USGS
science for a changing world

2006 Minerals Yearbook

PHOSPHATE ROCK

U.S. Department of the Interior
U.S. Geological Survey

November 2007

PHOSPHATE ROCK

By Stephen M. Jasinski

Domestic survey data and tables were prepared by Hoa Phamdang, statistical assistant, and the world production table was prepared by Glenn J. Wallace, international data coordinator.

In 2006, U.S. marketable phosphate rock production and reported usage dropped to their lowest points since 1965. Production was 30.1 million metric tons (Mt) compared with 36.1 Mt in 2005, and phosphate rock used was 30.2 Mt compared with 35.2 Mt in 2005 (tables 1, 3). U.S. production capacity was 34.7 Mt, which was slightly lower than that in 2005 owing to the closure to one mine (table 12). World production was lower than that in 2005 (table 13). China surpassed the United States as the world's leading producer of phosphate rock; however, the United States remained the world's leading consumer and importer of phosphate rock and also the leading producer and supplier of phosphate fertilizers.

Phosphorus is an essential element for plant and animal nutrition and is consumed primarily as a principal component of nitrogen-phosphorus-potassium (NPK) fertilizers. Phosphate rock minerals are the only significant global resources of phosphorus. In this report (unless noted otherwise), mine production is reported in terms of marketable production, which refers to beneficiated phosphate rock with a suitable phosphorus pentoxide (P_2O_5) content for wet-process phosphoric acid or elemental phosphorus manufacturing. Quantities are reported in metric units and percentages have been calculated using unrounded data.

In 2006, phosphate rock was produced at seven mines in Florida, three in Idaho, and one each in North Carolina and Utah (table 2).

Production of phosphoric acid decreased by 6% to 10.7 Mt P_2O_5 in 2006 from 11.4 Mt P_2O_5 in 2005 (U.S. Census Bureau, 2007). Combined production of all types of phosphate fertilizers was 12% lower than in 2005. The major fertilizer products manufactured from phosphoric acid were diammonium phosphate (DAP) and monoammonium phosphate (MAP).

Production

The U.S. Geological Survey domestic phosphate rock production data were obtained from monthly and semiannual voluntary canvasses of all companies that owned phosphate rock mines. All companies responded to the canvass in 2006. There were 12 active phosphate rock mines during the year; however, 1 mine was closed permanently in May, leaving 11 active mines at yearend (table 2).

The U.S. phosphate industry is concentrated in Florida in the counties of Hamilton, Hardee, Hillsborough, Manatee, and Polk. In 2006, seven mines, representing 66% of domestic annual production capacity, were active in Florida. The Mosaic Company operated five mines, and CF Industries, Inc. and PCS Phosphate Co., Inc. each operated one (table 2). In May, Mosaic, the leading domestic producer of phosphate rock, closed its Fort Green Mine in Polk County, owing to a cost-reduction program implemented by the company. The firm planned to mine the Fort Green reserves via another of the company's mines in the region (Mosaic Company, The, 2006, p. 3). Mosaic also temporarily closed its mines twice during 2006 because of reduced production at its phosphate plants that resulted from lower domestic and export sales. The company ceased production at the Four Corners, Fort Green, and Hopewell mines from February 6 to March 6 and closed all mines for 14 days during the Thanksgiving and Christmas holidays (Bouffard, 2006a, b).

In Beaufort County, NC, PCS operated a large integrated production facility in, that included a mine, and animal feed, fertilizer, and phosphoric acid plants.

In the Western Phosphate Field in Idaho, Montana, Utah, and Wyoming, four mines were active in 2006; three in Idaho, and one in Utah (table 2). In Idaho, phosphate rock was mined in Caribou County by Nu-West Industries, Inc. (a subsidiary of Agrium Inc., Calgary, Alberta, Canada), P4 Production, LLC (a subsidiary of Monsanto Co.), and J.R. Simplot Co. Simplot also operated the Vernal Mine in Uintah County, UT.

Consumption

Domestic consumption of phosphate rock decreased to 32.6 Mt compared with 37.8 Mt in 2005 (table 1). Phosphate rock used, as reported by the mining companies, decreased to 30.2 Mt from 35.2 Mt in 2005 (table 4). There were no sales of domestic rock reported by producers. Consumption by grade and by region was withheld to avoid disclosing company proprietary data. Phosphate rock was used primarily for production of wet-process phosphoric acid for fertilizer applications, which accounted for more than 93% of domestic consumption. The remainder was used in the manufacturing of animal feed supplements, for direct application to soil and elemental phosphorus production.

All phosphate rock mining companies are vertically integrated with one or more fertilizer plants, usually located near the mine. Mosaic is the leading company with about 57% of domestic phosphoric acid production capacity (Mosaic Company, The, 2007, p. 6). In 2006, it operated seven wet process phosphoric acid and fertilizer plants in Florida and one of each in Louisiana. However, the company permanently closed its Green Bay, FL, fertilizer plant and the South Pierce, FL, phosphoric acid and triple superphosphate (TSP) plant in May 2006 (Mosaic Company, The, 2006, p. 3).

PCS had phosphoric acid and fertilizer production facilities near its mines in Florida and North Carolina. Simplot sent phosphate concentrate by a slurry pipeline; ore from its Smoky Canyon Mine went to Pocatello, ID, and ore from the Vernal Mine went to Rock Springs, WY.

Three companies—Agrifos Fertilizer LLC, Pasadena, TX; Mississippi Phosphates Corp., Pascagoula, MS; and PCS

Nitrogen, Inc., Geismar, LA—manufactured wet-process phosphoric acid using imported phosphate rock from Morocco. Agrifos and Mississippi Phosphates produced phosphate fertilizer products for domestic and export markets. PCS sold its some merchant-grade phosphoric acid to Innophos, Inc., which has a nearby facility, for upgrading into high-purity acid for technical- and food-grade applications (Innophos, Inc., 2007, p. 6).

Monsanto Company operated the only elemental phosphorus plant in the United States in Soda Springs, ID. The company used elemental phosphorus primarily to manufacture phosphorus trichloride, which was used as a chemical intermediary for the production of glyphosate-base herbicides (Monsanto Company, 2006, p. 8-9). In other countries, elemental phosphorus is used chiefly to manufacture high-purity phosphoric acid, by burning the phosphorus in water, which is known as thermal acid. Worldwide, there has been a gradual shift to manufacture high-purity phosphoric acid from wet-process acid, which has lower operating costs and no hazardous waste disposal issues that are associated with elemental phosphorus. However, thermal acid still accounts for 65% of annual world production capacity of high-purity phosphoric acid. China is the leading producer of elemental phosphorus in the world with about 45 companies, most producing less than 10,000 metric tons per year of P_2O_5 (Jiang, 2006). The only other operating elemental phosphorus facilities in the world are located in Kazakhstan and the Netherlands (Duley, undated, p. 7).

The United States is considered a mature market for phosphate fertilizers, with average annual consumption of slightly more than 4 Mt during the past decade. In 2006, domestic consumption of P_2O_5 contained in fertilizers was 4.06 Mt, a 3.4% decrease from that in 2005. Consumption of all types of primary nutrients (NPK) contained in fertilizers combined fell by 4.1% (Terry and Kirby, 2007, p. 6).

Stocks

Stocks of phosphate rock that were held by producers on December 31 increased slightly compared with those of 2005. Regional data were consolidated to avoid disclosing company proprietary information (table 3).

Transportation

In Florida and North Carolina, crude phosphate rock ore was sent by a slurry pipeline from the mines to the processing plant. All beneficiated phosphate rock was used internally to manufacture wet-process phosphoric acid; the beneficiated phosphate rock was sent by conveyers to an acid plant. Mosaic sent beneficiated phosphate rock by rail to the Port of Tampa and then by barge across the Gulf of Mexico to its facilities in Louisiana. In central Florida, animal feed products, fertilizers, and phosphoric acid were sent by rail to domestic customers or to the Port of Tampa for export. The Port of Tampa handles the largest volume of fertilizer materials in the world (Wainio, 2006).

In northern Florida, PCS transported its fertilizer products by rail to consumers; some materials, however, were sent by rail to the PCS port facility at Morehead City, NC, for export. PCS used barges and tugboats to move products from its Aurora, NC, complex to the Port of Morehead City for export or delivery by rail to domestic consumers. Phosphoric acid producers along the Gulf of Mexico received phosphate rock by ship from Morocco and transported their products by barge on the Mississippi River and its tributaries or by rail to domestic consumers. In Idaho and Utah, phosphate rock was sent from the mine to the processing facility via truck, rail, and slurry pipelines.

Prices

Price data were collected through the semiannual canvass of producers and reflected the value of phosphate rock used for production of phosphoric acid and elemental phosphorus. The average used price increased to $30.52 per metric ton from $29.60 per ton in 2005 (table 5). Unlike many other mineral commodities, no standard domestic or world price for phosphate rock exists. Average ranges of world prices were published in various industry trade journals based on a sample of transactions. An import price of $47.52 per ton was determined based on the U.S. Census Bureau customs value and included cost, insurance, and freight (table 1).

Foreign Trade

U.S. producers reported no exports of phosphate rock in 2006 (table 1). The United States is the leading importer of phosphate rock in the world. Most of the shipments from Morocco were used by the three phosphoric acid producers located along the Gulf of Mexico. The remainder of Moroccan imports was used by Mosaic at its plants in Florida and Louisiana (Mosaic Co., The, 2007, p. 6). In 2006, U.S. imports were estimated to be 2.4 Mt, based on U.S. Census Bureau data and export information received from Office Chérifien des Phosphates (OCP), the Moroccan phosphate producer (Sendal, Bahcine, OCP, written commun., January 19, 2007). The U.S. Census Bureau withholds tonnage and value information for some phosphate rock and fertilizer product shipments, which necessitates the use of other sources. U.S. import tonnage of other phosphate fertilizers was insignificant when compared with exports of the same materials (tables 6-9, 11).

Exports of elemental phosphorus dropped to 8.57 t in 2006, from 12.9 t in 2005; however, the reported customs value increased to $2,193 per ton in 2006, from $2,000 per ton in 2005 (table 10).

The United States is the leading exporter of phosphate fertilizers in the world, accounting for about 37% of world P_2O_5 exports (International Fertilizer Industry Association, undated). In 2006, total exports of P_2O_5 contained in fertilizer products decreased as MAP exports were down by 20% (table 8); TSP exports dropped by 60% owing to the closure of the Mosaic TSP plant (table 6). Phosphoric acid and DAP exports were about the same as in 2005 (tables 7, 9). In 2006, U.S. DAP exports to China dropped for the fourth consecutive year, falling by 32% compared with those of 2005. This trend is likely to continue as China expands its domestic production capacity for phosphate fertilizers. The decline in DAP exports to China was offset by a 67% increase in exports to India (table 7). Exports of phosphate fertilizers, primarily MAP, to Central America and

South America accounted for more than 33% of total phosphate fertilizer exports. The increase in sales to those regions has partially replaced sales that would have gone to Asian countries in previous years.

World Review

World production of phosphate rock was 142 Mt, a 6% decrease compared with that of 2005 owing mainly to lower output from Israel, Jordan, and the United States. China (30.7 Mt), the United States (30.1 Mt), and Morocco (27.0 Mt) were the leading producing countries, accounting for 62% of the world total (table 13). This was the first time another country has surpassed the United States in phosphate rock production. Phosphate rock production in China was likely much higher than the official figure of 30.7 Mt, which did not include production from numerous, small independent mines (Li, Ying, and Zhong, 2006).

Australia.—Incitec Pivot Limited purchased Southern Cross Fertilisers Pty. Ltd., the only producer of phosphate rock and ammonium phosphate fertilizers, from BHP Billiton in May. Billiton had acquired the phosphate businesses when it bought WMC Resources Ltd. in July 2005. The vertically integrated operations include a phosphate rock mine; phosphoric acid, fertilizer, and sulfuric acid plants; and port facilities. The phosphate rock mine has production capacity of 2.8 Mt/yr (Incitec Pivot Limited, 2006).

Canada.—Agrium Inc. reported lower output of phosphate rock from its Kapuskasing, Ontario, mine owing to ore quality problems. The phosphate rock ore has high levels of iron, which increased production costs at both the mine and phosphoric acid plant in Redwater, Alberta. Agrium was planning to install a flotation system at Kapuskasing in 2007 to reduce the iron content before the ore is sent to the Redwater facility. In addition, the company was planning to be mining in areas with higher quality ore in late 2007. The company concluded a comprehensive drilling program in 2006 to reevaluate the reserves at Kapuskasing. The results of the reserve assessment combined with projected higher world phosphate fertilizer prices and a strong Canadian dollar led the company to reduce anticipated lifespan of the mine by 6 years, with the mine closing in 2013 rather than 2019 (Agrium Inc., 2007, p. 36).

Outlook

In 2007, U.S. production of phosphoric acid and fertilizers was expected to remain at or slightly below that of 2006 owing to lower production and exports of phosphate fertilizers. U.S. consumption of phosphate fertilizers was projected to increase because of a rise in planted acreage of corn, primarily for ethanol (Green Markets, 2006). However, the increased domestic consumption likely will not be able to offset decreases in export sales, thus phosphate rock production, reported usage, and consumption are expected to remain about the same as those of 2006. In addition, the closure of several mines and plants during the past 2 years has reduced production capacity for phosphate rock and phosphoric acid, which does not allow for significant expansion in output. One mine will reopen in 2007, but its output was expected to be offset by lower production at several other mines (Mosaic Co., The, 2007, p. 7). Several new mines are planned in Florida, but detailed permitting procedures and public opposition have slowed development. The new mines would be replacements for depleted mines during the next decade and would not increase U.S. capacity.

U.S. phosphate fertilizer manufacturers are dependent greatly upon export sales, primarily of MAP to Brazil and Canada and DAP to China, India, and South Asia. Sales to Brazil were expected to increase in 2007 after dropping in 2006 because of lower demand. DAP sales were expected to be significantly lower in 2007, as China and India have increased domestic production, displacing U.S. exports. India will continue to require imports of DAP to meet growing demand for phosphate fertilizers, but the amount from the United States will be dependent upon the level of domestic production, Government subsidy programs, and foreign competition.

World phosphate fertilizer consumption was projected to grow at an average annual rate of 2.9% during the next 5 years, according to the International Fertilizer Industry Association (Heffer and Prud'homme, 2007). The United States will remain the world's leading supplier of phosphate fertilizers; however, its ammonium phosphate export market share likely will continue to shrink as new phosphoric acid and fertilizer plants are built in Brazil, China, Morocco, and Saudi Arabia. Exports of DAP and MAP to Latin American countries are to expected to continue to grow, and sales to Asia gradually will decrease.

References Cited

Agrium Inc., 2007, Annual report—2006: Calgary, Alberta, Canada, Agrium Inc., 131 p.

Bouffard, Kevin, 2006a, Mosaic to idle three mines: Lakeland Ledger, February 1. (Accessed February 2, 2006, at http://www.theledger.com/article/20060201/NEWS/602010365)

Bouffard, Kevin, 2006b, Mosaic to close 4 mines for 14 days: Lakeland Ledger, November 1. (Accessed November 2, 2006, at http://www.theledger.com/article/20061101/NEWS/611010375)

Duley, Bill, [undated], Recycling phosphorus by recovery from sewage: London, United Kingdom, undated. (Accessed June 13, 2005, at http://www.nhm.ac.uk/research-curation/departments/mineralogy/research-groups/phosphate-recovery/duley.doc)

Green Markets, 2006, Major nutrient outlook bullish for 2007: Green Markets, v. 30, no. 46, p. 1, 11-12.

Heffer, Patrick, and Prud'homme, Michel, 2007, Medium-term outlook for global fertilizer demand, supply and trade, *in* IFA Annual Conference, 75th, Istanbul, Turkey, May 21-23, 2007, Proceedings: Paris, France, International Fertilizer Industry Association, [unpaginated].

Incitec Pivot Limited, 2006, Incitec Pivot makes major growth move: Southbank, Victoria, Australia, Incitec Pivot Limited media statement, May 9, 2 p.

Innophos, Inc., 2007, 10-K—2006: Securities and Exchange Commission, 123 p.

International Fertilizer Industry Association, [undated], Production and international trade statistics: Paris, France, International Fertilizer Industry Association. (Accessed February 15, 2007, at http://www.fertilizer.org/ifa/statistics/pit_public/pit_public_statistics.asp.)

Jiang, David, 2006, Competence of thermal acid in the China context, *in* Phosphates 2006, Brussels, Belgium, April 23-25, 2006, Proceedings: London, United Kingdom, British Sulphur Events, p. 81-84.

Li, Jun, Ying, Jiankang, and Zhong, Benhe, 2006, Phosphate rock resources and fertilizer production in China, *in* IFA Crossroads Asia-Pacific 2006, Chiangmai, Thailand, November 13-16, 2006, Proceedings: Paris, France, International Fertilizer Industry Association, 7 p.

Monsanto Company, 2006, 10-K—2006: Securities and Exchange Commission, 188 p.

Mosaic Company, The, 2006, Form 10-K—Fiscal year 2006: Securities and Exchange Commission, 435 p.
Mosaic Company, The, 2007, Form 10-K—Fiscal year 2007: Securities and Exchange Commission, 244 p.
Terry, D.L., and Kirby, B.J., 2007, Commercial fertilizers 2006: Lexington, KY, Association of American Plant Food Control Officials, 41 p.
U.S. Census Bureau, 2007, Fertilizer materials and related products—Fourth quarter 2006: U.S. Census Bureau MQ325B(06)-4, March, 6 p.
Wainio, Richard, 2006, 2006 State of the port address: Tampa, FL, Tampa Port Authority, December 7. (Accessed May 15, 2007, at http://www.tampaport.com/subpage.asp?navid=&id=58.)

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Fertilizers—Sustaining Global Food Supplies. Fact Sheet 155-99, 1999.
Marketable Phosphate Rock. Mineral Industry Surveys, crop year.
Phosphate. International Strategic Minerals Inventory Summary Report, Circular 930-C, 1984.
Phosphate Deposits. Ch. in United States Mineral Resources, Professional Paper 820, 1973.
Phosphate Rock. Ch. in Mineral Commodity Summaries, annual.
Phosphate Rock. Mineral Industry Surveys, monthly.
Phosphate Rock Resources of the United States. Circular 888, 1984.
Sedimentary Phosphate Resource Classification System of the U.S. Bureau of Mines and the U.S. Geological Survey. Circular 882, 1982.

Other

Phosphate Availability and Supply—A Minerals Availability Appraisal: U.S. Bureau of Mines Information Circular 9187, 1988.
Fertilizer Institute, The.
Fertilizer International, bimonthly.
Fertilizer Week, weekly.
Green Markets, weekly.
Industrial Minerals, monthly.
International Fertilizer Development Center.
International Fertilizer Industry Association.
OCP Group.
Potash and Phosphate Institute.
U.S. Department of Agriculture, Economic Research Service.

TABLE 1
SALIENT PHOSPHATE ROCK STATISTICS[1]

(Thousand metric tons and thousand dollars unless otherwise specified)

	2002	2003	2004	2005	2006
United States:					
Mine production (crude ore)	154,000	153,000	146,000	151,000 r	111,000
Marketable production:					
Quantity:					
Gross weight	36,100	35,000	35,800	36,100 r	30,100
P_2O_5 content	10,700	10,300	10,400	10,300 r	8,680
Value	993,000	946,000	995,000	1,070,000 r	919,000
Value, average[2] dollars per metric ton	27.47	27.01	27.79	29.61 r	30.49
Sold or used by producers:[3]					
Quantity:					
Gross weight	34,700	36,400	36,500	35,200 r	30,200
P_2O_5 content	10,300	10,600	10,500	10,200 r	8,710
Value[4]	962,000	981,000	1,010,000	1,040,000 r	922,000
Value, average dollars per metric ton	27.69	26.95	27.76	29.60 r	30.52
Exports:					
Quantity, gross weight	62 [5]	64 [5]	-- [6]	-- [6]	-- [6]
Value[6]	W	W	--	--	--
Value, average dollars per metric ton	W	W	XX	XX	XX
Imports for consumption[e, 5, 7]					
Quantity, gross weight	2,700	2,400	2,500	2,630	2,420
Value, cost, insurance, and freight[e]	112,000	84,000	91,300	107,000	115,000
Value, average dollars per metric ton	41.45	35.55	36.50	40.91	47.52
Consumption, gross weight[e, 8]	37,400	38,800	39,000	37,800	32,600
Stocks, December 31, producers	8,860	7,540	7,220	6,970	7,070
World, production, gross weight	136,000 r	139,000 r	143,000 r	151,000 r	142,000

rRevised. W Withheld to avoid disclosing company proprietary data. XX Not applicable. -- Zero.
[1]Data are rounded to no more than three significant digits, except average values per metric ton.
[2]Average value based on the sold or used values.
[3]Includes domestic sales and exports.
[4]Total value of all domestic and export sales.
[5]Source: U.S. Census Bureau.
[6]Reported by producers.
[7]Includes some estimated phosphate rock tonnage imported from Morocco but not reported by the U.S. Census Bureau
[8]Expressed as sold or used plus imports minus exports.

TABLE 2
ACTIVE PHOSPHATE ROCK MINES IN THE UNITED STATES IN 2006

Owner	Mine	County and State
CF Industries, Inc.	South Pasture	Hardee, FL.
Mosaic Co., The	Fort Green[1]	Polk, FL.
Do.	Four Corners	Hillsborough/Manatee/Polk, FL.
Do.	Hookers Prairie	Polk, FL.
Do.	Hopewell	Hillsborough, FL.
Do.	South Fort Meade	Polk, FL.
Nu-West Industries, Inc. (Agrium US, Inc.)	Dry Valley	Caribou, ID.
P4 Production, LLC. (Monsanto Co.)	South Rasmussen	Do.
PCS Phosphate Co., Inc.	Aurora	Beaufort, NC.
Do.	Swift Creek	Hamilton, FL.
Simplot, J.R., Co.	Smoky Canyon	Caribou, ID.
Do.	Vernal	Uintah, UT.

[1]Closed in May 2006.

TABLE 3
PRODUCTION OF PHOSPHATE ROCK IN THE UNITED STATES, BY PERIOD[1]

(Thousand metric tons and thousand dollars)

	Mine production, crude ore		Marketable production, beneficiated			
Period	Rock	P_2O_5 content	Rock	P_2O_5 content	Value[2]	Ending stocks, rock
2005:						
January-June	80,900 r	7,630 r	18,700 r	5,250 r	537,000 r	6,760
July-December	70,300 r	7,090 r	17,400	5,050	531,000 r	6,970
Total r	151,000	14,700	36,100	10,300	1,070,000	XX
2006:						
January-June	57,300	5,900	15,200	4,370	456,000	7,450
July-December	53,300	5,680	14,900	4,300	462,000	7,070
Total	111,000	11,600	30,100	8,680	919,000	XX

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Based on the per ton sold or used values.

TABLE 4
HOSPHATE ROCK SOLD OR USED BY PRODUCER
IN THE UNITED STATES, BY PERIOD[1]

(Thousand metric tons and thousand dollars)

Period	Rock	P_2O_5 content	Value[2]
2005:[r]			
January-June	17,900	5,170	517,000
July-December	17,300	4,990	525,000
Total	35,200	10,200	1,040,000
2006:			
January-June	14,900	4,300	443,000
July-December	15,300	4,400	479,000
Total	30,200	8,710	922,000

[r]Revised.
[1]Data are rounded to no more than three significant digit may not add to totals shown.
[2]Free on board mine.

TABLE 5
VALUE OF U.S. PHOSPHATE ROCK, BY GRADE

(Dollars per metric ton, free on board mine)

Grade [percentage of bone phosphate of line (BPL) content[1]]	2005	2006
66 to less than 70	W	W
60 to less than 66	29.67 [r]	W
Average weighted[2]	29.60 [r]	30.52

[r]Revised. W Withheld to avoid disclosing company proprietary data.
[1]1.0% BPL (tricalcium phosphate)=0.458% P_2O_5.
[2]Includes less than 60% and greater than 70%, in addition to the grades listed.

TABLE 6
U.S. EXPORTS OF SUPERPHOSPHATES
(CONCENTRATED)

(Thousand metric tons)

Country	2005	2006
Australia	41	26
Brazil	38	(1)
Chile	28	2
Japan	37	25
Other	24	13
Total	168	66

[1]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 7
U.S. EXPORTS OF DIAMMONIUM PHOSPHATE[1]

(Thousand metric tons)

Country	2005	2006
Argentina	197	209
Australia	259	130
Brazil	104	174
Canada	119	103
Chile	83	95
China	1,330	910
Colombia	113	126
Ecuador	50	63
Guatemala	90	87
India	1,180	1,960
Japan	244	324
Kenya	49	87
Mexico	381	422
New Zealand	137	58
Pakistan	642	336
Peru	118	184
Thailand	118	111
Turkey	68	--
Other	342	275
Total	5,620	5,660

-- Zero.

[1]Data are rounded to no more than three significant di
may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 8
S. EXPORTS OF MONOAMMONIUM PHOSPHAT

(Thousand metric tons)

Country	2005	2006
Argentina	223	241
Australia	625	342
Brazil	522	281
Canada	609	628
Chile	70	77
Colombia	134	131
India	335	--
Japan	136	117
Mexico	161	249
Other	79	244
Total	2,890	2,310

-- Zero.

[1]Data are rounded to no more than three significant di
may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 9
U.S. EXPORTS OF PHOSPHORIC ACID[1]

(Thousand metric tons)

Country	2005	2006
Canada	20	25
Colombia	9	11
India	250	356
Other	144	91
Total	423	483

[1]Excludes superphosphoric acid tonnage.

Source: U.S. Census Bureau.

TABLE 10
U.S. EXPORTS OF ELEMENTAL PHOSPHORUS[1]

	2005		2006	
Country	Quantity (metric tons)	Value[2] (thousands)	Quantity (metric tons)	Value[2] (thousands)
Brazil	9,120	$15,800	7,720	$16,400
Canada	872	2,180	696	2,020
Japan	56	133	--	--
Korea, Republic of	22	46	12	29
Mexico	2,420	6,840	1	3
Other	366	800	140	323
Total	12,900	25,800	8,570	18,800

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to total
[2]Free alongside ship values.

Source: U.S. Census Bureau.

TABLE 11
U.S. IMPORTS FOR CONSUMPTION OF PHOSPHATE ROCK AND PHOSPHATIC MATERIALS[1]

(Thousand metric tons and thousand dollars)

Phosphatic materials	2005		2006	
	Quantity	Value[2]	Quantity	Value[2]
Phosphate rock:				
Unground[3]	1,200	44,600	1,260	51,400
Ground[3]	518	27,300	511	32,900
Total[4]	2,630	107,000	2,420	115,000
Dicalcium phosphate	6	8,310	8	11,200
Elemental phosphorus	19	44,100	13	30,600
Normal superphosphate	1	169	28	5,870
Triple superphosphate	8	5,600	17	3,580
Diammonium phosphate	10	9,130	54	32,000
Fertilizer containing nitrates and phosphates	2	1,080	(5)	105
Phosphoric acid	58	27,900	75	30,500

[1]Data are rounded to no more than three significant digits.
[2]Declared cost, insurance, freight values.
[3]Some phosphate rock tonnages and values were suppressed by the U.S. Census Bureau.
[4]Includes an estimate for data suppressed by U.S. Census Bureau based on reported Morocc exports to the United States.
[5]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 12
PHOSPHATE ROCK ANNUAL WORLD PRODUCTION CAPACITY, DECEMBER 31, 2006[1]

(Thousand metric tons)

Region/country	Capacity
Africa	52,000
Asia	50,000
Europe and Russia	14,500
Latin America and Canada	7,800
Middle East	15,000
Oceania	3,000
United States	34,700
Total	177,000

[1]Data are rounded to no more than thre significant digits; may not add to totals shown.

Sources: International Fertilizer Association and U.S. Geological Surve

TABLE 13
PHOSPHATE ROCK, BASIC SLAG, AND GUANO: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons)

	Gross weight					P_2O_5 content				
Commodity and country[3]	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
Phosphate rock:										
Albania[e]	1	--	--	--	--	(4)	--	--	--	--
Algeria	740	905	1,017 r	878	1,500	220 r, e	267 r, e	300 e	266 r, e	450 e
Australia	2,025	2,285	2,014	2,200 r, e	2,300 e	482	545	490	590 r, e	600 e
Brazil, concentrate	5,084	5,584	5,690 r	5,488 r	5,800 p	1,831	2,005	2,181	2,044 r	2,100 p
Burkina Faso[e]	2 [5]	2	2	2	2	1 [5]	1	1	1	1
Canada[e]	1,000	1,000	1,000	900 r	550	380	380	380	325 r	200
Chile	20	21	21	20 r	20	5	5	5	5 e	5 e
China[e]	23,000	25,200	25,500	30,400	30,700	6,900	7,550	7,650	9,130	9,200
Christmas Island[e]	500	500	655	685	685	167	167	210	220	220
Colombia[e]	43	43	43	43	43	8 [5]	8	8	8	8
Egypt, beneficiated	1,550	2,183	2,219	2,144 r	2,200	434 e	630	650 e	622 r	650 e
Finland[e]	800	800	840	825	825	290	290	306	301	300
India[e]	1,250	1,175	1,180	1,200	1,200	370	345	349	355	355
Indonesia[e]	1	1	1	1	1	(4)	(4)	(4)	(4)	(4)
Iran[e]	303 [5]	194 [5]	230 [5]	250	300	36	23	28	30	36
Iraq, beneficiated[e]	300	3 r	30 r	30	30	100	1 r	10 r	10 r	10
Israel	4,091 r	3,708 r	3,290 r	3,236 r	2,949	1,130 r, e	1,020 e	900 e	890 r, e	810 e
Jordan	7,179	6,762 r	6,223 r	6,375 r	5,871	2,340	2,230 e	2,050	2,100 r	1,930
Kazakhstan	137	169	230	263 r	270 e	40	38	52 e	55 r, e	55 e
Korea, North[e]	300	300	300	300	300	95	95	95	95	95
Mexico	5	6	(4)	(4) r	(4) e	1	2	(4)	(4) r	(4) e
Morocco[6]	23,028 r	23,338 r	26,675 r	28,788 r	27,000 e	7,341 r	7,424 r	8,507 r	9,195 r	8,660 e
Nauru[e]	150 [5]	84	22	8 r	45	55	26	7	3	17
Pakistan	1 r	3 r	5 r	3 r	3	(4) r	(4) r	1 r	(4) r	1
Peru	16 e	32	38	38	38 p	6	12	14	14 e	14 e
Philippines[e]	400	400	400	400	400	135	135	135	135	135
Russia[e]	10,700	11,000	11,000	11,000	11,000	4,000	4,000	4,000	4,000	4,000
Senegal	1,551	1,765	1,580 r	1,455 r	600 e	554	630	569 r	504 r	200 e
South Africa	2,803	2,643	2,735	2,577	2,600 e	1,086	1,030 e	1,067	1,000 e	1,020 e
Sri Lanka	39	41	42 e	43 e	44 e	13	14	14 e	15 e	15 e
Syria[e]	2,483 [5]	2,414 [5]	2,883 [5]	3,850 r, 5	3,850	770 r	750 r	890 r	1,190 r	1,190
Tanzania	1	4	7	7 r	7 e	(4)	1	1 r	1 r	1 e
Thailand[e]	4 [5]	14 [5]	3 [5]	3 r	3	1	4	1	1 r	1
Togo	1,271	1,471	1,115	1,021 r	1,000 e	460 e	530 e	418 e	368 e	400 e
Tunisia, washed[e]	7,461 [5]	7,890 e	8,051 r, 5	8,220 r, 5	8,000	2,200	2,300 r, 5	2,400	2,400	2,400
United States	36,100	35,000	35,800	36,100 r	30,100	10,700	10,300 r	10,400	10,300 r	8,680
Uzbekistan[e]	425	430	430	430	600	101	102	102	102	140
Venezuela	390	260	300 r	392 r	400 e	111 e	75 e	85 r, e	110 r, e	115 e
Vietnam	779 r	821 r	902 r	940 r	980 e	234 r	246 r	271 r	282 r	294 e
Zimbabwe, concentrate	108	95	83	46 r	50 e	39	31	27	15 r, e	16 e
Total	136,000 r	139,000 r	143,000 r	151,000 r	142,000	42,600 r	43,200 r	44,600	46,700 r	44,300
Basic (Thomas converter) slag:[e]										
Egypt	7	7	7	8	8	2	2	2	2	2
France	50	50	50	50	50	8	8	8	8	8
Germany	-- r	-- r	-- r	-- r	--	-- r	-- r	-- r	-- r	--
Luxembourg	475	475	450	475	475	70	70	70	70	70
Total	532 r	532 r	507 r	533 r	533	80 r	80 r	80 r	80 r	80

[e]Estimated. [p]Preliminary. [r]Revised. -- Zero.

[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 May 3, 2007. Figures are from official country sources where available.

[3]Phosphate rock may be produced in Nigeria, but information is inadequate to estimate output.

[4]Less than ½ unit.

[5]Reported figure.

[6]Includes production from Western Sahara.