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), sometimes a manufactured product], and potassium-magnesium sulfate [K_2SO_4•$2MgSO_4$ or langbeinite or sulfate of potash magnesia (SOPM or K-Mag)]. Muriate of potash (MOP) is an acceptable mix of potassium chloride (95% or higher) 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) or 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 such additional nutrients 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 may be used in the chlor-alkali industry to produce potassium hydroxide. The alkali potassium hydroxide is the precursor of potassium carbonate and is used for industrial water treatment, for producing potassium phosphates, 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 10% of the annual consumption in the United States, but this percentage varies because industrial end uses tend to vary with the domestic economy, whereas fertilizer end uses tend to vary with disparate world weather patterns, world demand, relative currency values, and other countries’ economic gyrations and their ability to pay for either fertilizers or food stuffs.

Legislation and Government Programs

The 1993, a class-action potash antitrust lawsuit was filed in

Potash in the 20th Century

At the beginning of the 20th century potash was used for glassmaking, soapmaking, bleach, and making saltpeter. It was a fertilizer to such very high value crops as tobacco and cotton. In 1870, a mineral source of water-soluble potassium ore named “carnallite” had been found near Stassfurt, Germany, from which the vaunted German chemical industry learned to separate potassium chloride (KCl). During the First World War, there were no imports from Germany. Potassium was needed for the solid oxidizer potassium permanganate in First World War gas masks and as potassium nitrate, an oxidizer in the munitions and signaling rockets. The price of potash rose to $600 per ton measured in 1916 dollars. Potassic salts were extracted from subsurface Searles Lake brines in California, some Nebraska lake brines, the dust of cement plants, iron refinery dust in Pennsylvania, molasses refinery waste in Maryland, old-fashioned tree ashes in Michigan and Wisconsin, and kelp (seaweed) off the coast of California. After the war, Congress allocated money to find reasonably priced potash in the United States. In 1925, an oil exploration team in New Mexico noted sylvinite in a well east of Carlsbad, NM. Potash production as KCl commenced in New Mexico in 1932. Three mines were operating in the New Mexico Known Potash Resource Area by the beginning of the Second World War. The New Mexico reserves were seen to be finite in the 1950s as more mines started up, and after searching likely sedimentary basins in the United States, potash mine owners moved up to a showing of sylvinite in Saskatchewan, Canada. With difficulty, a huge high-grade resource of sylvinite was changed to reserves through technology. The year of peak U.S. potash production was 1966, as Canadian potash started to enter the U.S. market.

At the end of the 20th century, Canada provided approximately 90% of the KCl consumed in the United States.

many places and consolidated to the U.S. District Court for Minnesota in Minneapolis, MN; it was dismissed by summary judgment in January 1997, except for a California State Court lawsuit which allows indirect consumers to participate and is treated differently, and an Illinois State Court complaint of antitrust. An appeal to the U.S. Court of Appeals for the Eighth Circuit resulted in affirmation of dismissal for some of the defendants and a divided decision reversing the dismissal for some of the other defendants. These latter defendants reargued the case before the U.S. Court of Appeals for the Eighth Circuit in September 1999, and the court of appeals affirmed the dismissal of the complaint for all defendants by summary judgment on February 17, 2000. The plaintiffs appealed to the U.S. Supreme Court for review through a writ of certiori, which was denied without comment on October 2, 2000 (Potash Corp. of Saskatchewan, Inc., 2001a). According to the same Securities and Exchange Commission filing, the California State Court lawsuit was dismissed by the end of the year, as was the Illinois State Court complaint.

Production

Production of all types and grades of potash in the United States could not be accurately published in 2000 because of proprietary data constraints. Production increased moderately compared with that of 1999 (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.

Four U.S. companies produce potash in three States. 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 Utah surface brine operation and a deep solution mine in Michigan. Potash producers in the United States produced KCl, SOP, and SOPM. Potassium nitrate was manufactured in the United States, but output is not reported in this publication because it is a manufactured material rather than a mined material. Because all four companies produced standard and granular MOP, prices for those products were reported. All of the domestic production of SOP and SOPM, together known as sulfates, came from a single company, which prevents publishing data that could reveal or allow calculation of sulfates production, sales, or stocks.

Domestic potash sales were essentially unchanged (as K_2O) from that of 1999 owing to a moderate rise in apparent consumption, a moderate rise in imports, and a moderate decline in exports.

IMC Kalium Ltd. 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 and plant and SOP from the brines of Great Salt Lake near Ogden, UT. In Carlsbad, IMC Global's new SOPM processing plant was operating with ore from its original leases and the former Western Ag-Mineral leases. It was built near an older mine shaft with its own ore hoisting facility and a separate underground conveyor belt. Only SOPM ore was hoisted up this shaft, and only sylvinite (KCl ore) was hoisted up the original shaft. Mississippi Potash, Inc., a subsidiary of Mississippi Chemical Corp., produced MOP from two potash operations near Carlsbad, 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 for its market.

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. IMC Kalium Ogden Corp. continued to produce SOP from brines of Great Salt Lake through the use of solar evaporation ponds and some beneficiation in the adjacent plant. IMC Kalium Ogden's operation was offered for sale along with IMC Chemicals and IMC Salt in the middle of the year (North American Minerals News, 2000b).

In Michigan, IMC Potash Hersey Inc. operation produced white MOP from deep wells (deeper than 2,000 meters) and solution mining through mechanical evaporators and crystallizers.

The fertilizer industry has joined the latest electronic age time-saver technology with the initiation of business-to-business relationships. There are at least two such groups (Rooster.com and planetAG.com) in the United States and another forming in Germany (mySAP.com). At home, on their computers, farmers can "...market their crops, and buy their seed, fertilizers, crop protection products, equipment[,] and other supplies" (Green Markets, 2000d).

Consumption

The apparent consumption of potash for 2000 in the United States was estimated to have increased by less than 5% from that of 1999 to about 5.6 million metric tons (Mt). In 2000, 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. As the price rise of natural gas drove up the price of fixed nitrogen fertilizers and nitrogen/phosphate fertilizers, sales and application of these natural-gas-based fertilizers suffered. Since the three fertilizers have to be balanced in the soil for the most profitable investment for crop production, potash sales did not rise as much as they might have.

Fertilizer is an input into agriculture, and a reasonable description of potash demand can be given through the largest crops, which are corn for grain, soybeans for beans, and sorghum, rice, and cotton of all types. Corn, soybeans, and cotton showed increased planted area in 2000, up by a few percent compared with that of 1999, and area harvested was up by a few percent with yield and production increased by a few percent (National Agricultural Statistics Service, 2000, p. 4-5, 7, 10-11; 2001b, p. 1). Average corn yield was the second best yield rate on record, and total production was the second highest on record. Domestic corn consumption was boosted by two end uses: the increased production of ethanol owing to the increased domestic price of gasoline, and the increased exports of prepared meats, from cattle, pork, and poultry fed on domestic grains. The prepared meat markets—beef and pork to

Japan and chicken to Hong Kong and Russia—rose owing to the Asian Pacific Basin's return to financial health and the increase of Russia's consumer demand for meat. Corn exports declined but to a lesser extent owing to lower corn production in China, Eastern Europe, North Africa, and the Middle East due to adverse weather. Ending corn stocks in the United States were up by nearly 6% to 216.4 Mt (National Agricultural Statistics Service, 2001c, p. 1, 5). Soybean production for beans was the highest on record (National Agricultural Statistics Service, 2001a, p. 10), soybean exports soared nearly 17% (Economic Research Service, 2001), and ending U.S. soybean stocks were up by about 2.6% (National Agricultural Statistics Service, 2001c, p. 5). The wheat-of-all-types planted area was unchanged from 1999, and area harvested decreased by 1.5%, while yield per hectare declined by 1.7% owing to dry weather in the southern plains, amounting to a 3.3% decline in production, the only yield-declining major crop in 2000 (National Agricultural Statistics Service, 2001b, p. 1, 5). Wheat exports declined by about 2% (Economic Research Service, 2001, p. 2). Ending U.S. wheat stocks (all wheat in all positions) declined by 4.4% to 49 Mt (National Agricultural Statistics Service, 2001c, p. 1, 5). U.S. grain exports were lower except for soybeans and sorghum (Economic Research Service, 2001, p. 2-3). Sorghum and rice production declined in 2000 by 21% and 7%, respectively (National Agricultural Statistics Service, 2001b, p. 14). Cotton yield increased about 4% per acre and production increased by about 1.5% (National Agricultural Statistics Service, 2000, p. 10-11; 2001b, p. 10). Cotton and cotton linters exports increased by more than double (Economic Research Service, 2001, p. 4).

Mexico was reported to be an important importer of U.S. wheat, corn, soybeans, and cotton owing to its increased earnings from the elevated price of oil. For U.S. agricultural exports, Mexico was reported to be the second largest receiver, with Japan being the largest, in agricultural bulk commodities, and fourth for high-value products (Economic Research Service, 2001, p. 5). [High value products are all agricultural products minus bulk commodities.]

Generally, potash demand was up slightly but without a clear agricultural commodity or an importing country that made a large difference. The farmers produced more corn, cotton, and soybeans using a lesser amount of potash, which might mean that genetically modified seed was more efficient at using the agricultural inputs, such as acreage, fertilizer, rain, etc., than unmodified seed.

All U.S. grain prices were relatively low, but "[d]irect government payments to farmers rose from [less than] $8 billion in 1997 to a record $22 billion last year [2000]" (Collins, 2001).

According to Potash & Phosphate Institute data, agricultural MOP shipments from Canadian and U.S. producers to the major destination by State, in decreasing order of tonnage, were Illinois, Iowa, Indiana, Ohio, Missouri, Minnesota, Wisconsin, Michigan, Florida, and Tennessee (table 3). These 10 States received 65% of agricultural sales of MOP from Canadian and United States producers in 2000. For agricultural and nonagricultural MOP shipments from Canadian and United States producers, the major receiving States, in decreasing order, were Illinois, Ohio, Iowa, Indiana, Alabama, Wisconsin, Missouri, Minnesota, Michigan, and Florida. These 10 States received about 64% of agricultural and nonagricultural sales of MOP in 2000.

The major destinations for agricultural MOP shipments from U.S. producers, in decreasing order, were Texas, Missouri, Michigan, California, Illinois, Kansas, Nebraska, and Iowa. These eight States consumed about 80% of the MOP from domestic producers. For agricultural and nonagricultural MOP sales from U.S. producers, the major receiving States, in decreasing order, were Texas, Missouri, Michigan, California, Illinois, Mississippi, Kansas, Iowa, Nebraska, and New Mexico. These 10 States received about 80% of U.S.-produced agricultural and nonagricultural MOP.

Foreign Trade

Based on U.S. Census Bureau data, as modified by the USGS, the exports of all types and all grades of potash decreased by 20% to 367,000 metric tons (t) from 459,000 t in 1999 (table 6). Exports of MOP totaled about 49% of all potash exports, SOPM totaled about 27%, SOP totaled about 21%, and potassium nitrate totaled about 3%. Latin America received about 64% of all exports, the Pacific Basin received about 25%, with the remaining 11% distributed among Africa, Canada, Europe, and the Middle East.

U.S. MOP exports fell by 36% to 181,000 t from the 1999 total of 282,000 t. MOP exports decreased by 32% to Latin America, 98% to Europe, and 21% to the Pacific Basin. SOP exports increased by about 12% to 78,000 t from 68,000 t with stronger first half-year sales. SOP exports to the Pacific Basin rose by 76% to 43,000 t, and SOP exports to Latin America fell by 8% to 35,000 t. The Pacific Basin received about 55% of total SOP exports, while Latin America received about 45%. Total exports of SOPM were essentially unchanged from last year, with Canada increasing its imports by 27%, and imports to Latin America and the Pacific Basin declining by about 14% and about 4%, respectively.

Potash imports into the United States increased by about 3% compared with those of 1999 to about 4.6 Mt (tables 8, 9). MOP imports from Belarus, Canada, and Russia increased slightly. SOP imports from Canada, Chile, and Germany decreased. Potassium nitrate imports from Chile nearly doubled. MOP accounted for nearly 99% of total imports, and Canada supplied about 94% of the MOP imports.

Transportation

The U.S. Surface Transportation Board (STB) held hearings on the proposed merger of Burlington Northern and Santa Fe Railway Co. with Canadian National Railway Co., Grand Trunk Western Railroad Inc., and Illinois Central Railroad Co. The STB then put all mergers on hold because of railroad freight customers concerns that another large merger would again bring traffic to slow motion after the experience of the previous merger of the Union Pacific and Southern Pacific Railroads in 1997 and 1998 (Green Markets, 2000e) and the problematic division of Consolidated Railroad Corp. (CONRAIL) into a section for Norfolk Southern Corp. and a section for CSX Corp. in 1999.

A new bulk fertilizer terminal in the sea port of St. Petersburg, Russia, has been proposed with the help of the joint stock corporation (JSC) Uralkali of Berezniki, Perm, Russia (Fertilizer Week, 2000d).

World Review

Estimated world potash production for 2000 declined by about 1% from that of 1999 (table 10). European production was down by 1% with production in Germany and Spain decreasing and production in France and the United Kingdom increasing. In the former Soviet Union, production declined by about 9% compared with 1999 production. North America showed about a 4% increase, primarily from a production increase in Canada. Israel and Jordan, combined, reported an increase of less than 2% from that of 1999.

Canada.—Canpotex Ltd. reported an agreement with JSC Uralkali to form a joint marketing arrangement primarily in the Asian Pacific market but not in North America or Europe. (Fertilizer Markets, 2001; Potash Corp. of Saskatchewan, 2000; 2001a). Canpotex Ltd. sells offshore for the Saskatchewan operations of the three Canadian potash producers.

Chile.—In early 2000, Atacama Minerals Corp. decided to stockpile potassium nitrate ore while producing iodine. Potassium nitrate production was delayed for 6 years. Atacama Minerals estimated that world potassium nitrate consumption in 2000 was 450,000 metric tons per year (t/yr) with another 180,000 t/yr capacity starting up in Chile in the next 5 years (North American Minerals News, 2000a). Late in the year, another potassium nitrate producer, Compania de Salitre y Yodo, which already had a mine and mill at Pozo Almonte in northern Chile, announced a November startup of 90,000 t/yr capacity, using Canadian and Russian MOP as feedstock (Fertilizer Week, 2000a). The company mentioned plans for future iodine production.

China.—The Qarhan Lake potash project in Qaidam Basin of the Qinghai Province had been a joint venture between unnamed Chinese companies with Israel's Dead Sea Works Ltd. (DSW) and United Development Industries Co. (UDI) since 1993. They attempted to raise money as the Chinese Israeli Potash Co. (Cipco) in 1994 (European Chemical News, 1994). In 1998, the fundraising effort was the joint venture of Mingda Chemical Mines Co., DSW, and UDI (Fertilizer Week, 2000c) or Minda Chemical Corp. (Industrial Minerals, 2000b). In 2000, China seems to have taken control over the development at this site with a MOP project with reduced capacity of 180,000 t/yr under the name Qinghai Salt Lake Industry Group (Fertilizer Week, 2000b). Simultaneously, the Chaerhan Salt Lake Group has apparently commenced development of a MOP lake brine project near the city of Golmud in Qaidam Basin (Fertilizer Week, 2000c). Another joint venture, with the name of Lop Nor Sylvite Co., Ltd., in the Xinjiang Uyghar Autonomous Region, west of Qinghai Province, announced that it was working to develop MOP as an intermediate for producing SOP and potassium nitrate from the Lop Nor interior basin. The partners for this group are Sanwei Mining Co., the Xinjiang Delong Group Co., the Xinjiang Hami Gold Mine, and Xinjiang Nonferrous Metals Industrial Co., a regional government arm (Green Markets, 2000f).

Israel.—Haifa Chemicals Ltd. announced in May a 50% reduction in production to 67,500 t/yr of KNO_3 at the Haifa plant owing to world market conditions (Green Markets, 2000c). Haifa Chemicals reportedly has about 65% of world capacity and is owned by the U.S. company Trans-Resources, Inc. Haifa Chemicals opened talks with Israel Chemicals Ltd. for possible methods of cooperation (Green Markets, 2000b). There was a conflict between tourism and mineral sales at Eilat Port where dust from loading ships reached the hotels in the city. The Government of Israel operates the ports and has not invested in dust-free shiploading equipment, so it sought to shut down loading during tourist season. MOP would leave through this port towards the Asian markets (Green Markets, 2000a). DSW announced plans to increase MOP production by 0.36 Mt to 2.76 Mt (Green Markets, 2000g).

Russia.—JSC Uralkali Ltd., which operates the Berezniki plants in the Perm region, shipped some product through Fedcominvest in the early part of the year and through International Potash Co. in the latter part of the year, then sought a partnership with Canpotex International, Ltd., for 2001. JSC Uralkali had also started on the construction of a potash dock at the JSC St. Petersburg seaport, which is served by broad gauge rail, to replace the insufficient storage space at the port of Ventspils and to avoid the change of track gauge to standard gauge. JSC Uralkali had also chosen the Finnish port of Kotka, which is also served by broad gauge railroad tracks from mine to dock and is deep enough to handle panamax ships (Fertilizer Markets, 2001).

Spain.—Iberpotash S.A., which is the new name of the former Grupo Potasas, became majority-owned by DSW as of 1998 and is now 100% owned by DSW (Dead Sea Works Ltd., [undated], Iberpotash S.A.—Spain, accessed July 24, 2001, at URL http://www.dsw.co.il/iberp.htm). DSW announced plans to increase Spanish MOP capacity by about 12.5% or by 90,000 t/yr to 810,000 t/yr, but no timetable was given (Green Markets, 2000). Comercial de Potasas, S.A., the sales arm of Iberpotash, agreed to handle DSW potash sales into France, Portugal, and Spain (Industrial Minerals, 2000a). DSW has traditionally sold into those three countries because it ships from Ashdod on the eastern end of the Mediterranean Sea and sails past the French, Portuguese, and Spanish ports on the way to ports in the United States and Latin America.

Outlook

In the short to intermediate term, domestic potash consumption is likely to continue to vary within a 21-year historical band with a mean of 5.5 million metric tons per year (Mt/yr). That has been a band between 4.5 and 6.45 Mt/yr. There may be a slight downward trend as less potash will probably be needed for the same harvested areas owing to less weed competition in the fields for some crops. U.S. production is expected to remain relatively steady, and imports of potash will dominate the total supply. Demand should vary with U.S. food consumption and exports of U.S. farm crops and domestically fed meat products. Variations in demand come from combinations of weather pattern changes, national or regional (multinational) economy variations, and political decisions. On the world supply side, the world's largest potash producers are expected to continue to withhold some capacity from the world market for another year. The short- to intermediate-term outlook for world wide potash consumption is that more potash should be consumed in Asian and Latin American countries to balance out the fertilizer application rates and produce more crops per acre; European consumption might decline. The Government of Russia, or international organizations, will probably help Russian farmers purchase fertilizers to increase productivity per hectare so that Russia could become self-sustaining in food production. Some African nations will need international help to purchase potash-bearing fertilizers to achieve higher crop productivity. Over the long term, worldwide, more potash will be needed to feed a growing population.

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TABLE 1
SALIENT POTASH STATISTICS 1/ 2/

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

	1996	1997	1998	1999	2000
United States:					
Production	2,890	2,900 3/	3,000 3/	2,500 3/	2,600 3/
K2O equivalent	1,390	1,400 3/	1,300 3/	1,200 3/	1,300 3/
Sales by producers	2,960	3,000 3/	2,900 3/	2,500 3/	2,600 3/
K2O equivalent	1,430	1,400 3/	1,300 3/	1,200 3/	1,200 3/
Value 4/	$299,000	$320,000 5/	$330,000 5/	$280,000 5/	$290,000 5/
Average value of product dollars per metric ton	$101.08	$110.00 6/	$115.00 6/	$110.00 6/	$110.00 6/
Average value of K2O equivalent do.	$208.57	$230.00 6/	$250.00 6/	$230.00 6/	$230.00 6/
Exports	1,100	1,070	1,130	1,080	923
K2O equivalent	481	466	477	459	367
Imports for consumption 7/ 8/	8,140	9,030	7,870	7,360	7,580
K2O equivalent	4,940	5,490	4,780	4,470	4,600
Customs value	$563,000	$610,000	$648,000	$566,000	$555,000
Consumption, apparent 9/	10,000	11,000 3/	9,700 10/	8,700 10/	9,400 10/
K2O equivalent	5,890	6,500 3/	5,600 10/	5,100 10/	5,600 10/
World, production of marketable K2O equivalent	23,300	25,200	25,900 r/	25,600 r/	25,400 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)

	Crude salts 1/ (mine production)	
Period	Gross weight	K2O equivalent
1999:		
January-June 2/	6,000	700
July-December 2/	6,000	700
Total	12,000	1,400
2000:		
January-June 2/	6,000	700
July-December 2/	6,000	700
Total	12,000	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_2O equivalent)

State	Agricultural potash		Nonagricultural potash	
	1999	2000	1999	2000
Alabama	78,100	86,400	239,000	220,000
Alaska	4,180	986	1,950	5,020
Arizona	4,230	3,700	2,340	1,950
Arkansas	66,000	84,100	290	183
California	85,200	75,700	15,800	15,400
Colorado	15,200	15,300	1,660	1,820
Connecticut	2,050	1,890	2,380	1,590
Delaware	24,400	21,700	49,600	46,800
Florida	146,000	153,000	12,700	12,900
Georgia	124,000	131,000	741	1,100
Hawaii	--	370	--	--
Idaho	35,600	38,000	1,020	748
Illinois	542,000	591,000	21,600	25,000
Indiana	329,000	369,000	7,060	11,100
Iowa	351,000	386,000	4,160	4,490
Kansas	34,000	35,200	8,010	8,270
Kentucky	113,000	115,000	7,620	8,750
Louisiana	72,900	110,000	3,980	6,090
Maine	3,530	3,380	273	225
Maryland	27,900	28,200	617	1,830
Massachusetts	2,580	1,990	6,390	7,270
Michigan	163,000	170,000	10,600	8,240
Minnesota	236,000	254,000	7,180	7,670
Mississippi	58,700	38,700	44,100	61,900
Missouri	247,000	264,000	4,330	4,460
Montana	20,500	17,800	150	167
Nebraska	44,700	59,400	1,830	1,740
Nevada	313	65	249	693
New Hampshire	383	798	294	198
New Jersey	5,560	5,480	1,000	784
New Mexico	6,560	3,990	17,700	19,600
New York	68,200	55,300	3,050	2,790
North Carolina	111,000	125,000	648	264
North Dakota	24,800	30,600	254	79
Ohio	319,000	333,000	116,000	105,000
Oklahoma	16,500	18,200	3,650	6,740
Oregon	40,200	33,600	1,920	1,630
Pennsylvania	54,800	57,400	12,200	9,220
Rhode Island	--	--	86	43
South Carolina	51,700	57,300	137	169
South Dakota	14,700	18,100	524	727
Tennessee	147,000	129,000	6,680	7,260
Texas	129,000	126,000	21,500	26,900
Utah	4,790	1,990	11,400	5,420
Vermont	4,160	3,690	591	69
Virginia	71,800	84,800	114	601
Washington	42,100	43,600	919	1,360
West Virginia	2,930	3,900	355	728
Wisconsin	223,000	214,000	68,000	68,300
Wyoming	5,120	1,800	2,420	1,580
Total	4,170,000	4,400,000	725,000	725,000

-- 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_2O equivalent)

Grade	1999	2000
Agricultural:		
Standard	246	210
Coarse	2,000	2,090
Granular	1,520	1,700
Soluble	410	407
Total	4,170	4,400
Nonagricultural:		
Soluble	125	147
Other	601	578
Total	725	725
Grand total	4,900	5,130

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_2O equivalent)

	1999		2000	
Type and grade	January-June	July-December	January-June	July-December
Muriate, 60% K_2O minimum:				
Standard	150	150	155	160
Granular	170	150	165	160

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_2O content (percentage)	Quantity (metric tons)	
		Product	K_2O equivalent e/
1999:			
Potassium chloride, all grades	61	462,000	282,000
Potassium sulfate	51	134,000	68,400
Potassium magnesium sulfate	22	466,000	103,000
Potassium nitrate	45	13,500	6,080
Total	XX	1,080,000	459,000
2000:			
Potassium chloride, all grades	61	296,000	181,000
Potassium sulfate	51	153,000	78,100
Potassium magnesium sulfate	22	455,000	100,000
Potassium nitrate	45	19,000	8,570
Total	XX	923,000	367,000

e/ Estimated. XX Not applicable.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

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

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

(Metric tons of product)

Country	Potassium chloride 1999	Potassium chloride 2000	Potasium sulfate, all grades 1999	Potasium sulfate, all grades 2000	Potassium nitrate 1999	Potassium nitrate 2000	Total 1999	Total 2000
Argentina	2,350	3,320	14,100	19,100	--	579	16,500	23,000
Australia	70	--	4,030	4,650	--	--	4,100	4,650
Belgium	32,000	--	10	--	--	--	32,000	--
Bolivia	17,000	7,380	--	--	--	--	17,000	7,380
Brazil	70,600	25,900	1,550	1,050	153	1	72,300	26,900
Canada	3,830	5,860	74,100	97,800	7,550	6,910	85,500	111,000
Chile	79	25,400	52,900	28,800	--	--	52,900	54,200
China	--	--	5	40,200	--	--	5	40,200
Colombia	17,000	7,390	55,200	33,000	--	--	72,200	40,400
Costa Rica	3,670	2,230	50,200	42,500	--	--	53,900	44,800
Dominican Republic	33,500	16,300	10,600	2,490	39	45	44,100	18,800
Ecuador	--	6	8,460	17,400	20	139	8,480	17,500
France	--	41	15	10,300	--	--	15	10,400
Guatemala	12,800	--	13,300	5,820	--	120	26,100	5,940
Honduras	190	241	2,240	12,200	--	200	2,430	12,600
Italy	38	--	--	--	--	--	38	--
Ivory Coast	6,170	3,150	12,500	--	--	--	18,600	3,150
Jamaica	15,700	12,100	20	--	136	2,090	15,800	14,200
Japan	23,000	27,000	137,000	125,000	2	2	161,000	152,000
Korea, Republic of	--	--	20,600	15,300	3	4,480	20,600	19,800
Malaysia	--	--	--	12,800	916	1,370	916	14,200
Mexico	158,000	94,500	78,400	77,800	4,440	2,800	241,000	175,000
Panama	2,120	9,050	737	1,790	--	--	2,850	10,800
Peru	465	--	13,800	11,200	--	--	14,300	11,200
South Africa	11,500	--	--	3,970	--	--	11,500	3,970
Thailand	--	--	3,520	2,870	--	--	3,520	2,870
Venezuela	13,700	30,200	13,600	25,100	--	--	27,300	55,300
Other	39,000	26,100	33,100	16,600	255	310	72,300	43,000
Total	462,000	296,000	601,000	608,000	13,500	19,000	1,080,000	923,000

-- 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_2O content (percent)	Quantity (metric tons) Product	Quantity (metric tons) K_2O equivalent e/	Value (thousands) Customs	Value (thousands) C.i.f.
1999:					
Potassium chloride 2/	61	7,230,000	4,410,000	$539,000	$573,000
Potassium sulfate	51	86,000	43,900	18,800	20,800
Potassium nitrate	45	21,200	9,550	6,310	6,980
Potassium sodium nitrate mixture	14	15,700	2,200	2,590	2,970
Total	XX	7,360,000	4,470,000	566,000	604,000
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	555,000	581,000

e/ Estimated. 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/

	Potassium chloride (metric tons)		Potassium sulfate (metric tons)		Potassium nitrate (metric tons)		Potassium sodium nitrate (metric tons)		Total (metric tons)		Total value (thousands)			
											Customs		C.i.f.	
Country	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000
Belarus	106,000	135,000	--	--	--	--	--	--	106,000	135,000	$8,970	$11,400	$10,100	$12,900
Belgium	--	--	22	22	--	--	--	--	22	22	4	10	6	14
Bulgaria	--	1,000	--	--	--	--	--	--	--	1,000	--	85	--	100
Canada	6,880,000	7,020,000	21,800	17,900	5	5	102	136	6,900,000	7,040,000	513,000	492,000	544,000	511,000
Chile	--	50	10,600	7,840	17,800	34,900	15,600	9,190	44,000	52,000	9,070	12,400	10,200	14,000
China	--	--	187	1	--	--	--	--	187	1	15	9	15	9
Denmark	--	--	--	--	687	3,080	42	--	729	3,080	297	1,090	365	1,410
Germany	37	269	52,900	48,800	167	336	22	30	53,100	49,400	11,000	10,200	12,200	10,800
India	--	--	--	--	69	344	--	--	69	344	38	114	43	124
Israel	--	60	--	--	946	846	--	--	946	906	364	339	447	412
Japan	--	2	489	294	1,400	1,060	--	--	1,890	1,350	954	674	1,080	760
Mexico	--	--	--	--	2	4	--	--	2	4	4	7	5	7
Netherlands	--	--	--	4	34	--	--	--	34	4	21	2	24	2
Poland	--	--	--	--	72	93	--	--	72	93	45	46	50	57
Russia	251,000	296,000	--	--	--	--	--	--	251,000	296,000	21,900	25,200	25,100	28,300
United Kingdom	827	984	--	--	--	1	--	--	827	985	220	463	241	564
Other 2/	1	70	63 r/	20	31 r/	260	--	--	95 r/	350	48 r/	114	52 r/	140
Total	7,230,000	7,450,000	86,000	74,800	21,200	40,900	15,700	9,360	7,360,000	7,580,000	566,000	555,000	604,000	581,000

r/ Revised. -- Zero.

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

2/ Potassium chloride includes France (2000), Slovakia (2000), Spain (2000), and Switzerland (1999); potassium sulfate includes the Dominican Republic (2000) and France (1999); potassium nitrate includes the Dominican Republic (2000), Finland (2000), Italy (2000), Spain (1999), and Switzerland (1999).

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_2O equivalent)

Country	1996	1997	1998	1999	2000 e/
Belarus	2,716	3,247 r/	3,451 r/	3,600 e/	3,400
Brazil	243	280	326	350 e/	350
Canada	8,120	8,989	9,201	8,329	8,600
Chile	21	22	22	22 e/	23
China e/	110	115	120	150 r/	250
France	751 e/	725	656	311 r/	321
Germany	3,332	3,423	3,581	3,545 r/	3,409 3/
Israel	1,500 e/	1,488	1,668 r/	1,702 r/	1,710
Jordan	1,080 e/	868	910 e/	1,080 r/	1,110
Russia e/	2,620 r/	3,400	3,500	4,200	3,700
Spain e/	717	640	497 r/ 3/	550	522 3/
Ukraine e/	76	60 3/	35	35	30
United Kingdom	618	565	608	495 r/	600
United States	1,390	1,400 4/	1,300 4/	1,200 4/	1,300 4/
Total	23,300	25,200	25,900 r/	25,600 r/	25,400

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 27, 2001.
3/ Reported figure.
4/ Rounded to within 100,000 tons to avoid disclosing proprietary data.