan	170,000	151,000	8,240	8,190
Minnesota	254,000	272,000	7,670	10,600
Mississippi	38,700	31,600	61,900	53,100
Missouri	264,000	289,000	4,460	3,930
Montana	17,800	18,500	167	187
Nebraska	59,400	55,500	1,740	2,780
Nevada	65	145	693	890
New Hampshire	798	222	198	266
New Jersey	5,480	6,580	784	887
New Mexico	3,990	7,950	19,600	31,800
New York	55,300	56,200	2,790	4,470
North Carolina	125,000	118,000	264	188
North Dakota	30,600	30,000	79	38
Ohio	333,000	335,000	105,000	93,000
Oklahoma	18,200	18,000	6,740	5,060
Oregon	33,600	32,500	1,630	771
Pennsylvania	57,400	48,200	9,220	12,800
Rhode Island	--	--	43	35
South Carolina	57,300	55,600	169	190
South Dakota	18,100	21,200	727	526
Tennessee	129,000	135,000	7,260	11,600
Texas	126,000	106,000	26,900	34,700
Utah	1,990	4,210	5,420	11,600
Vermont	3,690	2,380	69	60
Virginia	84,800	72,900	601	24
Washington	43,600	38,300	1,360	1,600
West Virginia	3,900	2,670	728	1,110
Wisconsin	214,000	211,000	68,300	84,600
Wyoming	1,800	1,780	1,580	9,090
Total	4,400,000	4,270,000	725,000	746,000

-- Zero.

1/ Data are rounded to no more than 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 K<sub>2</sub>O equivalent)

Grade	2000	2001
Agricultural:		
Standard	210	174
Coarse	2,090	2,070
Granular	1,700	1,610
Soluble	407	406
Total	4,400	4,270
Nonagricultural:		
Soluble	147	142
Other	578	605
Total	725	746
Grand total	5,130	5,010

1/ Data are rounded to no more than 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/ 2/

(Dollars per metric ton of K<sub>2</sub>O equivalent)

Type and grade	2000		2001	
	January- June	July- December	January- June	July- December
Muriate, 60% K <sub>2</sub> O minimum:				
Standard	155	160	165	165
Granular	165	160	160	150

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

2/ Data rounded to nearest \$5.

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

	Approximate average K <sub>2</sub> O content (percent)	Quantity (metric tons)	
		Product	K <sub>2</sub> O equivalent e/
2000:			
Potassium chloride, all grades	61	296,000	180,000 r/
Potassium sulfate	51	153,000	78,100
Potassium magnesium sulfate	22	455,000	100,000
Potassium nitrate	45	19,000	8,570
Total	XX	922,000 r/	367,000
2001:			
Potassium chloride, all grades	61	296,000	181,000
Potassium sulfate	51	186,000	94,800
Potassium magnesium sulfate	22	391,000	86,000
Potassium nitrate	45	10,200	4,590
Total	XX	883,000	366,000

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

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

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

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	
	2000	2001	2000	2001	2000	2001	2000	2001
Argentina	3,320	424	19,100	6,120	579	--	23,000	6,550
Australia	--	--	4,650	18,800	--	1	4,650	18,800
Belgium	--	--	--	78	--	--	--	78
Bolivia	7,380	--	--	--	--	--	7,380	--
Brazil	25,900	46,300	1,050	5	1	32	26,900	46,400
Canada	5,860	4,920	97,800	76,700	6,910	7,140	111,000	88,800
Chile	25,400	20,200	28,800	32,700	--	--	54,200	52,900
China	--	--	40,200	88,000	--	--	40,200	88,000
Colombia	7,390	10,000	33,000	27,100	--	--	40,400	37,100
Costa Rica	2,230	4,030	42,500	27,900	--	--	44,800	31,900
Cote d'Ivoire	3,150	--	--	9,750	--	--	3,150	9,750
Dominican Republic	16,300	37,700	2,490	5,260	45	89	18,800	43,100
Ecuador	6	7,150	17,400	9,290	139	136	17,500	16,600
France	41	39	10,300	15,400	--	--	10,400	15,500
Guatemala	--	1,550	5,820	--	120	--	5,940	1,550
Honduras	241	5,000	12,200	1,200	200	--	12,600	6,200
Italy	19 r/	72	--	--	--	--	19 r/	72
Israel	--	--	--	--	2,090	--	2,090	--
Jamaica	12,100	5,800	--	--	-- r/	--	12,100 r/	5,800
Japan	26,500 r/	25,900	125,000	133,000	2	24	152,000	159,000
Korea, Republic of	--	--	15,300	14,800	4,480	169	19,800	15,000
Malaysia	--	--	12,800	997	1,370	1,030	14,200	2,030
Martinique	7,770	10,800	3,430	3,890	--	--	11,200	14,700
Mexico	94,500	83,000	77,800	53,100	2,800	1,510	175,000	138,000
Panama	9,050	2,210	1,790	442	--	--	10,800	2,650
Peru	--	930	11,200	9,220	--	--	11,200	10,100
South Africa	--	--	3,970	322	--	--	3,970	322
Thailand	--	--	2,870	3,450	--	--	2,870	3,450
Venezuela	30,200	13,600	25,100	28,700	--	--	55,300	42,300
Other	18,300 r/	16,500	13,200 r/	10,400	310	64	31,800 r/	27,000
Total	296,000	296,000	608,000	577,000	19,000	10,200	922,000 r/	883,000

r/ Revised. -- Zero.

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

2/ Includes potassium magnesium sulfate.

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

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

	Approximate average K <sub>2</sub> O content (percent)	Quantity (metric tons)		Value		
		Product	K <sub>2</sub> O equivalent e/	Customs (thousands)	Cost, insurance freight	
2000:						
Potassium chloride 2/	61	7,450,000	4,550,000	\$525,000	\$548,000	
Potassium sulfate	51	74,800	38,200	16,100	17,300	
Potassium nitrate	45	40,900	18,400	11,900	13,700	
Potassium sodium nitrate mixture	14	9,360	1,310	1,540	1,660	
Total	XX	7,580,000	4,600,000	554,000 r/	581,000	
2001:						
Potassium chloride 2/	61	7,300,000	4,450,000	500,000	527,000	
Potassium sulfate	51	113,000	57,800	21,000	23,000	
Potassium nitrate	45	50,800	22,900	13,000	14,900	
Potassium sodium nitrate mixture	14	15,400	2,160	2,620	2,920	
Total	XX	7,480,000	4,540,000	537,000	568,000	

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

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

2/ Contains imports listed under Harmonized Tariff Schedule of the United States code 3104.10.0000.

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



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 (metric tons)		Total value (thousands)			
	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	Customs		C.i.f.	
											2000	2001	2000	2001
Belarus	135,000	191,000	--	--	--	--	--	--	135,000	191,000	\$11,400	\$15,500	\$12,900	\$17,200
Belgium	--	--	22	8	--	--	--	--	22	8	10	4	14	5
Bulgaria	1,000	--	--	--	--	--	--	--	1,000	--	85	--	100	--
Canada	7,020,000	6,770,000	17,900	17,000	5	33	136	188	7,040,000	6,790,000	492,000	460,000	511,000	482,000
Chile	50	--	7,840	11,300	34,900	43,100	9,190	15,200	52,000	69,700	12,400	14,800	14,000	16,600
China	--	25	1	--	--	110	--	--	1	135	9	90	9	100
Denmark	--	--	--	--	3,080	2,500	--	--	3,080	2,500	1,090	812	1,410	1,100
France	50	--	--	124	--	--	--	--	50	124	6	31	10	38
Germany	269	1,080	48,800	84,100	336	1,050	30	12	49,400	86,300	10,200	15,400	10,800	16,800
India	--	50	--	50	344	115	--	--	344	215	114	101	124	107
Israel	60	20	--	--	846	2,990	--	--	906	3,010	339	791	412	1,090
Japan	2	332	294	711	1,060	731	--	--	1,350	1,770	674	735	760	829
Lithuania	--	9,710	--	--	--	--	--	--	--	9,710	--	811	--	939
Poland	--	--	--	--	93	113	--	--	93	113	46	63	57	72
Russia	296,000	329,000	--	--	--	--	--	--	296,000	329,000	25,200	27,900	28,300	30,900
United Kingdom	984	169	--	--	1	2	--	--	985	171	463	105	564	118
Other 2/	20 r/	21	24 r/	1	264 r/	2	--	6	308	30	117 r/	27	140	32
Total	7,450,000	7,300,000	74,800	113,000	40,900	50,800	9,360	15,400	7,580,000	7,480,000	554,000 r/	537,000	581,000	568,000

r/ Revised. -- Zero.

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

2/ Potassium chloride includes Slovakia, Spain (2000), and Switzerland (2001); potassium sulfate includes the Dominican Republic (2000), the Netherlands (2000), and Switzerland (2001); potassium nitrate includes the Dominican Republic (2000), Finland (2000), Italy (2000), and Mexico; potassium sodium nitrate includes the Netherlands (2001).

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

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

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

Country	1997	1998	1999	2000	2001 e/
Belarus	3,247	3,451	4,553 r/	3,786 r/	3,700
Brazil	280	326	348 r/	352 r/	352
Canada	8,989	9,201	8,475 r/	9,107 r/	8,200
Chile	22	22	22 e/	23	23
China e/	115	120	260 r/	380 r/	385
France	725	453 r/	345 r/	360 r/	300
Germany	3,423	3,582 r/	3,543 r/	3,407 r/	3,550
Israel	1,488	1,668	1,702	1,748 r/	1,774 3/
Jordan	850 r/	916 r/	1,080	1,160 r/	1,178 3/
Russia e/	3,400	3,500	4,200	3,700	4,300
Spain e/	639 r/	597 r/	656 r/	653 r/ 3/	525
Ukraine e/	60 3/	35	35	30	25
United Kingdom	565	608	495	500 r/	500
United States 4/	1,400	1,300	1,200	1,300	1,200
Total	25,200	25,800 r/	26,900 r/	26,500 r/	26,000

e/ Estimated. r/ Revised.

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

2/ Table includes data available through April 24, 2002.

3/ Reported figure.

4/ Rounded to within 100,000 tons to avoid disclosing proprietary data.