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2008 Minerals Yearbook

PHOSPHATE ROCK [ADVANCE RELEASE]

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PHOSPHATE ROCK

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Domestic phosphate rock production in 2008 was 30.2 million metric tons (Mt) compared with 29.7 Mt in 2007, and reported use of phosphate rock was 28.9 Mt compared with 31.1 Mt in 2007 (tables 1, 3–4). World production was slightly higher than that in 2007 (table 10). In the first half of the year, the supply of phosphate rock, sulfur, potash, and other raw materials tightened, with major producers operating nearly at full capacity. This resulted in the price of phosphate rock and phosphate fertilizers more than doubling between January and September. The high prices resulted in increased production and exploration for phosphate rock worldwide. The world phosphate market changed significantly in the second half of the year as the global economic downturn affected the fertilizer industry. Fertilizer producers were left with high inventories as farmers delayed purchases expecting prices to decrease. This led to the temporary closure at or of many phosphate rock mines and fertilizer plants. When the prices began to fall, the buyers found it difficult to obtain credit for fertilizer purchases. World consumption of phosphate contained in fertilizers decreased by about 8% in 2008, owing to the global economic downturn (Heffer and Prud'homme, 2009).

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 2008, phosphate rock was produced at seven mines in Florida, three in Idaho, and one each in North Carolina and Utah (table 2).

Domestic production of all types of phosphoric acid decreased to 9.22 Mt P_2O_5 in 2008 from 11.0 Mt P_2O_5 in 2007. Combined production of all types of phosphate fertilizers was 17% lower than in 2007 (U.S. Census Bureau, 2009). The major fertilizer products manufactured from phosphoric acid were diammonium phosphate (DAP) and monoammonium phosphate (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 2008. There were 12 active phosphate rock mines during the year (table 2).

The U.S. phosphate industry is concentrated in Florida in the counties of Hamilton, Hardee, Hillsborough, Manatee, and Polk. In 2008, 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).

In Beaufort County, NC, PCS operated a large integrated production facility 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 2008; 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

Phosphate rock was used primarily for production of wet-process phosphoric acid for fertilizer applications, which accounted for more than 95% 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 decreased to 31.6 Mt compared with 33.5 Mt in 2007 (table 1), owing to lower phosphoric acid production. There were no sales of domestic rock reported by producers. Consumption by grade and by region was withheld to avoid disclosing company proprietary data.

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 48% of domestic phosphoric acid production capacity and 10% of world capacity (Mosaic Company, The, 2008, p. 4). In 2008, the company operated four wet-process phosphoric acid and fertilizer plants in Florida and one of each in Louisiana.

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 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, Inc., which had a nearby facility, for upgrading into high-purity acid for technical- and food-grade applications (Innophos Holdings, Inc., 2009, p. 5).

Monsanto 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-based herbicides (Monsanto Company, 2008, p. 8). 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 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. 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 thought to be 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. For the period from July 1, 2007, to June 30, 2008, domestic consumption of P_2O_5 contained in fertilizers increased by 3.6% to 4.15 Mt compared with 4.06 Mt in the period from July 1, 2006, to June 30, 2007 (Slater and Kirby, 2008).

Stocks

Producers' stocks of phosphate rock in 2008 increased by 27% from those of 2007, owing to lower consumption and depressed market conditions in the second half of 2008. 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 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 beneficiated phosphate rock by rail to the Port of Tampa and ore 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 United States (Wainio, 2008).

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 (Potash Corp. of Saskatchewan Inc., 2009, p. 17). 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 price increased to $76.64 per metric ton in 2008 from $51.36 per ton in 2007 (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. In 2008, the average price from Morocco, the world's largest exporter of phosphate rock, was $170 to $210 per ton in January, and ended the year in a range of $320 to $380 per ton (Fertilizer Week, 2008b, c). The price reached its highest point in September, $400 to $460 per ton and quickly dropped throughout the remainder of the year. The large increase in price resulted from the combination of increased world consumption, tighter supply of phosphate rock, high freight rates, rising energy costs, and a weaker dollar (Huang, 2009). Moroccan producers accounted for almost 50% of world phosphate rock exports and had the most influence on the price increase. The import price of $96.95 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 2008 (table 1). The United States is the leading importer of phosphate rock in the world. Most of the shipments from Morocco were consumed by the three phosphoric acid producers located along the Gulf of Mexico. The remainder of Moroccan imports was consumed by Mosaic at its plants in Florida and Louisiana (Mosaic Company, The, 2008, p. 6). In 2008, U.S. imports were estimated to be 2.75 Mt, based on U.S. Census Bureau data and export information received from Office Chérifien des Phosphates (OCP), the Moroccan phosphate producer (Benzekri, Mohammed, OCP, written commun., January 15, 2009). 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 were insignificant when compared with exports of the same materials (tables 5–7, 9).

Exports of elemental phosphorus increased to 12,900 t in 2007 from 9,540 t in 2007. The average unit value increased to $3,660 per ton in 2008 from $2,106 per ton in 2007 owing to the rise in the cost of phosphate rock and energy (table 8).

The United States is the leading exporter of phosphate fertilizers in the world, accounting for about 35% of world P_2O_5 exports in 2008. In 2008, total exports of phosphoric acid and phosphate fertilizers increased by 9%, in terms of P_2O_5 content. India was the leading destination for U.S. phosphate exports (tables 5–7).

World Review

World production of phosphate rock was 161 Mt in 2008, a slight increase compared with that of 2007. China (50.7 Mt), the United States (30.2 Mt), and Morocco (25.0 Mt) were the leading producing countries, accounting for 66% of the world total (table 10). Phosphate rock production in China was likely higher than the official figure of 50.7 Mt, which did not include production from numerous, small independent mines.

Canada.—Development of phosphate rock projects in British Columbia and Ontario continued in 2008. PhosCan Chemical Corp. was evaluating development of the Martison Phosphate project near Hearst, Ontario. The project would consist of an open pit mine and beneficiation plant which would send the phosphate concentrate via a 70-kilometer (km) slurry pipeline to the phosphoric acid plant in Hearst. Some of the phosphoric acid would be sent by rail to Brandon, Manitoba for production of MAP and the remainder would be sold as merchant-grade superphosphoric acid (PhosCan Chemical Corp., 2008, p. 13).

Pacific Ridge Exploration Ltd. began exploration of its 517 square kilometer (km^2) Tumbler Ridge property in British Columbia. Two areas, the Tunnel and Wapiti Zones, have yielded content values of up to 29.1% P_2O_5 and 19.4% P_2O_5, respectively. Further exploration was scheduled to continue in 2009 (Pacific Ridge Exploration Ltd., 2009).

China.—Production of phosphate rock increased by 12% more than that of 2007, despite the loss of nearly 2 Mt of annual production after a major earthquake in May 2008 that damaged phosphate rock mining and processing facilities in Sichuan Province. During the year, the Government incrementally increased export tariffs on phosphate rock and phosphate fertilizers to 185% from 100% to ensure domestic supplies. Additionally, a tax was imposed on domestic phosphate rock production. These measures removed phosphate products from the world market and contributed to volatile prices in 2008 (Fertilizer International, 2009a).

Finland.—Yara International ASA announced intentions to begin expansion of its Siilinjarvi phosphate rock mine. The expansion will be done in two phases; the first phase was expected to be completed in late 2009 and was expected to increase annual production capacity to 1 Mt from 850,000. This increase will be implemented through the modification of the grinding and flotation circuits (Green Markets, 2008a). The second phase was planned for 2010–11 and would increase annual capacity to 1.3 Mt. This increase will be obtained by installing new crushing, flotation, and grinding equipment (Green Markets, 2008b).

Kazakhstan.—Phosphate producer, Kazphosphate LLC was planning to expand production of phosphate rock, phosphoric acid, phosphate fertilizers, and elemental phosphorus from 2009–12. The company proposed building a new phosphate rock processing mill that would double annual production capacity of 1 Mt. Capacity for combined DAP/MAP production would increase to 360,000 t/yr from 180,000 t/yr. Phosphoric acid capacity would increase to 70,000 t/yr from 45,000 t/yr and elemental phosphorus capacity would increase to 120,000 t/yr from 80,000 t/yr. Total cost of the expansion was estimated to be $800 million (Fertilizer Week, 2008a).

Namibia.—Development commenced on exploiting undersea phosphate rock deposits off the coast of Namibia. The Sandpiper/Meob deposit was being developed by a joint venture between Australian companies Bonaparte Diamond Mines NL and Union Resources Ltd. and the Namibian company Tungeni Investments cc. According to Bonaparte, the operating company, the inferred phosphate rock mineral resource is 790 Mt, with 610 Mt of 18% to 20% P_2O_5 grade and 180 Mt of 15.6% P_2O_5 grade. The mining license encompassed 6,000 km^2 and may be expanded by an additional 2,000 km^2. The joint venture planned to start production of 3 Mt/yr in 2011. Bonaparte and Tungeni also hold the mineral rights to another offshore deposit north of the Sandpiper/Meob deposit, but it has yet to be developed (Fertilizer International, 2009b).

Peru.—Companhia Vale Do Rio Doce (Vale) of Brazil began construction of its phosphate mining operation at Bayovar. The mine will have an annual production capacity of 3.9 Mt. The company planned to begin mining in 2010 and initially export the rock to Brazil. In addition, Vale is constructing port and export handling facilities in Piura, 40 km from the mine. The company was conducting feasibility studies on whether to build fertilizer plants in Peru for export of fertilizer to other countries in South America (Fertilizer Week, 2008d; Fertilizer International, 2009c).

Uganda.—Nilefos Minerals Ltd. (a Belgium-based subsidiary of the Madhvani Group of Uganda) announced plans to develop a new phosphate rock mine near Tororo. The company planned to invest more than $535 million during 5 years to construct the mine and production facilities. According to Nilefos, the deposits cover 26 km^2 and have resources of more than 230 Mt of phosphate rock. The company expects to produce triple superphosphate for export to markets in eastern and southern Africa (Ssonko, 2008).

Outlook

The world economic recession that began in 2008 was expected to continue to affect the phosphate industry in 2009. Domestic production and consumption were expected to increase gradually after the first quarter in response to crop fertilization needs; however a recovery, to the average rates of the past several years was not expected until early 2010. The world market likely will follow the same pattern as the U.S. market in the short term, thus further affecting those U.S. companies that are world suppliers. Brazil and India are expected to continue to be the leading destinations for U.S. phosphate fertilizer exports.

From 2009 to 2013, world phosphate rock production capacity is expected to increase by nearly 60 Mt, with the bulk of the growth accounted for by expansion projects in China and Morocco, and a new mining facility in Saudi Arabia. Other expansion projects are underway in Brazil, Israel, and Jordan in addition to previously mentioned projects in Canada, Finland, Kazakhstan, Namibia, Peru, and Uganda. Some smaller projects such as those in Australia and New Zealand may be delayed because of falling phosphate rock prices. Nearly 25% of the potential new supply is anticipated to be for the export market, which could lead to a surplus of phosphate rock (Heffer and

Prud'homme, 2009). There are no expansion plans for U.S. phosphate rock production capacity; although J.R. Simplot and Monsanto plan to move their mining operations in Idaho to adjacent locations after the current mines are depleted. In North Carolina, PCS applied for permits to expand its Aurora Mine in 2008. In Florida, Mosaic was still awaiting approval for mining permits for three mines that would replace existing mines when they are depleted.

World consumption of phosphate contained in fertilizers was forecasted to increase by 2.8% per year through 2013, with the majority of the growth taking place in Asia. During the same timeframe, production capacity for phosphate fertilizers was expected to increase by 9.1 Mt to 42.5 Mt. Most of the growth is expected to be for DAP production, with China, India, Morocco, and Saudi Arabia accounting for a significant portion of the increase (Heffer and Prud'homme, 2009; Fertilizer International, 2009a).

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TABLE 1

SALIENT PHOSPHATE ROCK STATISTICS[1]

(Thousand metric tons and thousand dollars unless otherwise specified)

	2004	2005	2006	2007	2008
United States:					
Mine production (crude ore)	146,000	151,000	111,000	126,000	124,000
Marketable production:					
Quantity:					
Gross weight	35,800	36,100	30,100	29,700	30,200
P_2O_5 content	10,400	10,300	8,680	8,480	8,590
Value	995,000	1,070,000	919,000	1,520,000	2,320,000
Value, average[2] dollars per metric ton	27.79	29.61	30.49	51.10	76.76
Sold or used by producers:					
Quantity:					
Gross weight	36,500	35,200	30,200	31,100	28,900
P_2O_5 content	10,500	10,200	8,710	8,890	8,200
Value	1,010,000	1,040,000	922,000	1,600,000	2,210,000
Value, average dollars per metric ton	27.76	29.60	30.52	51.36	76.64
Imports for consumption[e, 3, 4]					
Quantity, gross weight	2,500	2,630	2,420	2,670	2,750
Value, cost, insurance, and freight[e]	91,300	107,000	115,000	154,000	266,000
Value, average dollars per metric ton	36.50	40.91	47.52	57.54	96.95
Consumption, gross weight[e, 5]	39,000	37,800	32,600	33,500	31,600
Stocks, December 31, producers	7,220	6,970	7,070	4,970	6,340
World, production, gross weight	143,000 [r]	150,000	150,000 [r]	157,000 [r]	161,000

[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 2008

Owner	Mine	County and State
CF Industries, Inc.	South Pasture	Hardee, FL.
Mosaic Co., 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
2007:						
January–June	61,400	6,230	14,700	4,160	704,000	6,100
July–December	64,900	6,680	15,000	4,320	813,000	4,970
Total	126,000	12,900	29,700	8,480	1,520,000	XX
2008:						
January–June	63,400	6,360	15,300	4,370	1,730,000	4,890
July–December	61,100	6,000	14,900	4,220	585,000	6,340
Total	124,000	12,400	30,200	8,590	2,320,000	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]
2007:			
January–June	15,000	4,270	722,000
July–December	16,100	4,620	877,000
Total	31,100	8,890	1,600,000
2008:			
January–June	15,300	4,360	1,640,000
July–December	13,500	3,840	574,000
Total	28,900	8,200	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]

(Thousand metric tons and thousand dollars)

Country	2007		2008	
	Quantity	Value	Quantity	Value
Argentina	190	NA	112	76,800
Australia	101	NA	172	136,000
Brazil	286	NA	177	173,000
Canada	91	NA	205	22,400
Chile	134	NA	58	66,000
China	265	NA	--	--
Colombia	141	NA	68	59,100
India	1,650	NA	2,890	2,660,000
Japan	223	NA	281	265,000
Mexico	385	NA	188	119,000
Peru	89	NA	87	62,700
Thailand	74	NA	42	47,500
Other	559	NA	257	201,000
Total	4,190	NA	4,530	3,890,000

NA Not available. --Zero.

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

Source: U.S. Census Bureau.

TABLE 6

U.S. EXPORTS OF MONOAMMONIUM PHOSPHATE[1]

(Thousand metric tons and thousand dollars)

Country	2007		2008	
	Quantity	Value	Quantity	Value
Argentina	184	NA	76	81,300
Australia	517	NA	325	307,000
Brazil	340	NA	228	248,000
Canada	910	NA	1,220	359,000
China	(2)	NA	34	37,600
Colombia	136	NA	78	77,100
India	(2)	NA	104	115,000
Japan	98	NA	121	122,000
Mexico	138	NA	139	85,200
Other	129	NA	165	146,000
Total	2,450	NA	2,490	1,580,000

NA Not available.

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

[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 7

U.S. EXPORTS OF PHOSPHORIC ACID[1]

(Thousand metric tons and thousand dollars)

	2007		2008	
Country	Quantity	Value	Quantity	Value
Brazil	12	NA	34	18,900
Canada	10	NA	13	3,970
India	219	NA	366	228,000
Mexico	22	NA	65	19,300
Other	9 r	NA	31	12,100
Total	272	NA	510	282,000

rRevised. NA Not available.

[1]Excludes superphosphoric acid tonnage.

Source: U.S. Census Bureau.

TABLE 8

U.S. EXPORTS OF ELEMENTAL PHOSPHORUS[1]

	2007		2008	
Country	Quantity (metric tons)	Value[2] (thousands)	Quantity (metric tons)	Value[2] (thousands)
Brazil	8,570	$17,500	10,800	$42,500
Canada	596	1,740	1,770	3,900
Mexico	13	29	30	61
Other	361	770	315	745
Total	9,540	20,100	12,900	47,200

[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)

	2007		2008	
Phosphatic materials	Quantity	Value[2]	Quantity	Value[2]
Phosphate rock:				
Unground[3]	1,260	65,500	1,350	145,000
Ground[3]	534	37,400	488	32,900
Total[4]	2,670	154,000	2,750	266,000
Dicalcium phosphate	9	13,400	8	14,200
Elemental phosphorus	12	25,800	8	54,300
Normal superphosphate	85	27,200	2	484
Triple superphosphate	82	33,400	163	123,000
Diammonium phosphate	15	10,100	31	13,400
Fertilizer containing nitrates and phosphates	(5)	213	1	645
Phosphoric acid	10 r	5,100 r	49	41,900

rRevised.

[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 Moroccan exports to the United States.

[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				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Phosphate rock:										
Algeria	784	878	1,510 r	1,800 r	1,800 e	300	260	450	536 e	536
Australia	2,600 r	2,700 r	2,750 r	2,850 r	2,800	730 r	760 r	770 r	800 r	780
Brazil, concentrate	5,690	5,631 r	5,932 r	6,185 r	6,200 p	2,181	2,050 r	2,111 r	2,185 r	2,200 p
Burkina Faso[e]	2	2	2	2	2	1	1	1	1	1
Canada[e]	1,000	900	550	700	950	370 r	335 r	200 r	260 r	350
Chile, including phosphorite[4]	21	20	14	25 r	38	5	5	4 e	6 r	10 e
China	25,500	30,400	38,600	45,400 r	50,700	7,650	9,130	11,600	15,100	15,200
Christmas Island	-- r	-- r	-- r	-- r	--	-- r	-- r	-- r	-- r	--
Colombia[e]	43	43	43	43	24	8	8	8	8	7 [5]
Egypt, beneficiated	3,269 r	2,144	2,200	2,200 e	3,000 e	948 r, e	622	625 r, e	625 r, e	1,000 e
Finland[e]	840	825	825	825	825	306	301	300	300	300
India[e]	1,180	1,200	1,200	1,210	1,220	349	355	355	358	631
Indonesia[e]	1	1	1	1	1	(6)	(6)	(6)	(6)	(6)
Iran[e]	230 [5]	324 [5]	325	330	330	28	40	40	41	41
Iraq, beneficiated[e]	30	1 r	1 r	1 r	10	10	(6) r	(6) r	(6) r	3
Israel	3,290	3,236	2,949	3,069	3,088	900 e	890 e	810 e	840 e	850 e
Jordan	6,188	6,375	5,805	5,552 r	6,265	1,980	2,040	1,860	1,780 e	2,005
Kazakhstan	230	263	270 e	300	330	52 e	55 e	55 e	60 e	65 e
Korea, North[e]	300	300	300	300	300	95	95	95	95	95
Mexico	(6)	(6)	8	40 e	48	(6)	(6)	2	10 e	14
Morocco[7]	26,675	28,788	27,000 e	27,000 e	25,000 e	8,507	9,195	8,660 e	8,660 e	8,000 e
Nauru[e]	22	8	45	45	45	7	3	17	17	17
Pakistan	5	3	2 r	2 r	2	1	(6)	(6) r	(6) r	(6)
Peru[e]	38 [5]	38 r	38 r	38 r	38	14 [5]	14 r	17 r, [5]	17 r	17
Philippines	2 r	2 r	2 r	2 r	2 e	1 r, e	1 r, e	1 r, e	1 r, e	1 e
Russia[e]	11,000	11,000	11,000	11,400 r	10,400	4,000	4,000	4,000	4,200 r	3,800
Senegal	1,580	1,455	584	691 e	700 e	569	504	180	234 r	245 e
South Africa	2,735	2,577	2,629	2,556	2,287 p	998 r	941 r	960 r	933 r	830 p
Sri Lanka[e]	42	43	44	45	46	14	15	15	15	15
Syria	2,883	3,500	3,664	3,700 e	3,221	890 e	1,080 e	1,130 e	1,140 e	993
Tanzania	7	7 r	3	8 r	8 e	2	2 r	1	3 r	3 e
Thailand	3	3	1	4 r	3 e	1 e	1 e	(6) e	(6) e	(6) e
Togo	1,115	1,350	1,650	750 r	800 e	418 e	481 e	590 e	270 r	300 e
Tunisia, washed	8,051	8,220	7,801	8,005 r	8,000 e	2,400 e	2,400 e	2,300 e	2,300 e	2,300 e
United States	35,800	36,100	30,100	29,700	30,200	10,400	10,300	8,700	8,480	8,590
Uzbekistan[e]	430	430	600	600	600	102	102	140	140	140
Venezuela[e]	300 [5]	392 [5]	400	400	400	85	110	115	100	100
Vietnam	905	1,066	1,215	1,360	1,300 e	272	320	365	390 r	400 e
Zimbabwe, concentrate	83	46	66	30 e	30	27	15 e	21 e	10 e	10 e
Total	143,000 r	150,000	150,000 r	157,000 r	161,000	44,600 r	46,400 r	46,500 r	49,900 r	49,800

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				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Basic (Thomas converter) slag:[e]										
Egypt	7	8	8	8	8	2	2	2	2	2
France	50	50	50	50	50	8	8	8	8	8
Luxembourg	450	475	475	475	475	70	70	70	70	70
Total	507	533	533	533	533	80	80	80	80	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 April 30, 2009. 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]In 2008, Chile produced 2,892 metric tons (gross weight) of guano in addition to apatite and phosphorite. P_2O_5 content for these commodities are not available.

[5]Reported figure.

[6]Less than ½ unit.

[7]Includes production from Western Sahara.