POTASH

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Potash is used primarily as an agricultural fertilizer (plant nutrient) because it is a source of soluble potassium, one of the three primary plant nutrients; the others are fixed nitrogen and soluble phosphorus. Potash and phosphorus are mined products, and fixed nitrogen is produced from the atmosphere by using industrial processes. Modern agricultural practice uses these primary nutrients in large amounts plus additional nutrients, such as boron, calcium, chlorine, copper, iron, magnesium, manganese, molybdenum, sulfur, and zinc, to assure 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, potassium chloride 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 enter 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, producing potassium phosphates, and soap manufacture. The alkali salt, potassium carbonate, is used in the glass for TV and computer tube production, alkali 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 yearly 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, other countries' economic gyrations, and other countries' ability to pay for either fertilizers or food stuffs.

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 chemicals were 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 [$K_2SO_4 \bullet 2MgSO_4$, or langbeinite, or sulfate of potash magnesia (SOPM, or K-Mag)]. It should be noted that muriate of potash (MOP) is an acceptable, for fertilizer use, mix of potassium chloride (95% or greater) and sodium chloride plus minor amounts of other nontoxic minerals out of the mined ore 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 which is a natural product) because it functions as a potassic fertilizer. Saltpeter and Chilean saltpeter are still noted in the import tables (tables 8 and 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.

Legislation and Government Programs

The agreement to suspend the antidumping investigation of Canadian potash producers in January 1988 was reviewed by the International Trade Commission under a sunset review. Both the suspended investigation and the agreement to suspend were terminated on January 1, 2000, because no interested domestic party filed a notice of intent to participate in the review (International Trade Commission, 1999).

The 1993 class-action potash antitrust lawsuit filed in many places and consolidated to the Eighth Circuit Court in Minneapolis, MN, was dismissed by summary judgment in January 1997. An appeal to the Eighth Circuit Court of Appeals 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 Eighth Circuit Court of Appeals 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 Illinois class action lawsuit that did not join the consolidation was dismissed, and the California class action lawsuit that did not join the consolidation was stayed pending the decision of the Eighth Circuit Court of Appeals (IMC Global Inc., 2000). The consolidated plaintiffs were reported to be considering an appeal to the U.S. Supreme Court for review (Potash Corporation of Saskatchewan, Inc., 2000, p. 24 and 25).

Production

Production of all types and grades of potash in the United States could not be accurately published in 1999 because of proprietary data constraints. Production declined moderately compared to that of 1998 (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 are estimated to represent about 98% of the total production shown in table 1.

Four companies, three United States and one Canadian, produce potash in three States within the United 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 owns a Utah surface brine operation and a deep solution mine in Michigan. Potash producers in the United States produced potassium chloride, potassium sulfate, and potassium magnesium sulfate. 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 produce standard and granular muriate of potash, prices for those products can be 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 production and sales declined from that of 1998 owing to the farmers' decisions to spend less money when faced with lower prices for domestic agricultural grain, and reduced demand for potash exports, particularly SOP shipments to Latin America and China.

IMC Kalium Ltd., of IMC Global Inc., produced MOP, SOP, and SOPM in Carlsbad, NM, at the operation that was started in 1940, and now also is using langbeinite from the former Western Ag-Mineral Mine property. It also produces MOP from the Hersey, MI, solution-mine plant and SOP from the brines of the Great Salt Lake near Ogden, UT. At yearend, the new langbeinite processing plant was reported to be in startup mode. It was built near an older mine shaft and has its own ore hoisting facility. Only langbeinite ascends this hoist, and only sylvinite ascends the original hoist. The two plants have a combined production capacity of about 1.54 million tons (Mt/yr)[1] of product. 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." In the second quarter of 1999, Mississippi Chemical announced the completion of the 54,000-ton-per-year (t/yr) expansion of its "red granular" capacity (Mississippi Chemical Corp., 1999).

In Utah, the Reilly-Wendover Division's near-surface brine operation of Reilly Industries, Inc., continued production of MOP and manure salts. The Moab Salt Inc. solution mine and mill continued production of MOP and table salt for Potash Corporation of Saskatchewan, Inc. (PCS). PCS sold Moab Salt Inc. to Intrepid Oil & Gas, LLC of Denver, CO, in February 2000 (Potash Corporation of Saskatchewan, Inc., 2000, p. 3). IMC Kalium Ogden Corp. 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.

Consumption

The apparent consumption of potash for 1999 in the United States was estimated to have declined by about 10%, compared with that of 1998, to about 5.1 Mt. In this year, as several other years, the variation in demand for potash in the United States was driven directly by the demand for exported farm crops, especially grain crops. The demand for exported food has declined due to economic turmoil in several portions of the world. The large carryover grain stocks from the excellent harvest in 1998 resulted in reduced demand in the spring of 1999, and another good grain harvest in the fall of 1999 led to an average potash demand in the second half of 1999. The domestic demand for feed grains was lower owing to fewer hogs and chickens destined for export. Low grain prices, especially soybeans, discouraged fertilizer application, and the calendar-year potash application total was less than 1998 and near a 10-year low, according to agricultural MOP sales from "Potash Sales by North American Producers" by State for agricultural uses, as reported in the last 10 years of monthly data from the Potash & Phosphate Institute. That data comparison may not be totally proper as the sulfates sales were dropped from the report half way through 1997. The La Niña weather pattern persisted during 1999 and produced a drought on the east coast, rains in the Northwest, and a year of slightly warmer than average temperatures. This was also about 1½ to 2½ years after the financial crises that occurred in Thailand, Indonesia, the Republic of Korea, and later Russia and Brazil. Their demand patterns did not return to precrisis levels.

The domestic grain harvest was relatively plentiful for 1999. Planted corn acreage decreased by 3% from that of 1998 to 31.3 million hectares (Mha) (77.4 million acres), and harvested acreage also declined by 3% to 28.5 Mha (70.5 million acres), a nearly normal loss (Economic Research Service, January 14, 2000, Feed outlook—2000, FDS-0100, accessed March 28, 2000, at URL http://usda.mannlib.cornell.edu/). The average yield-per-acre for corn was the third highest on record at 8.4 metric tons per hectare (133.8 bushels per acre). The domestic feed grain harvest, in general, for 1999 was down 3% from 1998. With lower domestic and foreign demand and a good harvest, the total grain stocks (corn, sorghum, oats, barley, all wheats, and soybeans) as of December 1, 1999, were down only 0.6% (National Agricultural Statistics Service, January 12, 2000, Grain Stocks—2000, 1Q, PGS-BB, 1Q, accessed March 29, 2000, at URL http://usda.mannlib.cornell.edu/). It will take improved foreign demand to improve domestic potash demand for 2000.

According to Potash & Phosphate Institute data, agricultural MOP shipments from Canadian and U.S. producers to the major destination States, in decreasing order of tonnage, were Illinois, Iowa, Indiana, Ohio, Missouri, Minnesota, Wisconsin, Michigan, Tennessee, and Florida (table 3). These 10 States received about 65% of agricultural sales of MOP from Canadian and United States producers for 1999. For nonagricultural MOP, shipments from Canadian and United States producers, the major receiving States, in decreasing

[1]All tonnages are reported in metric tons, K_2O equivalent, unless otherwise noted.

order, were Alabama, Ohio, Wisconsin, Delaware, and Mississippi. These five States received 82% of nonagricultural sales of MOP for 1999.

Agricultural MOP shipments from U.S. producers to the major receiving States, in decreasing order, were Texas, Missouri, Michigan, California, Illinois, Kansas, Louisiana, and Arkansas. These eight States consumed about 80% of the MOP from the domestic producers. For nonagricultural MOP sales from U.S. producers to the major receiving States, in decreasing order, were Mississippi, New Mexico, Texas, California, Utah, Alabama, and Kansas. These seven States received about 80% of U.S.-produced, nonagricultural MOP.

Foreign Trade

On the basis of U.S. Bureau of the Census import and export data, as modified by the USGS, the exports of all types and grades of potash decreased from 477,000 metric tons (t) for 1998 to 459,000 t for a 4% decrease (table 6). MOP exports increased by 27% from the 1998 total to 462,000 t. U.S. MOP exports increased to Latin America, Europe, the Pacific Basin, and Africa. SOP exports, in contrast, fell by more than 53% to 134,000 t. The major reason for this decline was the substitution in China of Chinese manufactured SOP potash for the U.S.-produced product. As a result, Chinese SOP imports fell from about 73,500 t to zero. Apparently, China also exported some excess SOP to the Republic of Korea, for Republic of Korea imports fell from about 1,800 t to zero. Total Asian SOP imports from the United States fell by about 75%. Domestic SOP exports to Latin American declined about 20%. Possibly, the European SOP producers were more aggressive into the Latin America market, having also lost a portion of their sales to China and other Asian consumers, or the new SOP production in Chile displaced some imports from non-Latin American sources such as the United States.

There were signs that at least two Asian Pacific countries were recovering from the 1997 recession in Asia. In 1999, corn shipments to the Republic of Korea and Thailand increased. Brazil also imported more corn owing to dryer Brazilian weather, while Mexico imported more corn owing to lower corn prices. For agricultural trade, the North American Free Trade Association and Brazil became alternative agricultural sales destinations, while Asia sorted out its economics, even if at lower prices than the Asian importers had been willing to pay in the halcyon days before July 1997 (Langley, 2000).

Potash imports into the United States declined by more than 6% relative to 1998 to about 4.47 Mt (tables 8 and 9). MOP imports from Belarus, Canada, and Russia declined slightly. SOP imports from Canada and Chile increased, but SOP from Germany decreased. MOP was more than 98% of total imports, and Canada supplied about 95% of the MOP imports.

Transportation

Late in the year, the Burlington Northern Santa Fe Railway Co. and the Canadian National Railway Co. proposed a merger of the two systems. The merger would be "end-to-end" since there was little overlap of territories (Fertilizer Markets, 1999d). The U.S. Surface Transportation Board would have to approve the merger.

A new bulk fertilizer terminal in the Port of Gdynia, Poland, on the Baltic Sea, opened for export of products from Northwest Central Europe. Gdynia is a few kilometers north by northwest from Gdañsk, Poland (Fertilizer International, 1999a).

A new bulk fertilizer terminal in the Port of Muuga, near Tallinn, Estonia, on the Gulf of Finland, opened for export of products from the northwest Central Europe (Fertilizer International, 1999b).

The International Potash Company announced an expansion to the Kalija Parks' bulk fertilizer terminal at Ventspils, Latvia, on the Baltic Sea. A new berth for panamax vessels, limited to 70,000 t, and a 20,000-ton-per-day bulk shiploader, was inaugurated. In the same article, IPC reported a new warehouse in Nikolaev on the Black Sea, 130 kilometers (km) northeast of Odessa, and construction of a transshipment facility at the container terminal of Vostochny in the Free Enterprise Zone of Nakhodka on the Pacific Ocean (Phosphorus & Potassium, 2000b).

In blue water transportation, grain is the fourth largest tonnage of the major commodities that are delivered by ocean transport, and fertilizers are the sixth. After a slow spring with low rates paid to shippers, shipping activity was building through the summer and fall. By the fall, panamax timecharter (U.S. Gulf to Asia) rates for grain (and steaming coal) had nearly doubled from the beginning of the year. Handy-size timecharter rates were up by about 50% in the fall, which demonstrated that smaller loads were somewhat closer to capacity in the springtime and did not rise as much going into fall. It also demonstrates that the Asian grain importers were again willing to pay greater "cost, insurance, and freight," charges and could receive more from their retailers (Hayley-Bell, 2000, p. 56 and 58). The Baltic Freight Index (for Capesize and Panamax ships) increased from about 800 at the beginning of 1999 to about 1,300 at yearend. An end-of-the-year example is a shipment that was "fixed" at $21.25 per metric ton for a movement from Ventspils, Latvia, to Shekou, China (20 nautical miles from Hong Kong on the Pearl River) for 55,000 t to 60,000 t of MOP, loading in the middle third of November, with quoted minimum loading and unloading daily rates (Hayley-Bell, 2000, p. 57). New deep water freight indexes were "rebased to 100" on January 1, 2000, with more categories to better track fair costs and rates and provide futures markets for transportation to shippers and shipowners. It appears that both old and new indexes will be referenced for some time.

World Review

The estimate of world potash production for 1999 was essentially unchanged from that of 1998 (table 10). The European production declined owing to temporary flooding in part of the Cleveland Potash Mine in England and the dwindling of potash mining in France towards cessation in 2004. The former Soviet Union increased production by about 900,000 t. Production in Canada and the United States

decreased, Canada by 850,000 t. South American production was essentially unchanged, and Middle East production increased marginally.

A worldwide Sulphate of Potash Information Board was formed of Chilean, French, German, and U.S. producers. This board can provide telephone numbers and e-mail addresses for obtaining agronomic and economic data, both published and previously unpublished, via fax and e-mail (Phosphorus & Potassium, 2000c).

Brazil.—In early 1999, Brazil cut back on fertilizer imports as the Real declined in value owing to worldwide investor worries over the underlying strength of the economies of various developing countries following the problems of Thailand. Brazil's potash imports were down 40% for the first half of 1999 relative to those of 1998.

Canada.—Potash production declined from the three producers, PCS, IMC Global Inc., and Agrium Inc. The United States and Brazil purchased less for the year. China made a rather large purchase for the first half of the year, some of which probably went to the new SOP manufacturing plants. One Canadian firm reported lower netback prices for potash during the fourth quarter of the year owing to "product and country mix and higher ocean freight costs" (Potash Corporation of Saskatchewan, Inc., 2000, p. 36). PCS agreed to recapitalize the Minera Yolanda S.C.M. project in Chile. Canpotex Ltd. reported that their exports by world region were, in 1999, 75% to Asia, 13% to Latin America, 8% to Oceania, and 4% to Europe (Potash Corporation of Saskatchewan, Inc., 2000, p. 12).

Chile.—The Aguas Blancas Project of Atacama Minerals Corp. of Canada announced that the commencement of development involved an iodine-only project for several years (Industrial Minerals, 1999c).

The Minera Yolanda S.C.M. project of Kap Resources Ltd. of Canada failed to gain needed financial support early in the year and sought protection in bankruptcy. In May, PCS agreed to purchase all the Kap Resources shares and recapitalize for about $36 million. The project, when operational, will produce sodium nitrate, potassium nitrate, and iodine. In July, PCS completed the purchase and changed the project's name to PCS Yumbes S.C.M. (Potash Corporation of Saskatchewan, Inc., 1999).

Sociedad Quimica y Minera de Chile S.A. (SQM) reported that a fire at Pedro de Valdivia halted production in late August for about 3 weeks, then caused half-rate production for 4 more weeks (Fertilizer Markets, 1999b). These workings of the unique caliche deposits date from before the World War I. They produced sodium nitrate, mixed sodium-potassium nitrate, and iodine. The Minsal site, developed over several years, has produced MOP since 1995, lithium chloride brine in 1997, and started the production of SOP and boric acid plants in 1998. Some of the MOP production was sent to the older caliche workings for conversion to potassium nitrate (Fertilizer International, 1999c).

Norsk Hydro A.S. agreed to a joint venture with SQM to produce potassium nitrate for European sales. Project size was estimated to be 68,000 t/yr and the project cost was estimated to be $16 million. The expected startup date is 2001 and the plant will be between Antofagasta and Tocopilla, the locations of two other potassium nitrate plants (Industrial Minerals, 1999b, p. 9).

China.—While China has not found large deposits of MOP, it currently has significant reserves of mirabilite ($Na_2SO_4 + 10H_2O$) which, when combined with imported MOP, replaces imported SOP with domestically manufactured SOP (Phosphorus & Potassium, 1999b). Total capacity was estimated at 150,000 t/yr from more than 100 plants.

France.—Mines de Potasses d'Alsace (MDPA) closed the Marie-Louise potash refinery in the middle of the year. This was a dissolution-recrystallization refinery with a no-pump, horizontal crystallizer. MDPA no longer can produce white, technical grade MOP. The flotation refinery at Amélie became the last active refinery of MDPA and it produces mostly pink potash (Phosphorus & Potassium, 1999c).

Germany.—The European Commission (EC) initiated an investigation of the price quoted to Kali und Salz Beteiligungs AG for the 49% of Kali und Salz GmbH that was owned by a government body. The price is less than an independent evaluator gave for the 49% portion. The EC wondered if there was a subtle subsidy in the proposed purchase (Industrial Minerals, 1999b, p. 10-13).

Israel.—The 9% equity interest in Israeli Chemicals Ltd. (ICL) owned by PCS was not joined to the 51% formerly owned by Israel Corp. PCS lists that 9% equity in ICL as available for sale in their 1999 10-K. The Mishor Rotem potassium nitrate complex of Haifa Chemicals Ltd. was debottlenecked resulting in a doubling of annual capacity to 90,000 t/yr and brings Haifa Chemicals' total Israel capacity to 225,000 t/yr (Phosphorus & Potassium, 2000a).

Russia.—Uralkali Ltd., which operates the Berezniki plants in the Perm region, reported a moderately healthy annual profit of $26.7 million for the year. Uralkali also agreed to a second dealer for exports. Along with the International Potash Company, it will start to ship a few hundred thousand tons through Fedcominvest, which will handle exports to some parts of the world (Fertilizer Week, 2000b). Fedcominvest has financed sulfur recovery capacity from gas wells and sold recovered sulfur (accessed at http://www.devcocos.com/astrakhan.html on May 2, 2000).

Thailand.—Early in the year, the managers of the Asean Potash Mining Co. announced that an effort would be made to gather up the promises of loans and commence the development of the carnallite reserves for the production of MOP and byproduct magnesium chloride near Bamnet Narong, Chaiyaphum Province. The planned MOP capacity is 660,000 t/yr with a startup date in 2003 (Fertilizer Markets, 1999a).

At the end of the year, Asia Pacific Potash Corp. (APPC) controller of 60% of the unnamed joint venture, signed a memorandum of understanding with United Infrastructure Company International, Ltd. (UIC), a transportation and environmental infrastructure project division of Bechtel Enterprises Holding, of Bechtel Group Inc., to join in the effort to obtain financing and development of the Somboon potash deposit for a 20% stake in the unnamed joint venture. Norsk Hydro (Asia) Pte. Ltd. was the second party to join the joint venture effort at 20% stake of the unnamed joint venture, and

UIC is the third and final (Fertilizer Markets, 1999c; Fertilizer Week, 2000a). Asia Pacific Resources Ltd. (APR) of Vancouver, Canada, owns 90% of APPC, and the Government of the Kingdom of Thailand owns 10% of APPC. The project involves a 1.2 Mt/yr MOP mine and beneficiation plant.

United Kingdom.—Cleveland Potash Ltd. (CPL) reported that a water leak had occurred in the mine in February (Phosphorus & Potassium, 1999a). The leak was south of the center of the mine and flooded to the south, halting production for several months from that portion of the mine. Production was temporarily moved back to the north part of the mine. Later in the year, CPL management reduced the flooding in the southern part of the mine and returned to previous production levels (Phosphorus & Potassium, 2000a).

Uzbekistan.—Thyssen Handel Berlin, which was combined into Mannesmann Handel in late 1999, announced a plan to develop a potash resource near Tuibegatansk. The company was planning a 300,000-t/yr facility to exploit an estimated 4-Mt reserve (Industrial Minerals, 1999a).

Outlook

In the next few years, there should be a change back to more protein in Asian diets following the return to healthy economies, which could lead to more imports of meat from the United States or more imports of grain for feeding locally raised cattle. This should result in an improvement of potash consumption in the United States. More importantly, the Government of Russia has started to focus on food production, and the U.S. Department of Agriculture and nongovernmental organizations have started to consider how to improve former Soviet Union food supplies, temporarily from U.S. surpluses, and with intermediate-term help to increase productivity from the historically productive Russian farmland. This would mean new mechanization, new seeds, new practices for the soil-climate-crop matrix, and better fertilization.

The Directorate-General of Agriculture of the European Commission released the Agenda 2000, partially concerned with the modifications to the Common Agricultural Policy. The European Fertilizer Manufacturers Association released a study of the Agenda 2000 with a forecast of the changes in fertilizer usage from the crop year 1998-99 to period between 2006-09. The Association expected a decline of about 4% for potash over that period, with Austria, Germany, and the Netherlands increasing their consumption. Estimating apparent consumption of about 5 Mt of potash for the European Union in 1998, a 4% change is about 200,000 t in 2006 (about 8 years). This should not be a large disruption to the distribution of potash, or to the producers of potash in Europe.

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TABLE 1
SALIENT POTASH STATISTICS 1/ 2/

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

		1995	1996	1997	1998	1999
United States:						
Production		3,050	2,890	2,900 3/	3,000 3/	2,500 3/
K_2O equivalent		1,480	1,390	1,400 3/	1,300 3/	1,200 3/
Sales by producers		2,880	2,960	3,000 3/	2,900 3/	2,500 3/
K_2O equivalent		1,400	1,430	1,400 3/	1,300 3/	1,200 3/
Value 4/		$284,000	$299,000	$320,000 5/	$330,000 r/ 5/	$280,000 5/
Average value per ton of product	dollars	$98.58	$101.08	$110.00 6/	$115.00 6/	$110.00 6/
Average value per ton of K_2O equivalent	do.	$202.43	$208.57	$230.00 6/	$250.00 6/	$230.00 6/
Exports		938	1,100	1,070	1,130 r/	1,080
K_2O equivalent		409	481	466	477 r/	459
Imports for consumption 7/ 8/		7,960	8,140	9,030	7,870	7,360
K_2O equivalent		4,820	4,940	5,490	4,780	4,470
Customs value		$602,000	$563,000	$610,000	$648,000	$566,000
Consumption, apparent 9/		9,900	10,000	11,000 3/	9,700 10/	8,700 10/
K_2O equivalent		5,820	5,890	6,500 3/	5,600 r/ 10/	5,100 10/
World, production, marketable K_2O equivalent		24,800 r/	23,300 r/	25,200 r/	25,700 r/	25,700 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 five dollars 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 CRUDE ORE IN NEW MEXICO

(Thousand metric tons)

	Crude salts 1/ (mine production)	
Period	Gross weight	K_2O equivalent
1998: r/		
January-June 2/	6,000	700
July-December 2/	6,000	700
Total	12,000	1,400
1999:		
January-June 2/	6,000	700
July-December 2/	6,000	700
Total	12,000	1,400

r/ Revised.
1/ Sylvinite and langbeinite.
2/ Data are rounded to no more than one significant digit.

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

(Metric tons of K_2O equivalent)

State	Agricultural potash		Nonagricultural potash	
	1998	1999	1998	1999
Alabama	77,600	78,100	221,000	239,000
Alaska	587	4,180	4,130	1,950
Arizona	3,500	4,230	2,100	2,340
Arkansas	59,400 r/	66,000	253 r/	290
California	85,400	85,200	12,800	15,800
Colorado	16,800	15,200	2,000	1,660
Connecticut	2,040	2,050	1,730	2,380
Delaware	21,400	24,400	54,100	49,600
Florida	127,000	146,000	11,300	12,700
Georgia	133,000	124,000	1,280	741
Hawaii	6,990	--	22	--
Idaho	39,000	35,600	1,270	1,020
Illinois	566,000	542,000	13,200	21,600
Indiana	353,000	329,000	25,200	7,060
Iowa	391,000	351,000	6,520	4,160
Kansas	39,700	34,000	7,320	8,010
Kentucky	96,600	113,000	1,270	7,620
Louisiana	61,600	72,900	3,750	3,980
Maine	3,410	3,530	408	273
Maryland	29,800	27,900	664	617
Massachusetts	2,100	2,580	4,440	6,390
Michigan	195,000	163,000	9,520	10,600
Minnesota	287,000	236,000	4,900	7,180
Mississippi	92,400	58,700	46,100	44,100
Missouri	247,000	247,000	3,620	4,330
Montana	17,200	20,500	316	150
Nebraska	45,700	44,700	2,310	1,830
Nevada	455	313	615	249
New Hampshire	278	383	90	294
New Jersey	4,830	5,560	1,360	1,000
New Mexico	6,770	6,560	17,900	17,700
New York	58,500	68,200	2,930	3,050
North Carolina	96,400	111,000	633	648
North Dakota	29,500	24,800	230	254
Ohio	375,000	319,000	99,200	116,000
Oklahoma	15,200	16,500	7,550	3,650
Oregon	35,100	40,200	1,470	1,920
Pennsylvania	61,000	54,800	7,790	12,200
Rhode Island	1,640	--	84	86
South Carolina	50,700	51,700	1,460	137
South Dakota	15,200	14,700	673	524
Tennessee	101,000	147,000	4,680	6,680
Texas	132,000	129,000	21,400	21,500
Utah	7,930	4,790	7,920	11,400
Vermont	5,240	4,160	64	591
Virginia	68,300	71,800	386	114
Washington	42,500	42,100	1,250	919
West Virginia	2,390	2,930	688	355
Wisconsin	219,000	223,000	63,500	68,000
Wyoming	3,800	5,120	3,040	2,420
Total	4,330,000	4,170,000	686,000 r/	725,000

r/ Revised. -- 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	1998	1999
Agricultural:		
Standard	280	246
Coarse	2,150	2,000
Granular	1,480	1,520
Soluble	425	410
Total	4,330	4,170
Nonagricultural:		
Soluble	90	125
Other	596 r/	601
Total	686 r/	725
Grand total	5,020	4,900

r/ Revised.
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/

(Dollars per metric ton of K_2O equivalent)

	1998 2/		1999 3/	
Type and grade	January-June	July-December	January-June	July-December
Muriate, 60% K_2O minimum:				
Standard	144	146	150	150
Granular	177 r/	169	170	150

r/ Revised.
1/ Average prices, f.o.b. mine, based on sales.
2/ Data rounded to nearest dollar.
3/ Data rounded to nearest five dollars.

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

	Approximate average K_2O content (percent)	Quantity (metric tons)	
		Product	K_2O equivalent
1998:			
Potassium chloride, all grades	61	364,000	222,000
Potassium sulfate	51	290,000	148,000 r/
Potassium magnesium sulfate	22	457,000 r/	100,000 r/
Potassium nitrate	45	15,400	6,910
Total	XX	1,130,000 r/	477,000 r/
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

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

Source: Bureau of the Census, 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	
	1998	1999	1998	1999	1998	1999	1998	1999
Argentina	5,400	2,350	11,700	14,100	--	--	17,100	16,500
Australia	63	70	5,480	4,030	--	--	5,550	4,100
Belgium	18,500	32,000	--	10	--	--	18,500	32,000
Brazil	29,900	70,600	964	1,550	235	153	31,100	72,300
Canada	2,890	3,830	85,400	74,100	6,890	7,550	95,200	85,500
Chile	865	79	38,500	52,900	63	--	39,500	52,900
China	--	--	144,000	5	4	--	144,000	5
Colombia	12,600	17,000	24,000	55,200	--	--	36,600	72,200
Costa Rica	5,260	3,670	57,400	50,200	--	--	62,700	53,900
Dominican Republic	15,200	33,500	7,030	10,600	19	39	22,300	44,100
Ecuador	8,420	--	2,070	8,460	12	20	10,500	8,480
France	2	--	1,120	15	--	--	1,130	15
Guatemala	10	12,800	5,270	13,300	--	--	5,280	26,100
Honduras	2,340	190	15,800	2,240	120	--	18,200	2,430
Italy	217	38	21	--	--	--	238	38
Japan	10,100	23,000	168,000 r/	137,000	--	2	178,000 r/	161,000
Korea, Republic of	--	--	9,530 r/	20,600	--	3	9,530 r/	20,600
Malaysia	--	--	14,000	--	2,130	916	16,100	916
Mexico	147,000	158,000	97,600 r/	78,400	5,300	4,440	250,000 r/	241,000
Peru	1,940	465	18,900 r/	13,800	--	--	20,800	14,300
Thailand	--	--	4,180	3,520	--	--	4,180	3,520
Venezuela	10,800	13,700	6,200	13,600	30	--	17,000	27,300
Other	93,200	91,400	28,500 r/	46,300	569	391	122,000 r/	138,000
Total	364,000	462,000	746,000 r/	601,000	15,400	13,500	1,130,000 r/	1,080,000

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: Bureau of the Census, 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)		Value (thousands)	
		Product	K_2O equivalent e/	Customs	C.i.f.
1998:					
Potassium chloride	61	7,730,000	4,720,000	$619,000	$697,000
Potassium sulfate	51	94,600	48,200	19,400	21,600
Potassium nitrate	45	23,900	10,700	6,170	6,910
Potassium sodium nitrate mixture	14	21,200	2,970	3,190	3,770
Total	XX	7,870,000	4,780,000	648,000	729,000
1999:					
Potassium chloride	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

e/ Estimated. XX Not applicable.

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

Source: Bureau of the Census, 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)			
											Customs		C.i.f.	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Belarus	275,000	106,000	--	--	--	--	--	--	275,000	106,000	$23,600	$8,970	$26,100	$10,100
Belgium	--	--	84	22	--	--	--	--	84	22	26	4	26	6
Canada	7,140,000	6,880,000	10,700	21,800	30	5	706	102	7,150,000	6,900,000	572,000	513000	644,000	544,000
Chile	--	--	1,400	10,600	22,500	17,800	20,500	15,600	44,400	44,000	8,770	9,070	10,000	10,200
Denmark	--	--	8	--	--	687	--	42	8	729	5	297	6	365
Germany	2,320	37	81,800	52,900	1	167	--	22	84,100	53,100	16,000	11,000	17,900	12,200
Israel	18	--	--	--	822	946	8	--	848	946	329	364	416	447
Japan	1	--	50	489	317	1,400	--	--	368	1,890	289	954	315	1,080
Mexico	--	--	--	--	1	2	--	--	1	2	2	4	2	5
Netherlands	30	--	--	--	--	34	--	--	30	34	6	21	6	24
Poland	--	--	--	--	127	72	--	--	127	72	69	45	80	50
Russia	316,000	251,000	--	--	--	--	--	--	316,000	251,000	26,900	21,900	30,400	25,100
United Kingdom	196	827	--	--	--	--	--	--	196	827	11	220	12	241
Other 2/	--	1	536	250	90	100	--	--	626	351	88	101	92	110
Total	7,730,000	7,230,000	94,600	86,000	23,900	21,200	21,200	15,700	7,870,000	7,360,000	648,000	566,000	729,000	604,000

-- Zero.

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

2/ Includes China, France (1999), India, Spain (1999), and Switzerland (1999).

Source: Bureau of the Census, 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	1995	1996	1997	1998	1999 e/
Belarus	3,211	2,716	3,248 r/	3,400 e/	3,600
Brazil	215	243	280 r/	326 r/	350
Canada	9,066 r/	8,120	8,989 r/	9,201 r/	8,329 3/
Chile	23	21	22 r/	22	22
China e/	80	110	115	120	125
France	799	751 e/	725	656	300
Germany	3,278	3,332	3,423	3,581 r/	3,600
Israel	1,325	1,500 e/	1,488	1,500	1,750
Jordan	1,075 r/	1,080 r/ e/	868 r/	910 r/ e/	1,100
Russia e/	2,800 3/	2,618	3,400	3,500	4,200
Spain	760	717 r/ e/	640 e/	585 r/	550
Ukraine	110	76 r/ e/	60	35 r/ e/	35
United Kingdom	582	618	565	608 r/	500
United States	1,480	1,390	1,400 4/	1,300 4/	1,200 4/
Total	24,800 r/	23,300 r/	25,200 r/	25,700 r/	25,700

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, 2000.

3/ Reported figure.

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