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2015 Minerals Yearbook

PHOSPHATE ROCK [ADVANCE RELEASE]

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Phosphate Rock

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In 2015, domestic production of marketable phosphate rock was 27.4 million metric tons (Mt), which was 8% more than that in 2014. Reported domestic use of phosphate rock decreased by 2% to 26.2 Mt compared with 26.7 Mt in 2014, and U.S. consumption of phosphate rock decreased by 3% to 28.1 Mt compared with 29.1 Mt in 2014 because of lower production of phosphoric acid. Producer stocks of phosphate rock increased to 6.73 Mt, 14% more than at yearend 2014 (table 1). World phosphate rock production was estimated to be 242 Mt, a slight increase over that of 2014. World consumption of phosphate fertilizers and industrial products increased by less than 2% over that of 2014. Higher consumption in India was offset by lower consumption in Brazil and the United States (Heffer and Prud'homme, 2016)

Phosphorus is an essential element for plant and animal nutrition and is consumed primarily as a principal component of nitrogen-phosphorus-potassium (N-P-K) 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. Percentages have been calculated using unrounded data.

In 2015, domestic production of phosphoric acid for agricultural use decreased to 7.42 Mt of P_2O_5 from 7.57 Mt in 2014. Combined production of diammonium phosphate (DAP) and monoammonium phosphate (MAP), the major fertilizer products manufactured from phosphoric acid, was 4.32 Mt of P_2O_5, which was 7% lower than that in 2014 (Fertilizer Institute, The, 2016b).

Production

The U.S. Geological Survey obtained domestic phosphate rock production data from monthly and semiannual voluntary canvasses of all five companies that mined phosphate rock. All companies responded to the canvasses, representing 100% of production data. In 2015, phosphate rock was produced at five mines in Florida, three in Idaho, and one each in North Carolina and Utah (table 2).

The U.S. phosphate industry is concentrated in central Florida in the counties of Hardee, Hillsborough, Manatee, and Polk. In 2015, the mines in Florida accounted for 63% of domestic annual production capacity. The Mosaic Company operated four mines in the region. PCS Phosphate Co., Inc. operated one mine in Hamilton County in northern Florida (table 2).

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

In the Western Phosphate Field of Idaho, Montana, Utah, and Wyoming, four mines were active in 2015—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.

Stonegate Agricom Ltd. (Toronto, Ontario, Canada) continued to develop the Paris Hills phosphate project in Bear Lake County in southeastern Idaho. The company planned to open an underground phosphate rock mine in a 1,010-hectare area where three mines operated intermittently during the 20th century. The Bloomington Canyon Mine operated from 1942 to 1943 and from 1973 to 1975, the Consolidated Mine operated from 1930 to 1932, and the Paris Canyon Mine operated from 1917 to 1926 (Jasinski and others, 2004, p. 62–63). The company suspended development activity from January to September 2015 owing to financial constraints. Stonegate had planned to produce an average of 904,000 metric tons per year (t/yr) of phosphate rock for about 19 years (Green Markets, 2015c).

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 for animal feed supplements, direct application to soil, and elemental phosphorus production. Domestic apparent consumption of phosphate rock was 28.1 Mt compared with 29.1 Mt in 2014 (table 1).

All U.S. phosphate rock mining companies were vertically integrated, having one or more fertilizer plants, usually located near the mine. No sales of domestically mined phosphate rock were reported by producers. Mosaic was the leading company with about 79% of North American phosphoric fertilizer production and 14% of world output. In 2015, the company operated four wet-process phosphoric acid plants and four fertilizer plants in Florida and one of each in Louisiana (Mosaic Company, The, 2016, 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. In Utah, Simplot sent ore by pipeline from the Vernal Mine to its plant in Rock Springs, WY.

PCS Nitrogen, Inc. manufactured wet-process phosphoric acid in Geismar, LA, using imported phosphate rock from Morocco. PCS Nitrogen sold some merchant-grade phosphoric acid to Innophos Holdings, Inc., which had a nearby facility for upgrading into high-purity phosphoric acid for technical- and food-grade applications (Innophos Holdings, Inc., 2016, 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 Co., 2015, p. 18). In other countries, elemental phosphorus was used chiefly to manufacture high-purity phosphoric acid by burning the phosphorus in water, producing what is known as thermal acid. Worldwide, a gradual shift to manufacturing high-purity phosphoric acid from wet-process acid has taken place because it has lower production costs and none of the hazardous waste disposal issues that are associated with elemental phosphorus. Thermal acid, however, still accounts for more than 50% of annual world production capacity of high-purity phosphoric acid, primarily in China. The only other operating elemental phosphorus facilities in the world were in Kazakhstan and Vietnam.

The United States is considered a mature market for phosphate fertilizers, with average annual consumption of slightly more than 4.0 Mt from 1990 through 2013. 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 2013 (July 1, 2012, to June 30, 2013), reported that consumption of P_2O_5 in fertilizers was 4.29 Mt compared with 3.95 Mt in crop year 2012 (Slater and Kirby, 2016, p. 6).

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. 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 Phosphate transported its fertilizer products by rail to consumers; some materials, however, were sent by rail to the PCS Phosphate port facility at Morehead City, NC, for export. PCS transported products from its Aurora, NC, complex to the Port of Morehead City by barge for export or delivery by rail to domestic consumers. Phosphoric acid producers along the Gulf of Mexico received imported phosphate rock by ship 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 transported to the processing facility from the mine via rail, slurry pipeline, and truck.

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. Because phosphate rock produced in the United States is all used internally, it is not a good indicator of actual world price trends. The total value of phosphate rock used in the United States decreased slightly from that of 2014, and the average unit value decreased by 8% to $72.41 per metric ton from $78.59 per ton in 2014 (table 1). 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 2015, the average unit value declined to $115.16 per metric ton of imported phosphate rock based on the U.S. Census Bureau customs value and included cost, insurance, and freight (table 1). The import price was in range of average world prices.

Foreign Trade

U.S. producers reported no exports of phosphate rock in 2015 (table 1). The United States is the leading importer of phosphate rock in the world. In 2015, U.S. imports were 1.96 Mt, down from 2.39 Mt in 2014, owing to the closure of the Mississippi Phosphates Corp. plant in 2014. In 2015, 76% of imported phosphate rock was from Peru, 22% from Morocco, and 2% from Senegal. About 98% of imported phosphate rock was consumed by Mosaic and PCS Nitrogen at their phosphoric acid plants in Louisiana along the Gulf of Mexico. U.S. import tonnage of other phosphate fertilizers was small compared with exports of the same materials (tables 5−7, 9).

For the second consecutive year, the United States was not the leading world exporter of phosphate fertilizers (DAP, MAP, and superphosphates), in terms of tonnage, ranking second after China (International Fertilizer Industry Association, 2015). The United States had been the leading world exporter of phosphate fertilizers for about 80 years, up to 2014. Total exports of phosphoric acid and phosphate fertilizers, in terms of P_2O_5 content, decreased by 17% from 2014 (Fertilizer Institute, The, 2016a). India was the leading destination for all types of U.S. phosphate exports combined, in terms of P_2O_5 (tables 5−7).

World Review

World production of phosphate rock increased slightly in 2015, compared with that of 2014. China (120 Mt), Morocco (29.0 Mt), and the United States (27.4 Mt) were the leading producing countries, accounting for 73% of the world total (table 10). Phosphate rock production in China has been reported by several sources to be much lower than the official statistics used in table 10. Production has been estimated to be between 80 to 85 Mt, based on reported production of phosphate fertilizers, industrial phosphates, and exports of phosphate rock (Zhao, 2015).

In 2015, major projects were under development in Morocco (capacity expansion) and Saudi Arabia (new mining operation). New mines were in various stages of development in Angola, Australia, Brazil, Congo (Brazzaville), Guinea-Bissau, Mali, Mozambique, Peru, and Uganda. Expansion of production capacity was planned in China, Egypt, Jordan, Russia, Senegal, South Africa, Togo, and Tunisia. Except for China, Morocco, and Saudi Arabia, the projects in other countries were not expected to begin operation until after 2020 (Prud'homme, 2016).

Canada.—Fertoz Ltd. (Wakerly, Queensland, Australia) continued developing the Fernie and Wapiti phosphate rock deposits in British Columbia. Fertoz planned to sell the phosphate rock for direct application to soil and signed

marketing agreements with three companies to sell phosphate rock in western Canada. Fertoz expected to produce up to 75,000 t/yr from the Wapiti Mine. The company conducted exploration activities at the Fernie project in 2015 (Green Markets, 2015b).

In Quebec, two phosphate rock mines received mining permits from Provincial authorities in 2015. The proposed Arnaud Mine near Sept-Iles, which was being developed by Investissement Quebec (62%) and Yara International ASA (Oslo, Norway) (38%), received approval to mine in March. The proposed open pit mine would produce between 1.2 and 1.5 million metric tons per year (Mt/yr) of high-grade apatite concentrate for about 30 years (Green Markets, 2015a). Construction was scheduled to begin in 2016; however, in October, Yara decided to limit its participation because of financial concerns and had not announced its final investment decision by yearend 2015 (Green Markets, 2015d).

Arianne Phosphate Inc. received a permit for its Lac à Paul phosphate project in December 2015. Arianne planned to produce about 3 Mt/yr of high-grade apatite concentrate for about 25 years. In March, the company completed a trial production run of 1.2 Mt of 40% P_2O_5 concentrate for customer testing. Arianne planned to begin production in 2018 (Arianne Phosphate Inc., 2015).

Morocco.—OCP Group continued with an expansion program that was to increase its mine capacity from 32 Mt/yr to 55 Mt/yr during the next decade. In 2015, construction was ongoing at the Khourigba and Gantour mining areas. A 10-Mt/yr expansion at Khourigba was planned to be completed in 2016. A 21-Mt/yr expansion at Gantour was planned to be completed by 2023. OCP planned to open new mines at the Meskala deposit in the Essaouira Region after 2023 (Fertilizer International, 2016).

Saudi Arabia.—Ma'aden Phosphate Co. (MPC) continued development of the Umm Wu'al phosphate mine on the Al Khabra deposit. The mine was part of the Wa'ad Al Shammal phosphate project joint venture among MPC (60%), Mosaic (25%), and Saudi Arabian Basic Industries Corp. (15%). The project was to include the phosphate rock mine and beneficiation plant and production facilities for phosphoric acid, animal feed, purified phosphoric acid, sodium tripolyphosphate, and sulfuric acid. The phosphate products would be sent by rail to Ras Al Khair to be processed into fertilizers. Existing fertilizer plants would be expanded at Ras Al Khair as part of the project. Production capacity was planned to be 5.3 Mt/yr of phosphate concentrate, 1.5 Mt/yr of phosphoric acid, and 3.5 Mt/yr of phosphate fertilizers. The project was expected to be completed in 2017 (Fertilizer International, 2015).

Outlook

According to the International Fertilizer Association (IFA), world phosphate rock supply is projected to increase to 250 Mt/yr in 2020 from 225 Mt/yr in 2015. Global production capacity is projected to increase to 290 Mt/yr in 2020 from 250 Mt/yr in 2015 (Prud'homme, 2016). The increase likely will be from a combination of new mines and expansions of existing operations. The IFA forecasts use the lower estimated production and capacity figures for China rather than official data. The bulk of the new capacity is expected to be in Jordan, Morocco, and Saudi Arabia (Fertilizer International, 2015). U.S. production capacity likely will remain stable through 2017. Three new mines are planned in Idaho, but two would be replacements for existing mines and will not significantly change domestic production capacity. Two mines are under development in Florida, but neither has been permitted.

The projected increases in annual production capacity for phosphate rock will be commensurate with the associated increase in phosphoric acid and fertilizer production. Phosphate fertilizers are necessary to grow crops for food and biofuels to meet the needs of world population growth. According to the IFA, world consumption of P_2O_5 in all uses is projected to increase slightly over the next several years to 51.6 Mt in 2020 from 46.8 Mt in 2015 (Heffer and others, 2016).

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TABLE 1
SALIENT PHOSPHATE ROCK STATISTICS[1]

(Thousand metric tons and thousand dollars unless otherwise specified)

	2011	2012	2013	2014	2015
United States:					
Mine production (crude ore)	129,000	150,000	139,000	112,000	127,000
Marketable production:					
Quantity:					
Gross weight	28,100	30,100	31,200	25,300	27,400
P_2O_5 content	8,160	8,590	8,930	7,110	7,710
Value	2,720,000	3,080,000	2,850,000	1,990,000	1,980,000
Value, average[2]	96.64	102.54	91.11	78.59	72.41
Used by producers:					
Quantity:					
Gross weight	28,600	27,300	28,800	26,700	26,200
P_2O_5 content	8,320	7,720	8,200	7,540	7,390
Value	2,850,000	2,620,000	2,610,000	2,150,000	1,920,000
Value, average	99.61	96.12	90.72	80.31	73.31
Imports for consumption:[3]					
Quantity, gross weight	3,750	3,570	3,170	2,390	1,960
Value, cost, insurance, and freight	477,000	481,000	382,000	238,000	226,000
Value, average	127.36	134.67	120.73	99.75	115.16
Consumption, gross weight[4]	32,400	30,900	31,900	29,100	28,100
Stocks, December 31, producers	4,580	6,700	9,000	5,880	6,730
World, production, gross weight	200,000	216,000 [r]	232,000 [r]	237,000 [r]	242,000

[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 used-by-producer values.
[3]Source: U.S. Census Bureau.
[4]Expressed as used by producer plus imports.

TABLE 2
ACTIVE PHOSPHATE ROCK MINES IN THE UNITED STATES IN 2015

Owner	Mine	County and State
Mosaic Company, The	Four Corners	Hillsborough/Manatee, FL.
Do.	South Fort Meade	Hardee, FL.
Do.	South Pasture	Do.
Do.	Wingate	Manatee, FL.
Nu-West Industries, Inc. (Agrium Inc.)	Rasmussen Ridge	Caribou, ID.
P4 Production, LLC. (Monsanto Co.)	Blackfoot Bridge	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
2014:						
January–June	57,100	6,090	13,000	3,680	999,000	7,940
July–December	54,700	5,970	12,300	3,430	988,000	5,880
Total	112,000	12,100	25,300	7,110	1,990,000	XX
2015:						
January–June	64,300	8,030	13,800	3,880	842,000	6,870
July–December	62,500	8,340	13,600	3,830	1,140,000	6,730
Total	127,000	16,400	27,400	7,710	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]
2014:			
January–June	12,900	3,630	992,000
July–December	13,800	3,910	1,160,000
Total	26,700	7,540	2,150,000
2015:			
January–June	12,800	3,620	788,000
July–December	13,400	3,770	1,130,000
Total	26,200	7,390	1,920,000

[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)

	2014		2015	
Country	Quantity	Value	Quantity	Value
Argentina	105	45,400	48	22,100
Australia	131	54,900	56	25,200
Brazil	421	182,000	248	107,000
Canada	130	45,100	129	44,100
China	59	19,500	--	--
Colombia	136	63,800	149	68,400
Honduras	58	26,100	78	35,700
India	614	278,000	636	287,000
Japan	163	74,900	126	59,000
Mexico	237	106,000	206	94,600
Peru	176	77,300	126	57,200
Other	274	118,000	312	142,000
Total	2,500	1,090,000	2,110	942,000

-- Zero.

[1]Presentation of annual data is based on the top 10 quantities (gross weight) of the leading countries in 2015.

[2]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, 2]

(Thousand metric tons and thousand dollars)

	2014		2015	
Country	Quantity	Value	Quantity	Value
Argentina	145	63,500	72	32,300
Australia	257	110,000	320	143,000
Brazil	647	287,000	683	303,000
Canada	773	396,000	787	411,000
Colombia	127	58,800	121	54,800
Japan	101	48,500	90	42,000
Mexico	41	19,900	57	27,100
Peru	21	9,170	16	7,390
Uruguay	21	7,510	45	20,200
Venezuela	11	4,830	26	11,600
Other	13	6,220	35	17,500
Total	2,160	1,010,000	2,250	1,070,000

[1]Presentation of annual data is based on the top 10 quantities (gross weight) of the leading countries in 2015.

[2]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[1, 2]

(Thousand metric tons and thousand dollars)

	2014		2015	
Country	Quantity	Value	Quantity	Value
Brazil	83	29,900	91	36,400
Canada	7	2,110	6	1,830
India	445	143,000	297	109,000
Mexico	80	23,700	42	12,500
Other	8	2,620	7	2,510
Total	623	201,000	443	163,000

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

Source: U.S. Census Bureau.

TABLE 8
U.S. EXPORTS OF ELEMENTAL PHOSPHORUS[1]

	2014		2015	
Country	Quantity (metric tons)	Value[2] (thousands)	Quantity (metric tons)	Value[2] (thousands)
Brazil	15,500	$50,600	13,900	$49,800
Canada	1,260	3,490	1,360	4,080
Mexico	37	74	25	48
Netherlands	3,030	6,040	3,250	6,540
Other	244	634	295	1,360
Total	20,100	60,800	18,800	61,800

[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	2014		2015	
	Quantity	Value[2]	Quantity	Value[2]
Phosphate rock:				
Unground	2,120	193,000	1,520	150,000
Ground	268	45,400	443	75,700
Total	2,390	238,000	1,960	226,000
Dicalcium phosphate	11	13,800	11	11,900
Elemental phosphorus	16	59,400	14	51,000
Normal superphosphate	3	1,070	--	--
Triple superphosphate	432	180,000	235	92,800
Diammonium phosphate	404	198,000	621	295,000
Monoammonium phosphate	959	467,000	582	291,000
Fertilizer containing nitrates and phosphates	21	11,900	87	43,100
Phosphoric acid	1	263	1	159

-- Zero.

[1]Data are rounded to no more than three significant digits.

[2]Declared cost, insurance, and freight values.

Sources: U.S. Census Bureau.

TABLE 10
PHOSPHATE ROCK: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons)

	Gross weight					P_2O_5 content				
Commodity and country[3]	2011	2012	2013	2014	2015[e]	2011	2012	2013	2014	2015[e]
Algeria	1,287	1,250	1,151	1,418 [r]	1,400	386 [e]	375 [e]	345	412 [r]	412
Australia	3,169	2,850	2,583 [r]	2,490 [r]	2,500	800	730	670 [r]	647 [r]	650
Brazil, concentrate	6,738	6,740	6,715 [r]	6,513	6,100	2,374	2,388	2,504 [r]	2,521 [r]	2,360
Canada[e]	900	650	300	--	--	325	230	111	--	--
Chile:										
Apatite	14	9	12	9	8	4	3	4	4	3
Guano	2	1	3	3	3	NA	NA	NA	NA	NA
Phosphorite	--	6	--	11	9	--	NA	--	--	NA
China	81,000	95,300	111,700 [r]	120,000 [r]	120,000	24,000	28,500	33,500 [r]	36,000 [r]	36,000
Colombia	30	30	25	50 [r]	50	9	9	8 [r]	15 [r]	15
Egypt, beneficiated	4,746	6,236	5,922	5,400	5,500	1,400	1,835	1,777	1,620	1,650
Finland	870	858	877	946 [r]	950	318 [r, e]	313 [r, e]	320 [r, e]	345 [r, e]	347
India[e]	1,900	1,150	1,200	1,500 [r]	1,500	470 [r]	285 [r]	300	370 [r]	370
Indonesia[e]	1	1	1	1	1	(4)	(4)	(4)	(4)	(4)
Iran	370 [r, 5]	370 [r]	380 [r]	122 [r]	125	110 [r]	110 [r]	114 [r]	37 [r]	38
Iraq, beneficiated	185 [r]	250	213 [r]	34 [r]	--	56 [r]	75	64 [r]	7 [r]	--
Israel	3,105	3,514	3,578	3,357	3,538 [5]	960 [r]	1,090 [r]	1,100 [r]	1,040 [r]	1,100
Jordan	7,594	6,383	5,399	7,144	8,335 [5]	2,430	2,043	1,728	2,286	2,600
Kazakhstan[e]	1,900	2,100	1,700	1,840 [r]	1,840	400 [r]	439 [r]	411 [r]	350 [r]	387
Korea, North[e]	300	300	300	300	300	90	90	95	95	95
Mexico	1,691	1,725 [r]	2,217 [r]	1,663 [r]	1,677 [5]	474 [r]	483 [r]	620 [r]	466 [r]	470
Morocco[6]	28,052	27,060	26,400	27,390 [r]	29,000	8,977	8,659	8,448	8,585 [r]	9,100
Pakistan	31	69	58	60	60	6	12	10	11	11
Peru[7]	2,544	3,209	3,546	3,801	3,881 [5]	774	975	1,075	1,155	1,180
Philippines	3	3	3	4	5 [5]	1	1	1	1	1
Russia[e, 8]	10,300	10,300	11,000	11,000	11,600	3,900	3,900	4,160	4,160	4,480
Saudi Arabia	1,000	3,000	2,810	3,600 [r]	4,000	330	975	915	1,170 [r]	1,300
Senegal	1,411	1,381	882	943 [r]	1,243 [5]	458 [r]	450 [r]	290 [r]	305 [r]	405
South Africa	2,565	2,243	2,132	2,164	1,983 [5]	962	829	780	800	740
Sri Lanka	51	52	53	50	50	18	18	19	18	18
Syria	3,541	1,534	1,000	1,234	750	1,062	460	300	370	225
Tanzania	18 [e]	20	20	20	10	5 [e]	6	6	6	3
Thailand	3	2	(4)	1	2	1	1	(4)	(4)	1
Togo	866	1,159 [9]	1,214 [9]	1,086 [r]	1,100	310 [e]	420 [e]	440	390 [r, e]	400
Tunisia, washed	2,479	2,762	3,283	3,784	2,800	719 [e]	750 [e]	1,050	1,210	810
Turkey	NA	NA	510	604	600	NA	NA	153	181	180
United States	28,100	30,100	31,200	25,300	27,400 [5]	8,160	8,590	8,930	7,110	7,710
Uzbekistan[e]	800	800	850 [r]	800 [r]	750	140 [r]	140 [r]	145 [r]	140 [r]	130
Venezuela	168	162	98	100	100	45	44	27	27	27
Vietnam	2,395	2,365	2,650 [r]	2,636 [r]	2,500	670 [r]	665 [r]	745 [r]	740 [r]	700
Zimbabwe, concentrate[e]	60	20	6	9 [r]	9	22 [r]	7	2	3 [r]	3
Total	200,000	216,000 [r]	232,000 [r]	237,000 [r]	242,000	61,200 [r]	65,900 [r]	71,200 [r]	72,600 [r]	73,900

[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]Includes data available through June 6, 2016. Figures are from official country sources where available.

[3]In addition to the commodities listed, Burkina Faso and Nauru produced phosphate rock and France and Luxembourg made basic Thomas converter slag, but information is inadequate to estimate output.

[4]Less than ½ unit.

[5]Reported figure.

[6]Includes production from Western Sahara.

[7]Source: Vale S.A.

[8]Estimated based on reported production in company reports.

[9]Reported by the Direction Générale de la Statistique et de la Comptabilité Nationale.