



# 2009 Minerals Yearbook

## PHOSPHATE ROCK

# PHOSPHATE ROCK

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Domestic phosphate rock production in 2009 was 26.4 million metric tons (Mt) compared with 30.2 Mt in 2008, and reported use of phosphate rock was 25.5 Mt compared with 28.9 Mt in 2008 (tables 1, 3–4). World production was slightly higher than that in 2008 (table 10), owing to increased production in China. In 2009, the world phosphate market, except for China, was affected by the world economic downturn, low demand for fertilizers, and high inventories of phosphate rock and fertilizers. In the United States, phosphate rock production and reported use were at their lowest levels since 1964, and apparent consumption was the lowest since 1972. Market conditions improved slightly in the last quarter of the year as production and consumption of phosphate rock and fertilizers increased.

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 2009, 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 in 2009 decreased to 8.66 Mt  $P_2O_5$  from 9.22 Mt  $P_2O_5$  in 2008. Combined production of all types of phosphate fertilizers was slightly higher than in 2008 because of increased production of diammonium phosphate (DAP) (U.S. Census Bureau, 2010). The major fertilizer products manufactured from phosphoric acid were 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 2009. During the year, 12 phosphate rock mines were active (table 2).

The U.S. phosphate industry is concentrated in Florida in the counties of Hamilton, Hardee, Hillsborough, Manatee, and Polk. In 2009, 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 (table 2).

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 2009—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 Co. Simplot also operated the Vernal Mine in Uintah County, UT.

In Idaho, all three producers, Agrium, P4 Production, and Simplot began development of new mines as replacements for their current mines when the mines are exhausted.

## 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 27.5 Mt compared with 31.6 Mt in 2008 (table 1), owing to lower phosphoric acid production. 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 with one or more fertilizer plants, usually located near the mine. Mosaic is the leading company with about 56% of domestic phosphoric acid production capacity and 13% of world capacity. In 2009, the company operated four wet process phosphoric acid plants and four fertilizer plants in Florida and one of each in Louisiana (Mosaic Company, The, 2010, 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 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., 2010, p. 7).

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-base herbicides (Monsanto Company, 2009, p. 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 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 was 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 were thought to be located in Kazakhstan and the Netherlands.

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. 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 2008 (July 1, 2007 to June 30, 2008), showed a 10% drop in  $P_2O_5$  consumed in fertilizers from the previous crop year (Slater and Kirby, 2010). Consumption of  $P_2O_5$  contained in fertilizers was estimated to have decreased again in crop year 2009.

### Stocks

Producers' stocks of phosphate rock in 2009 were 28% higher than those of 2008 owing to lower consumption. 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, 2009).

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 Corporation of Saskatchewan Inc., 2010, p. 18). 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 increased by 45% over that of 2008, owing to a large increase in regional values in the first half of the year. The average value increased to \$127.22 per metric ton in 2009 from \$76.64 per ton in 2008 (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 \$80.61 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 2009 (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, 2010, p. 7). In 2009, U.S. imports were estimated to be 2.0 Mt, based on U.S. Census Bureau data and export information received from OCP Group, the Moroccan phosphate producer (Benzekri, Mohammed, OCP Group, written commun., July 22, 2009). 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 were insignificant compared with exports of the same materials (tables 5–7, and 9).

Exports of elemental phosphorus increased to 17,300 t in 2009 from 12,900 t in 2008. The average unit value increased to \$3,820 per ton in 2009 from \$3,660 per ton in 2008 (table 8).

The United States is the leading exporter of phosphate fertilizers in the world, accounting for about 30% of world  $P_2O_5$  exports in 2009. In 2009, total exports of phosphoric acid and phosphate fertilizers increased by 2%, in terms of  $P_2O_5$  content (U.S. Census Bureau, 2010). India was the leading destination for U.S. phosphate exports (tables 5–7).

### World Review

World production of phosphate rock in 2009 increased slightly compared with that of 2008. China (60.2 Mt), the United States (26.4 Mt), and Morocco (23.0 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 60.2 Mt, which did not include production from numerous, small independent mines. Information was not available to estimate production from these operations.

**Australia.**—Minemakers Ltd. progressed in the development of its Wonarah phosphate rock mine in the Northern Territory of Australia. The deposit has an inferred phosphate rock resource of 1,100 Mt with an average grade of 18% P<sub>2</sub>O<sub>5</sub>. The firm plans to ship the phosphate rock from the Port of Darwin to destinations in Asia and New Zealand (Drummond, 2010).

**Mali.**—Two companies began exploration of separate phosphate rock deposits in Mali. Oklo Uranium Ltd. of Australia was developing the Tattoul deposit in northeastern Mali. The company expected to start production in 2012 (Industrial Minerals, 2009b). Great Quest Metals Ltd. of Canada began exploration of the Tin Hina deposit in the Tilemsi Valley in northeastern Mali near the border with Niger. The firm claimed potential resources of more than 50 Mt of phosphate rock. The deposit is located near the Tamaguillelt phosphate rock deposit, from which phosphate rock was produced from the late 1970s to the early 1990s. Great Quest was not planning to acquire the Tamaguillelt deposit or closed phosphate plant in Bourem (Industrial Minerals, 2009a).

**Morocco.**—OCP Group, the Moroccan phosphate rock producer, announced plans to expand its phosphate rock production capacity from 28 Mt/yr to 54 Mt/yr by 2015. The company plans to develop three new mines and build a slurry pipeline to transport ore from the mines to the processing plant (Bakr, 2009).

**Namibia.**—Minemakers Ltd. gained controlling interest in the Sandpiper/Meob offshore phosphate deposit after its acquisition of Bonaparte Diamond Mines NL and another Australian company, Union Resources Ltd. Minemakers other partner in the project was Tungeni Investments CC, a Namibian firm. The phosphate deposits were about 100 kilometers off the coast of Namibia and contained an estimated indicated resource of 47.6 Mt grading 21.4% P<sub>2</sub>O<sub>5</sub> and estimated inferred resources of 1.41 billion metric tons grading 18.8% P<sub>2</sub>O<sub>5</sub>, according to Minemakers (Drummond, 2010).

## Outlook

The phosphate industry was expected to recover gradually from the effects of the world financial downturn through 2010. World production of phosphate rock, phosphoric acid, and fertilizers was projected to increase slightly in 2010, following the depressed conditions in 2009. Between 2009 and 2014, world phosphate rock annual production capacity is projected to increase from 190 Mt to 228 Mt, from new mines and expansions at existing mines (Heffer and Prud'homme, 2010). New mines were planned for Australia, Brazil, Kazakhstan, Namibia, Peru, and Russia. Mine expansions were planned in Algeria, China, Jordan, Morocco, Tunisia, and Vietnam. About one-half the new production will be available for sale on the world market.

Phosphate rock production in North America was projected to drop slightly during the next 5 years owing to mine depletions in Florida and Canada. Four new mines are in various stages of permitting in Florida to replace existing mines; the permitting process, however, has extended for several years because of opposition to mine expansion by counties located south of the planned new mines over water management and pollution issues. In Idaho, two new mines are planned to replace existing

mines in the next 5 years; both were well into the permitting process in 2009.

World consumption of phosphate contained in fertilizers was projected to increase by about 7% in 2010, after the poor economic conditions in 2009, and then increase by 3% annually through 2014, according to IFA (Heffer and Prud'homme, 2010). U.S. fertilizer consumption was expected to rebound by more than 5% in 2010 based on preliminary data of U.S. phosphoric acid and fertilizer production.

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TABLE 1  
SALIENT PHOSPHATE ROCK STATISTICS<sup>1</sup>

(Thousand metric tons and thousand dollars unless otherwise specified)

	2005	2006	2007	2008	2009
United States:					
Mine production (crude ore)	151,000	111,000	126,000	124,000	107,000
Marketable production:					
Quantity:					
Gross weight	36,100	30,100	29,700	30,200	26,400
P <sub>2</sub> O <sub>5</sub> content	10,300	8,680	8,480	8,590	7,640
Value	1,070,000	919,000	1,520,000	2,320,000	3,360,000
Value, average <sup>2</sup> dollars per metric ton	29.61	30.49	51.10	76.76	127.19
Sold or used by producers:					
Quantity:					
Gross weight	35,200	30,200	31,100	28,900	25,500
P <sub>2</sub> O <sub>5</sub> content	10,200	8,710	8,890	8,200	7,380
Value	1,040,000	922,000	1,600,000	2,210,000	3,250,000
Value, average dollars per metric ton	29.60	30.52	51.36	76.64	127.22
Imports for consumption <sup>e, 3, 4</sup>					
Quantity, gross weight	2,630	2,420	2,670	2,750	2,000
Value, cost, insurance, and freight <sup>e</sup>	107,000	115,000	154,000	266,000	161,000
Value, average dollars per metric ton	40.91	47.52	57.54	96.95	80.61
Consumption, gross weight <sup>e, 5</sup>	37,800	32,600	33,500	31,600	27,500
Stocks, December 31, producers	6,970	7,070	4,970	6,340	8,120
World, production, gross weight	152,000 <sup>r</sup>	151,000 <sup>r</sup>	160,000 <sup>r</sup>	165,000 <sup>r</sup>	166,000

<sup>e</sup>Estimated. <sup>r</sup>Revised.

<sup>1</sup>Data are rounded to no more than three significant digits, except average values per metric ton.

<sup>2</sup>Average value based on the sold or used values.

<sup>3</sup>Source: U.S. Census Bureau.

<sup>4</sup>Includes some estimated phosphate rock tonnage imported from Morocco but not reported by the U.S. Census Bureau.

<sup>5</sup>Expressed as sold or used plus imports.



TABLE 2  
ACTIVE PHOSPHATE ROCK MINES IN THE UNITED STATES IN 2009

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. (Agrim 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<sup>1</sup>

(Thousand metric tons and thousand dollars)

Period	Mine production, crude ore		Marketable production, beneficiated			Ending stocks, rock
	Rock	P <sub>2</sub> O <sub>5</sub> content	Rock	P <sub>2</sub> O <sub>5</sub> content	Value <sup>2</sup>	
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
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

XX Not applicable.

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

<sup>2</sup>Based on the per ton sold or used values.

TABLE 4  
PHOSPHATE ROCK SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY PERIOD<sup>1</sup>

(Thousand metric tons and thousand dollars)

Period	Rock	P <sub>2</sub> O <sub>5</sub>	
		content	Value <sup>2</sup>
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
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

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

<sup>2</sup>Free on board mine.

TABLE 5  
U.S. EXPORTS OF DIAMMONIUM PHOSPHATE<sup>1,2</sup>

(Thousand metric tons and thousand dollars)

Country	2008		2009	
	Quantity	Value	Quantity	Value
Argentina	112	76,800	88	32,300
Brazil	177	173,000	144	35,200
China	--	--	348	106,000
India	2,890	2,660,000	3,210	1,030,000
Japan	281	265,000	162	51,200
Kenya	30	10,500	150	100,000
Mexico	188	119,000	208	68,600
Pakistan	--	--	146	45,000
Peru	87	62,700	136	40,400
Vietnam	--	--	196	66,900
Other	713 <sup>r</sup>	462,000 <sup>r</sup>	743	244,000
Total	4,530	3,890,000	5,530	1,820,000

<sup>r</sup>Revised. -- Zero.

<sup>1</sup>Presentation of annual data is based on the top 10 quantities (gross weight) of the leading countries in 2009.

<sup>2</sup>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<sup>1,2</sup>

(Thousand metric tons and thousand dollars)

Country	2008		2009	
	Quantity	Value	Quantity	Value
Argentina	76	81,300	231	68,500
Australia	325	307,000	257	90,300
Brazil	228	248,000	495	158,000
Canada	1,220	359,000	601	196,000
Chile	75	75,100	46	14,000
Colombia	78	77,100	92	29,100
India	104	115,000	43	36,000
Japan	121	122,000	64	20,700
Mexico	139	85,200	106	35,900
Uruguay	--	--	43	11,900
Other	123 <sup>r</sup>	108,000 <sup>r</sup>	130	57,000
Total	2,490	1,580,000	2,110	717,000

<sup>r</sup>Revised. -- Zero.

<sup>1</sup>Presentation of annual data is based on the top 10 quantities (gross weight) of the leading countries in 2009.

<sup>2</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 7  
U.S. EXPORTS OF PHOSPHORIC ACID<sup>1</sup>

(Thousand metric tons and thousand dollars)

Country	2008		2009	
	Quantity	Value	Quantity	Value
Brazil	34	18,900	35	16,400
Canada	13	3,970	29	8,400
India	366	228,000	404	96,800
Mexico	65	19,300	60	18,000
Other	31	12,100	7	2,820
Total	510	282,000	535	142,000

<sup>1</sup>Excludes superphosphoric acid tonnage.

Source: U.S. Census Bureau.



TABLE 8  
U.S. EXPORTS OF ELEMENTAL PHOSPHORUS<sup>1</sup>

Country	2008		2009	
	Quantity (metric tons)	Value <sup>2</sup> (thousands)	Quantity (metric tons)	Value <sup>2</sup> (thousands)
Brazil	10,800	42,500	14,300	58,900
Canada	1,770	3,900	1,270	3,640
Mexico	30	61	517	995
Other	315	745	1,250	2,500
Total	12,900	47,200	17,300	66,000

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

<sup>2</sup>Free alongside ship values.

Source: U.S. Census Bureau.

TABLE 9  
U.S. IMPORTS FOR CONSUMPTION OF PHOSPHATE ROCK AND PHOSPHATIC MATERIALS<sup>1</sup>

(Thousand metric tons and thousand dollars)

Phosphatic materials	2008		2009	
	Quantity	Value <sup>2</sup>	Quantity	Value <sup>2</sup>
Phosphate rock:				
Unground <sup>3</sup>	1,350	145,000	988	83,100
Ground <sup>3</sup>	488	32,900	379	26,900
Total <sup>4</sup>	2,750	266,000	2,000	161,000
Dicalcium phosphate	8	14,200	6	11,200
Elemental phosphorus	8	54,300	4	15,600
Normal superphosphate	2	484	(5)	114
Triple superphosphate	163	123,000	38	9,340
Diammonium phosphate	31	13,400	22	9,710
Fertilizer containing nitrates and phosphates	1	645	1	492
Phosphoric acid	49	41,900	31	30,600

<sup>1</sup>Data are rounded to no more than three significant digits.

<sup>2</sup>Declared cost, insurance, freight values.

<sup>3</sup>Some phosphate rock tonnages and values were suppressed by the U.S. Census Bureau.

<sup>4</sup>Includes an estimate for data suppressed by U.S. Census Bureau based on reported Moroccan exports to the United States.

<sup>5</sup>Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 10  
PHOSPHATE ROCK, BASIC SLAG, AND GUANO: WORLD PRODUCTION, BY COUNTRY<sup>1,2</sup>

(Thousand metric tons)

Commodity and country <sup>3</sup>	Gross weight					P <sub>2</sub> O <sub>5</sub> content				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
Phosphate rock:										
Algeria	878	1,510	1,800	1,805 <sup>r</sup>	1,800 <sup>e</sup>	260	450	536	542 <sup>r</sup>	540 <sup>e</sup>
Australia	2,700	2,750	2,850	2,950 <sup>r,e</sup>	2,800	760	770	655 <sup>r</sup>	678 <sup>r</sup>	643
Brazil, concentrate	5,631	5,932	6,185	6,343 <sup>r</sup>	6,350	2,050	2,111	2,185	2,242 <sup>r</sup>	2,250
Burkina Faso <sup>e</sup>	2	2	2	2	2	1	1	1	1	1
Canada <sup>e</sup>	800 <sup>r</sup>	500 <sup>r</sup>	700	700 <sup>r</sup>	700	270 <sup>r</sup>	165 <sup>r</sup>	210 <sup>r</sup>	210 <sup>r</sup>	200
Chile, phosphate rock and phosphorite <sup>4</sup>	20	14	25	38	35	5	4	6	10	9
China	30,400	38,600	45,400	50,700	60,200	9,130	11,600	15,100	15,200	18,000
Colombia <sup>e</sup>	43	43	43	27 <sup>r</sup>	30	8	8	8	8 <sup>r</sup>	8
Egypt, beneficiated	3,371 <sup>r</sup>	2,177 <sup>r</sup>	3,890 <sup>r</sup>	5,523 <sup>r</sup>	5,000 <sup>e</sup>	1,011 <sup>r</sup>	653 <sup>r</sup>	1,167 <sup>r</sup>	1,657 <sup>r</sup>	1,500 <sup>e</sup>
Finland <sup>e</sup>	825	825	825	825	825	301	300	300	300	300
India <sup>e</sup>	1,200	1,200	1,210	1,220	1,230	355	355	358	631	640
Indonesia <sup>e</sup>	1	1	1	1	1	(5)	(5)	(5)	(5)	(5)
Iran <sup>e</sup>	324 <sup>6</sup>	325 <sup>6</sup>	330	325	330	40	40	41	36 <sup>r</sup>	40
Iraq, beneficiated <sup>e</sup>	1	1	1	10	30	(5)	(5)	(5)	3	10
Israel	3,236	2,949	3,069	3,088	2,697	890 <sup>e</sup>	810 <sup>e</sup>	840 <sup>e</sup>	850 <sup>e</sup>	740 <sup>e</sup>
Jordan	6,375	5,805	5,552	6,265	5,281	2,040	1,860	1,780	2,005	1,620
Kazakhstan	800 <sup>r</sup>	845 <sup>r</sup>	720 <sup>r</sup>	1,226 <sup>r</sup>	1,225	175 <sup>r</sup>	195 <sup>r</sup>	165 <sup>r</sup>	280 <sup>r</sup>	280 <sup>e</sup>
Korea, North <sup>e</sup>	300	300	300	300	300	95	95	95	95	95
Mexico	(5)	8	42 <sup>r</sup>	968 <sup>r</sup>	1,443	(5)	2	14 <sup>r</sup>	291 <sup>r</sup>	433
Morocco <sup>e,7</sup>	28,788	27,400 <sup>r</sup>	27,800 <sup>r</sup>	24,500 <sup>r</sup>	23,000 <sup>e</sup>	9,195	8,700 <sup>r</sup>	8,900 <sup>r</sup>	7,850 <sup>r</sup>	7,360 <sup>e</sup>
Nauru <sup>e</sup>	8	45	45	45	45	3	17	17	17	17
Pakistan	3	2	2 <sup>e</sup>	2 <sup>e</sup>	2 <sup>e</sup>	(5)	(5)	(5) <sup>e</sup>	(5) <sup>e</sup>	(5) <sup>e</sup>
Peru <sup>e</sup>	47 <sup>r</sup>	38	57 <sup>r</sup>	38	38	14	11 <sup>r</sup>	17 <sup>6</sup>	11 <sup>r</sup>	11
Philippines	2	2	2	2	2 <sup>e</sup>	1 <sup>e</sup>	1 <sup>e</sup>	1 <sup>e</sup>	1 <sup>e</sup>	1 <sup>e</sup>
Russia <sup>e</sup>	11,000	11,000	11,400	10,400	10,000	4,000	4,000	4,200	3,800	3,650
Senegal	1,455	584	691	645 <sup>r</sup>	650 <sup>e</sup>	504	180	234	180 <sup>r</sup>	200 <sup>e</sup>
South Africa	2,577	2,629	2,556	2,287	2,237	941	960	933	830 <sup>e</sup>	810 <sup>e</sup>
Sri Lanka <sup>e</sup>	43	42 <sup>r,6</sup>	40 <sup>r,6</sup>	40 <sup>r</sup>	40	15	15	15	15	15
Syria	3,500	3,664	3,678 <sup>r</sup>	3,221	2,466	1,080 <sup>e</sup>	1,130 <sup>e</sup>	1,140 <sup>e</sup>	993	1,030 <sup>e</sup>
Tanzania	7	3	8	8 <sup>e</sup>	8 <sup>e</sup>	2	1	3	3 <sup>e</sup>	3 <sup>e</sup>
Thailand	3	1	4	4 <sup>r</sup>	4 <sup>e</sup>	1 <sup>e</sup>	(5) <sup>e</sup>	1 <sup>r,e</sup>	1 <sup>r,e</sup>	1 <sup>e</sup>
Togo	1,350	1,650	750	842 <sup>r</sup>	850 <sup>e</sup>	481 <sup>e</sup>	590 <sup>e</sup>	270 <sup>e</sup>	303 <sup>r,e</sup>	300 <sup>e</sup>
Tunisia, washed	8,220	7,801	8,005	7,623 <sup>r</sup>	7,398	2,400 <sup>e</sup>	2,300 <sup>e</sup>	2,400 <sup>r,e</sup>	2,300 <sup>e</sup>	2,200 <sup>e</sup>
United States	36,100	30,100	29,700	30,200	26,400	10,300	8,680	8,480	8,590	7,640
Uzbekistan <sup>e</sup>	430	600	600	600	600	102 <sup>6</sup>	140	140	140	140
Venezuela <sup>e</sup>	392 <sup>6</sup>	400	400	400	400	110	115	115 <sup>r</sup>	115 <sup>r</sup>	115
Vietnam	1,024 <sup>r</sup>	1,232 <sup>r</sup>	1,523 <sup>r</sup>	2,099 <sup>r</sup>	2,000 <sup>e</sup>	320	365	390	600 <sup>r</sup>	600 <sup>e</sup>
Zimbabwe, concentrate <sup>e</sup>	46 <sup>6</sup>	66 <sup>6</sup>	30	30	30	15	21	10	10	10
Total	152,000 <sup>r</sup>	151,000 <sup>r</sup>	160,000 <sup>r</sup>	165,000 <sup>r</sup>	166,000	46,900 <sup>r</sup>	46,600 <sup>r</sup>	50,700 <sup>r</sup>	50,800 <sup>r</sup>	51,400

See footnotes at end of table.

TABLE 10—Continued  
 PHOSPHATE ROCK, BASIC SLAG, AND GUANO: WORLD PRODUCTION, BY COUNTRY<sup>1,2</sup>

(Thousand metric tons)

Commodity and country <sup>3</sup>	Gross weight					P <sub>2</sub> O <sub>5</sub> content				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
Basic (Thomas converter) slag: <sup>e</sup>										
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

<sup>e</sup>Estimated. <sup>f</sup>Revised.

<sup>1</sup>World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Table includes data available through May 14, 2010. Figures are from official country sources where available.

<sup>3</sup>In addition to the commodities listed, phosphate rock may be produced in Nigeria, but information is inadequate to estimate output.

<sup>4</sup>In 2008, Chile produced 2,892 metric tons (gross weight) of guano in addition to apatite and phosphorite. P<sub>2</sub>O<sub>5</sub> content for these commodities are not available.

<sup>5</sup>Less than ½ unit.

<sup>6</sup>Reported figure.

<sup>7</sup>Includes production from Western Sahara.