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2010 Minerals Yearbook

PHOSPHATE ROCK [ADVANCE RELEASE]

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Phosphate Rock

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World phosphate markets rebounded in 2010, returning to consumption levels of 2008 before the global economic downturn that affected fertilizer markets. Domestic phosphate rock production in 2010 was 25.8 million metric tons (Mt) compared with 26.4 Mt in 2009 owing to producers significantly drawing down stocks of phosphate rock. Reported domestic use of phosphate rock was 28.1 Mt compared with 25.5 Mt in 2009 (tables 1, 3, 4) as production of phosphoric acid and ammonium phosphates increased in 2010. World production was 12% higher than that in 2009 (table 10) owing to market rebound from the global economic downturn and increasing demand for fertilizer in China and India. 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.

Domestic production of all types of phosphoric acid in 2010 increased to 9.41 Mt P_2O_5 from 8.66 Mt in 2009. Phosphate acid production for fertilizer use increased to 8.72 Mt P_2O_5 compared with 8.01 Mt in 2009. Combined production of all types of phosphate fertilizers was 12% higher than in 2009 because of increased production of monoammonium phosphate (MAP) (U.S. Census Bureau, 2011). The major fertilizer products manufactured from phosphoric acid were diammonium phosphate (DAP) and MAP.

Production

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 2010, phosphate rock was produced at seven mines in Florida, three in Idaho, and one each in North Carolina and Utah (table 2).

The U.S. phosphate industry is concentrated in Florida in the counties of Hamilton, Hardee, Hillsborough, Manatee, and Polk. In 2010, seven mines, representing 65% 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 mine (table 2).

Mosaic planned to use imported phosphate rock, primarily from a joint venture with Vale S.A. in Peru, at its Louisiana phosphate plants (Mosaic Company, The, 2011, p. 2). According to U.S. Census Bureau statistics, Mosaic imported 183,000 metric tons (t) of phosphate rock from Peru in 2010.

Mosaic was forced to close temporarily its South Fort Meade Mine from early September to early December after a July 30, 2010, preliminary injunction by the U.S. District Court for the Middle District of Florida. The injunction stemmed from a lawsuit filed by the Sierra Club and other environmental groups in Florida challenging the Army Corps of Engineers permit approval for expansion of the mine into Hardee County. In late October, Mosaic reached an agreement with the environmental groups to allow the company 4 months to mine about 80 hectares (ha) of the 4,280 ha of the extension into Hardee County. Mosaic mined the area from December 2010 to March 2011. Mosaic increased production at its other mines and used imported phosphate rock from Morocco and Peru as feedstock to its fertilizer plants to replace lost production from the South Fort Meade Mine in 2010 (Green Markets, 2010b).

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

In the Western Phosphate Field in Idaho, Montana, Utah, and Wyoming, four mines were active in 2010—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, L.L.C. (a subsidiary of Monsanto Co.), and J.R. Simplot Company. Simplot also operated the Vernal Mine in Uintah County, UT.

In Idaho, Agrium, P4 Production, and Simplot began development of new mines as replacements for their current operations to be used when the mines are exhausted. Simplot received approval for its mine expansion in December 2010 (J.R. Simplot Company, 2011). P4 Production submitted plans to spend an additional $10 million in environmental safeguards at its Blackfoot Bridge Mine that was under development in the Caribou/Targhee National Forest in Idaho (Green Markets, 2010a). Agrium was in the initial stages of development of its new mine, and Federal and State agencies were planning to commence work on an environmental impact statement in 2011 (U.S. Bureau of Land Management, 2011).

Consumption

Phosphate rock was used primarily for production of wet-process phosphoric acid for fertilizer applications, which accounted for more than 90% of domestic consumption. The remainder was used in the manufacturing of animal feed supplements, for direct application to soil, and for elemental phosphorus production. Domestic consumption of phosphate rock was 30.5 Mt compared with 27.5 Mt in 2009 (table 1), owing to the improved market conditions. There were no sales of domestically mined phosphate rock reported by producers. Consumption by grade and by region was withheld

from publication to avoid disclosing company proprietary information.

All phosphate rock mining companies are vertically integrated, having one or more fertilizer plants, usually located near the mine. Mosaic was the leading company with about 56% of domestic phosphoric acid production capacity and 13% of world capacity. In 2010, the company operated four wet process phosphoric acid plants and four fertilizer plants in Florida and one of each in Louisiana (Mosaic Company, The, 2011, p. 1).

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

Three companies—Agrifos Fertilizer Inc., 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 some merchant-grade phosphoric acid to Innophos Holdings, Inc., which had a nearby facility, for upgrading into high-purity acid for technical- and food-grade applications (Innophos Holdings, Inc., 2011, p. 8).

Monsanto operated the only elemental phosphorus plant in the United States in Soda Springs, ID. The company used elemental phosphorus to manufacture phosphorus trichloride, which was used as a chemical intermediary for the production of glyphosate-base herbicides (Monsanto Company, 2010, p. 7). In other countries, elemental phosphorus was 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 manufacturing high-purity phosphoric acid from wet-process acid, which has lower operating costs and none of the hazardous waste disposal issues that are associated with elemental phosphorus. Thermal acid, however, still accounts for 65% of annual world production capacity of high-purity phosphoric acid, primarily in China. The only other operating elemental phosphorus facilities in the world were located in China, Kazakhstan, and the Netherlands.

The United States is considered a mature market for phosphate fertilizers, with average annual consumption of slightly more than 4.0 Mt during the past decade. Fertilizer consumption information is collected by the American Association of Plant Food Officials on a crop year (July 1 to June 30) basis. The most recent data, for crop year 2009 (July 1, 2008, to June 30, 2009), showed a 25% decrease in P_2O_5 consumed in fertilizers from the previous crop year, owing to the economic downturn that affected the global fertilizer industry (Slater and Kirby, 2011, p. 6). Consumption of P_2O_5 contained in fertilizers was estimated to have increased in crop year 2010 because of fertilizer use and sales returning to near average levels.

Stocks

Producers' stocks of phosphate rock on December 31, 2010, were 31% lower than in yearend 2009 (table 3).

Transportation

In Florida and North Carolina, crude phosphate rock ore was sent by slurry pipeline from the mines to the processing plants. All beneficiated phosphate rock was used internally to manufacture wet-process phosphoric acid; the beneficiated phosphate rock was sent by conveyers to acid plants. Mosaic sent some beneficiated phosphate rock by rail to the Port of Tampa and ore by barge across the Gulf of Mexico to its facilities in Louisiana. However, since the company stopped sending rock from its mines in Florida to Louisiana, after it began receiving phosphate rock from Peru in August 2010. 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 United States.

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 total value of phosphate rock used in the United States decreased by 32% from that of 2009 owing to a return to lower prices because of the economic downturn that began in late 2008 after the prices had spiked (table 1). 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. The import price of $87.79 per metric 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 2010 (table 1). The United States is the leading importer of phosphate rock in the world. More than 90% of imported phosphate rock was from Morocco and all imported phosphate rock was consumed by phosphoric acid producers located along the Gulf of Mexico—Agrifos, Mississippi Phosphates, Mosaic, at its Louisiana plants, and PCS Nitrogen. In 2010, U.S. imports were estimated to be 2.4 Mt, based on data from the U.S. Census Bureau and PIERS, a commercial database reporting on waterborne trade activity. Tonnage and value information for some phosphate rock and fertilizer product shipments were underreported by the U.S. Census Bureau, which necessitated the use of other sources. U.S. import tonnage of other phosphate

fertilizers was insignificant compared with exports of the same materials (tables 5−7, 9).

The United States is the leading exporter of phosphate fertilizers in the world, accounting for about 25% of world P_2O_5 contained in processed phosphate exports in 2010. In total, exports of phosphoric acid and phosphate fertilizers decreased by 9%, in terms of P_2O_5 content (U.S. Census Bureau, 2011). India was the leading destination for U.S. phosphate exports (tables 5−7).

World Review

World production of phosphate rock increased by 12% in 2010 compared with that of 2009. China (68.0 Mt), the United States (25.8 Mt), and Morocco (25.8 Mt) were the leading producing countries, accounting for 66% of the world total (table 10). Phosphate rock production in China likely was higher than the official figure of 68.0 Mt, which did not include production from numerous, small independent mines. Information was not available to estimate production from these operations. Much of the activity in phosphate rock exploration and expansion took place in Africa and Australia in 2010. In addition to major projects in Africa (Morocco and Namibia), smaller mines were under various stages of development in Angola, Mali, Mauritania, Mozambique, Uganda, and Zambia. Expansion of production capacity was planned in Egypt, Senegal, South Africa, Tunisia, and Togo. Phosphate rock production began in Saudi Arabia in late 2010; however, the rock was being stockpiled until the associated phosphate plant began operation in 2011 (Ma'aden Phosphate Co., 2010).

Australia.—Four major phosphate projects were under development in Australia in 2010, three in the Northern Territory and one in Queensland. The largest of the four, the Wonarah Rock Phosphate project located near Tennant Creek, Northern Territory, reported significant progress in 2010, according to Minemakers Ltd. (Minemakers Ltd., 2010, p. 2). The company completed the first stage of the project, a feasibility study for a direct-shipping ore operation, which could start by late 2011, depending on the phosphate rock prices. The second stage would involve construction of a beneficiation plant, and stage three would be construction of a rail spur to the main railway to the Port of Darwin. A feasibility study has yet to be started for the stages 2 and 3. In July 2010, Minemakers signed an investment agreement with JDCPhosphate, Inc. of Florida, which has developed a dry kiln technology for producing superphosphoric acid. Minemakers would be granted the exclusive Australian license to use the JDC process at Wonarah plant. Total reported indicated and inferred resources at the Wonarah project were 1,258 Mt grading of 12% P_2O_5, with an Australasian Joint Ore Reserves Committee (JORC)-compliant indicated resource of 399 Mt grading 21% P_2O_5, with a cutoff grade of 15% P_2O_5 (Fertilizer International, 2010d).

Legend International Holdings, Inc. reported completion of a feasibility study by Wengfu Group Ltd. of China for the Paradise Phosphate Project in Queensland. The project included the Paradise North and Paradise South Mines and a processing facility at Mt. Isa. Legend planned to start mining at Paradise North in 2013 at a rate of 1.25 million metric tons per year (Mt/yr) of marketable rock, with an average grade of 29.5% P_2O_5. The ore would be beneficiated by dry screening to remove silica and sent by truck to a phosphate fertilizer complex, which would be constructed at Mt. Isa. The fertilizer complex would include production facilities for sulfuric acid, phosphoric acid, ammonium phosphates, and aluminum fluoride. Legend planned to start mining the Paradise South deposit in 2017 at a rate of 2.5 Mt/yr. The ore would be processed at an onsite flotation plant before being sent to Mt. Isa. The company reported total JORC-compliant indicated resources at 392 Mt, grading 15.7% P_2O_5. The company expected to begin operating in 2013 (Fertilizer International, 2010b).

Korab Resources Ltd. (through its subsidiary GeolSec Phosphate Operations Pty. Ltd.) was developing a phosphate rock deposit near Rum Jungle in the Northern Territory. The company planned to market the phosphate rock for direct application to soil for organic farming. The phosphate rock would be mined by simple quarrying and processed by crushing and grinding. GeolSec planned to start production in 2011 at a rate of 15,000 metric tons per year (t/yr), increasing to 30,000 t/yr in 2013. The total resources of the deposit were estimated to be 1.3 Mt with an average grade of 12% P_2O_5 (Fertilizer International, 2010a).

In the other project in the Northern Territory, phosphate rock would be recovered as a byproduct of rare-earth processing. The Arafura Resources Ltd.'s, Nolans Bore project, located 135 kilometers northwest of Alice Springs, had resources of 3.9 Mt of phosphate rock, with and an average grade of 12.9% P_2O_5, in addition to 848,000 t of rare-earth oxides, and 6,000 t of uranium. The company planned to start production in 2013 (Fertilizer International, 2010e).

Brazil.—Vale, through its wholly owned subsidiary Mineracao Naque SA, consolidated its position as the leading fertilizer producer in Brazil through the acquisition of the fertilizer assets of three other producers in Brazil: Bunge Participacoes e Investimentos S.A. (Bunge Ltd.), Fertilizantes Fosfatodos S.A. (Fosfertil), and some assets held by Yara International ASA of Norway. Included in the transaction were Bunge's two phosphate rock mines and the associated phosphoric acid plants. Vale also obtained the Anitapolis phosphate rock mine project that was owned by Bunge and Yara. Vale gained a controlling interest in Fosfertil, which included three phosphate rock mines (Fertilizer Week America, 2010a).

Canada.—Agrium expected its Kapuskasing, Ontario, phosphate rock mine to be depleted in 2013. The company was in negotiations to establish a long-term supply contract for its Redwater, Alberta, phosphate operations, probably with an overseas supplier (Agrium Inc., 2011, p. 22).

Morocco.—OCP Group, the Moroccan phosphate producer, announced plans to expand its phosphate rock and fertilizer production capacity incrementally during a 7-year period beginning in 2011. OCP planned to increase annual phosphate rock mine production capacity from 30 Mt/yr to 50 Mt/yr, increase beneficiation capacity from 9 Mt/yr to 38 Mt/yr, increase DAP/MAP capacity from 3 Mt/yr to 9 Mt/yr, and expand the port facility at Jorf Lasfar to handle up to 38 Mt/yr of phosphate products. The expansion of the DAP and MAP capacity was to be done through the construction of four new

plants at Jorf Lasfar, each with an annual production capacity of 1 Mt/yr of combined DAP and MAP. The plants were planned to be built at 6-month intervals between 2013 and 2015. In the first quarter of 2013, OCP expected to start building a 44-Mt/yr slurry pipeline to transport phosphate rock from the mines to the new and existing phosphate plants at Jorf Lasfar. Upon completion of all projects, Morocco will be the world's leading supplier of phosphate rock, phosphoric acid, DAP, and MAP (Fertilizer Week, 2010).

Namibia.—Marine Phosphate (Pty.) Ltd. (a joint venture between Minemakers, Tungeni Africa Investments cc, and Union Resources Ltd.) completed a scoping study of Sandpiper/Meob offshore phosphate joint-venture project about 60 km offshore of Namibia at a depth of 225 meters. Initial indicated reserves are 73.9 Mt, with an average grade of 20.57% P_2O_5 and inferred reserves are 1,500 Mt, with an average grade of 18.7% P_2O_5. The company also planned to test the JDCPhosphate process with ore from Namibia. A feasibility study was planned for 2011 to determine if the project should produce phosphate rock, phosphoric acid, or both. Minemakers, which holds the largest share in the project, planned to start production in late 2013 (Fertilizer International, 2011).

Peru.—Vale of Brazil began production at its Miski Mayo Mine phosphate rock mine in the Sechura Desert in the Piura region of northwestern Peru. Production was expected to increase gradually from the initial production capacity of 1 Mt/yr to full capacity of 3.9 Mt/yr during several years. The mine is operated by a subsidiary of Vale and is owned by a joint-venture agreement between Vale (40%), Mosaic (35%), and Mitsui & Co. of Japan (25%). Mosaic entered into the joint venture in March 2010, and it will receive up to 35% of production. The rock was to be shipped primarily to Brazil, Indonesia, and the United States. Vale was considering building a phosphate plant onsite before 2013, depending on market conditions (Fertilizer Week America, 2010b).

Stonegate Agricom Ltd. of Canada was developing the Mantaro Phosphate property located 250 km from Lima near Huancayo. The company planned to conduct a feasibility study in 2011 and start production in 2013. The company was still evaluating the total estimated reserves for the project (Fertilizer International, 2010c).

Outlook

World phosphate rock annual production capacity was projected to increase 26% from 2010 to 2015, increasing from 203 Mt to 256 Mt, with more than 50% of the increase from Africa. The increase will be from a combination of new mines and expansion of existing operations, some of which were discussed in the previous section. About 70% of the new capacity will be for the export market (Heffer and Prud'homme, 2011). U.S. production capacity will likely remain the same or decrease slightly through 2015 depending on whether three new mines under development in Florida are able to receive permits to operate. A new mine in Idaho was expected to be permitted, but it would be as a replacement for an existing mine.

The projected increases in annual production capacity for phosphate rock will supply the associated increase in phosphoric acid and fertilizer production. World population growth ensures the need for phosphate fertilizer to grow crops for food and biofuels. World consumption of P_2O_5 in fertilizer was projected to increase from 39.9 Mt in 2010 to 41.4 Mt in 2011 and to 44.9 Mt in 2015, according to the International Fertilizer Industry Association. Phosphoric acid production capacity was expected to increase by 3.9% per year between 2010 and 2015, with one-third of the new output from operations in China. Global production of phosphate fertilizer was expected to increase from 36.6 Mt/yr P_2O_5 to 44.4 Mt/yr P_2O_5 (Heffer and Prud'homme, 2011).

Domestic production and consumption of phosphate rock in 2011 were expected to be slightly higher than in 2010 as the fertilizer markets return to conditions seen before the economic downturn.

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TABLE 1
SALIENT PHOSPHATE ROCK STATISTICS[1]

(Thousand metric tons and thousand dollars unless otherwise specified)

	2006	2007	2008	2009	2010
United States:					
Mine production (crude ore)	111,000	126,000	124,000	107,000	106,000
Marketable production:					
Quantity:					
Gross weight	30,100	29,700	30,200	26,400	25,800
P_2O_5 content	8,680	8,480	8,590	7,640	7,400
Value	919,000	1,520,000	2,320,000	3,360,000	1,980,000
Value, average[2] dollars per metric ton	30.49	51.10	76.76	127.19	76.69
Sold or used by producers:					
Quantity:					
Gross weight	30,200	31,100	28,900	25,500	28,100
P_2O_5 content	8,710	8,890	8,200	7,380	8,000
Value	922,000	1,600,000	2,210,000	3,250,000	2,210,000
Value, average dollars per metric ton	30.52	51.36	76.64	127.22	78.50
Imports for consumption[e, 3, 4]					
Quantity, gross weight	2,420	2,670	2,750	2,000	2,400
Value, cost, insurance, and freight[e]	115,000	154,000	266,000	161,000	211,000
Value, average dollars per metric ton	47.52	57.54	96.95	80.61	87.79
Consumption, gross weight[e, 5]	32,600	33,500	31,600	27,500	30,500
Stocks, December 31, producers	7,070	4,970	6,340	8,120	5,620
World, production, gross weight	151,000	160,000	165,000	161,000 [r]	181,000 [e]

[e]Estimated. [r]Revised.

[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]Source: U.S. Census Bureau.

[4]Includes some estimated phosphate rock tonnage imported from Morocco but not reported by the U.S. Census Bureau.

[5]Expressed as sold or used plus imports.

TABLE 2
ACTIVE PHOSPHATE ROCK MINES IN THE UNITED STATES IN 2010

Owner	Mine	County and State
CF Industries Holdings, Inc.	South Pasture	Hardee, FL.
Mosaic Company, The	Four Corners	Hillsborough/Manatee/Polk, FL.
Do.	Hookers Prairie	Polk, FL.
Do.	Hopewell	Hillsborough, FL.
Do.	South Fort Meade	Polk, FL.
Do.	Wingate	Manatee, FL.
Nu-West Industries, Inc. (Agrium 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.

Do. Ditto.

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
2009:						
January–June	53,800	5,430	12,900	3,730	2,500,000	9,100
July–December	53,200	5,470	13,500	3,910	858,000	8,120
Total	107,000	10,900	26,400	7,640	3,360,000	XX
2010:						
January–June	55,300	5,870	13,200	3,720	896,000	7,570
July–December	50,600	6,030	12,700	3,680	1,080,000	5,620
Total	106,000	11,900	25,800	7,400	1,980,000	XX

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
PHOSPHATE ROCK SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY PERIOD[1]

(Thousand metric tons and thousand dollars)

Period	Rock	P_2O_5 content	Value[2]
2009:			
January–June	11,200	3,230	2,310,000
July–December	14,300	4,150	936,000
Total	25,500	7,380	3,250,000
2010:			
January–June	13,700	3,850	912,000
July–December	14,400	4,160	1,290,000
Total	28,100	8,000	2,210,000

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

[2]Free on board mine.

TABLE 5

U.S. EXPORTS OF DIAMMONIUM PHOSPHATE[1, 2]

(Thousand metric tons and thousand dollars)

Country	2009		2010	
	Quantity	Value	Quantity	Value
Argentina	88	32,300	147	69,200
Brazil	144	35,200	151	59,800
China	348	106,000	59	16,700
Colombia	76	24,400	127	57,200
India	3,210	1,030,000	2,550	1,080,000
Japan	162	51,200	166	64,100
Mexico	208	68,600	216	88,400
Pakistan	146	45,000	113	55,100
Peru	136	40,400	59	23,700
Thailand	67	21,400	99	51,100
Other	946 r	365,000 r	402	148,000
Total	5,530	1,820,000	4,090	1,710,000

rRevised.

[1]Presentation of annual data is based on the top 10 quantities (gross weight) of the leading countries in 2010.

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

TABLE 6

U.S. EXPORTS OF MONOAMMONIUM PHOSPHATE[1, 2]

(Thousand metric tons and thousand dollars)

Country	2009		2010	
	Quantity	Value	Quantity	Value
Argentina	231	68,500	258	112,000
Australia	257	90,300	330	153,000
Brazil	495	158,000	588	255,000
Canada	601	196,000	647	263,000
Chile	46	14,000	76	28,700
China	12	3,600	26	8,020
Colombia	92	29,100	133	66,900
Ecuador	18	6,910	25	11,000
Japan	64	20,700	71	26,300
Mexico	106	35,900	96	43,900
Other	184 r	94,500 r	79	33,000
Total	2,110	717,000	2,330	1,000,000

rRevised.

[1]Presentation of annual data is based on the top 10 quantities (gross weight) of the leading countries in 2010.

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

TABLE 7

U.S. EXPORTS OF PHOSPHORIC ACID[1]

(Thousand metric tons and thousand dollars)

Country	2009		2010	
	Quantity	Value	Quantity	Value
Brazil	35	16,400	96	42,600
Canada	29	8,400	17	4,860
India	404	96,800	456	153,000
Mexico	60	18,000	60	17,500
United Arab Emirates	(2)	48	31	10,500
Other	7	2,780 r	14	6,880
Total	535	142,000	673	235,000

rRevised.

[1]Excludes superphosphoric acid tonnage.

[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 8

U.S. EXPORTS OF ELEMENTAL PHOSPHORUS[1]

Country	2009		2010	
	Quantity (metric tons)	Value[2] (thousands)	Quantity (metric tons)	Value[2] (thousands)
Brazil	14,300	58,900	14,100	46,200
Canada	1,270	3,640	950	3,180
Mexico	517	995	2,830	5,420
Other	1,250	2,500	389	1,820
Total	17,300	66,000	18,300	56,600

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

[2]Free alongside ship values.

Source: U.S. Census Bureau.

TABLE 9

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

(Thousand metric tons and thousand dollars)

Phosphatic materials	2009		2010	
	Quantity	Value[2]	Quantity	Value[2]
Phosphate rock:				
Unground[3]	988	83,100	1,280	117,000
Ground[3]	379	26,900	605	48,900
Total[4]	2,000	161,000	2,400	211,000
Dicalcium phosphate	6	11,200	7	9,990
Elemental phosphorus	4	15,600	7	23,500
Normal superphosphate	(5)	114	4	1,400
Triple superphosphate	38	9,340	189	66,900
Diammonium phosphate	22	9,710	190	101,000
Monoammonium phosphate	62	38,800	269	151,000
Fertilizer containing nitrates and phosphates	1	492	(5)	182
Phosphoric acid	31	30,600	31	20,600

[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 not reported by U.S. Census Bureau.

[5]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 10

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

(Thousand metric tons)

Commodity and country[3]	Gross weight					P_2O_5 content				
	2006	2007	2008	2009	2010[e]	2006	2007	2008	2009	2010[e]
Phosphate rock:										
Algeria[e]	1,510 [4]	1,800 [4]	1,805 [4]	1,070 [r]	1,800	450	536	542	305 [r]	540
Australia[e]	2,750 [4]	2,850 [4]	2,950	2,500 [r]	2,600	770	655	678	575 [r]	600
Brazil, concentrate	5,932	6,185	6,343	6,000 [r]	5,700	2,111	2,185	2,242	2,100 [r]	2,000
Burkina Faso[e]	2	2	2	2	2	1	1	1	1	1
Canada[e]	500	700	700	670 [r]	700	165	210	210	200	200
Chile:										
Apatite	12	13	21	11	15	4 [e]	4 [e]	7 [e]	3 [e]	5
Guano	--	--	3	2	2	NA	NA	NA	NA	NA
Phosphorite	2	12	17	1	1	NA	NA	NA	NA	NA
China	38,600	45,400	50,700	60,200	68,000 [4]	11,600	15,100	15,200	18,000	20,400 [4]
Colombia[e]	43	43	27	27 [r]	30	8	8	8	8	8
Egypt, beneficiated	2,177	3,890	5,523	6,627 [r]	6,000	653	1,167	1,657	2,000 [r]	1,920
Finland[e]	825	825	825	650 [r]	825	300	300	300	225 [r]	300
India[e]	1,200	1,210	1,220	1,230	1,240	355	358	631	640	645
Indonesia[e]	1	1	1	1	1	(5)	(5)	(5)	(5)	(5)
Iran[e]	325	330	325	330	330	40	41	36	40	40
Iraq, beneficiated[e]	1	1	10	30	10	(5)	(5)	3	10	3
Israel	2,949	3,069	3,088	2,697	3,135 [4]	810 [e]	840 [e]	850 [e]	740 [e]	860
Jordan	5,805	5,552	6,265	5,281	6,000	1,860	1,780	2,005	1,620	2,000
Kazakhstan[e]	845 [4]	720 [4]	1,226 [4]	1,225 [r, 4]	1,600	195	165	280	280	350
Korea, North[e]	300	300	300	300	300	95	95	95	95	95
Mexico	8	42	968	1,443	1,507 [4]	2	14	291	433	452 [4]
Morocco[6]	27,400	27,800	24,500	18,400 [r]	25,800	8,700	8,900	7,850	6,000 [r]	8,500
Nauru[e]	45	45	45	45	45	17	17	17	17	17
Pakistan	2	4 [r]	4 [r]	4 [r]	4	(5)	1 [r]	1 [r]	1 [r]	1
Peru[e]	38	57	38	38	791 [4]	11	17	11	11	237
Philippines	2	2	2	2 [r]	2	1	1	1	1 [r]	1
Russia[e]	11,000	11,400	10,400	9,500 [r]	11,000	4,000	4,200	3,800	3,500 [r]	4,000
Senegal	584	691	645	950 [r, e]	950	180	234	180	320 [r, e]	320
South Africa	2,629	2,556	2,287	2,237	2,494 [4]	966 [r]	986 [r]	959 [r]	858 [r]	935 [4]
Sri Lanka[e]	42 [4]	40 [4]	42 [r, 4]	42 [r, 4]	42	15	15	15	15	15
Syria	3,664	3,678	3,221	2,466	3,000	1,130 [e]	1,140 [e]	993	1,030 [e]	930
Tanzania	3	8	29 [r]	1 [r]	1	1	3	9	(5) [r]	(5)
Thailand	1	4	4	3 [r]	3	(5) [e]	1 [e]	1 [e]	1 [r, e]	1
Togo[e]	1,650 [4]	750 [4]	842 [4]	726 [r, 4]	850	590	270	303	260 [r]	300
Tunisia, washed[e]	7,801 [4]	8,005 [4]	7,623 [4]	7,398 [4]	7,600	2,300	2,400	2,300	2,200	2,200
United States	30,100	29,700	30,200	26,400	25,800 [4]	8,680	8,480	8,590	7,640	7,400 [4]
Uzbekistan[e]	600	600	600	600	800	140	140	140	140	200
Venezuela[e]	400 [4]	400	400	400	400	115	115	115 [r]	115 [r]	115
Vietnam	1,232	1,523	2,101 [r]	1,896 [r]	2,000	370 [r]	460 [r]	630 [r]	570 [r]	600
Zimbabwe, concentrate[e]	66 [4]	30	30	30	30	21	10	10	10	10
Total	151,000	160,000	165,000	161,000 [r]	181,000	46,700 [r]	50,800 [r]	51,000 [r]	50,000 [r]	56,200
Basic (Thomas converter) slag:[e]										
Egypt	-- [r]	-- [r]	-- [r]	-- [r]	--	-- [r]	-- [r]	-- [r]	-- [r]	--
France	50	50	50	50	50	8	8	8	8	8

See footnotes at end of table.

TABLE 10—Continued

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

(Thousand metric tons)

Commodity and country[3]	Gross weight					P_2O_5 content				
	2006	2007	2008	2009	2010[e]	2006	2007	2008	2009	2010[e]
Basic (Thomas converter) slag—Continued:[e]										
Luxembourg	475	475	475	475	475	70	70	70	70	70
Total	525 [r]	525 [r]	525 [r]	525 [r]	525	78 [r]	78 [r]	78 [r]	78 [r]	78

[e]Estimated. [r]Revised. NA Not available. -- 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 13, 2011. Figures are from official country sources where available.

[3]In addition to the commodities listed, phosphate rock may be produced in Nigeria, but information is inadequate to estimate output.

[4]Reported figure.

[5]Less than ½ unit.

[6]Includes production from Western Sahara.