

PHOSPHATE ROCK

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: Phosphate rock ore was mined by five firms at 10 mines in four States and processed into an estimated 27.8 million tons of marketable product, valued at \$2.1 billion, f.o.b. mine. Florida and North Carolina accounted for more than 75% of total domestic output; the remainder was produced in Idaho and Utah. Marketable product refers to beneficiated phosphate rock with phosphorus pentoxide (P₂O₅) content suitable for phosphoric acid or elemental phosphorus production. More than 95% of the phosphate rock mined in the United States was used to manufacture wet-process phosphoric acid and superphosphoric acid, which were used as intermediate feedstocks in the manufacture of granular and liquid ammonium phosphate fertilizers and animal feed supplements. Approximately 50% of the wet-process phosphoric acid produced was exported in the form of upgraded granular diammonium and monoammonium phosphate fertilizer, and merchant-grade phosphoric acid. The balance of the phosphate rock mined was for the manufacture of elemental phosphorus, which was used to produce phosphorus compounds for industrial applications.

Salient Statistics—United States:	2012	2013	2014	2015	2016^e
Production, marketable	30,100	31,200	25,300	27,400	27,800
Used by producers	27,300	28,800	26,700	26,200	26,500
Imports for consumption	3,570	3,170	2,390	1,960	1,600
Consumption, apparent ¹	30,900	31,900	29,100	28,100	28,100
Price, average value, dollars per ton, f.o.b. mine ²	102.54	91.11	78.59	72.41	77.00
Stocks, producer, yearend	6,700	9,000	5,880	6,730	7,400
Employment, mine and beneficiation plant, number ^e	2,230	2,170	2,100	2,000	2,000
Net import reliance ³ as a percentage of apparent consumption	5	3	18	4	3

Recycling: None.

Import Sources (2012–15): Peru, 58%; and Morocco, 42%.

Tariff: Item	Number	Normal Trade Relations 12–31–16
Natural calcium phosphates:		
Unground	2510.10.0000	Free.
Ground	2510.20.0000	Free.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: In 2016, estimated U.S. phosphate rock production was slightly higher than that in 2015, but consumption was unchanged and stocks increased. In the first half of 2016, some producers reduced production of phosphoric acid and fertilizers in response to reduced world demand and lower fertilizer prices.

Domestic phosphate rock production capacity was 32.8 million tons in 2016. Two new mines remained in the permitting phase in Florida. The mines will be replacements for existing mines that were planned to be exhausted in the next decade. In Idaho, one existing producer planned to open a new mine in late 2017 to replace its current mine, which was expected to be depleted in late 2017. A Canadian firm continued permitting activities and soliciting investment for a new underground phosphate rock mine in southeastern Idaho. The mine was not expected to begin production until after 2018.

World production of phosphate rock was estimated to have increased in 2016, mainly because of growth in China and Tunisia. However, fertilizer industry associations and analysts have estimated that, based on reported fertilizer production and trade data, official Chinese production data have been overstated and may have been 85 million tons of marketable rock in 2015. Estimated production for China in 2016 was based on official statistics from the National Bureau of Statistics of China.

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World phosphate rock production capacity was expected to increase by 2% per year through 2020, based on lower estimated production from China. The largest areas of growth were planned for Africa and the Middle East. In Morocco, work continued on the expansion of phosphate rock mines and processing facilities, which was expected to double phosphate rock production capacity by 2020. A new 5.3-million-ton-per-year phosphate mining and processing complex remained on schedule to open in 2017 in Saudi Arabia. The major U.S. phosphate rock producer is part of a joint venture in the project.

Other significant phosphate rock projects were expected to begin by 2020 in Algeria, Brazil, Egypt, Jordan, Kazakhstan, Peru, Russia, and Senegal.

Continued population growth will require a growing supply of phosphate rock to produce fertilizers for crops, animal feed supplements, and industrial applications (in order of importance). World consumption of P₂O₅ contained in all uses was expected to increase incrementally to 48.9 million tons in 2020 from 44.5 million tons in 2016.

World Mine Production and Reserves: Reserves for China were updated with information from official sources. Reserves for Saudi Arabia were updated with information from company reports. The phosphate rock mines in Iraq and Syria were reported to be closed in late 2015 because of ongoing conflicts in that region. Iraq only reported a small quantity of production in 2015; therefore, it was placed in the "Other countries" category.

	Mine production		Reserves ⁴
	2015	2016 ^e	
United States	27,400	27,800	1,100,000
Algeria	1,400	1,500	2,200,000
Australia	2,500	2,500	1,100,000
Brazil	6,100	6,500	320,000
China ⁵	120,000	138,000	3,100,000
Egypt	5,500	5,500	1,200,000
India	1,500	1,500	65,000
Israel	3,540	3,500	130,000
Jordan	8,340	8,300	1,200,000
Kazakhstan	1,840	1,800	260,000
Mexico	1,680	1,700	30,000
Morocco and Western Sahara	29,000	30,000	50,000,000
Peru	3,880	4,000	820,000
Russia	11,600	11,600	1,300,000
Saudi Arabia	4,000	4,000	680,000
Senegal	1,240	1,250	50,000
South Africa	1,980	1,700	1,500,000
Syria	750	—	1,800,000
Togo	1,100	900	30,000
Tunisia	2,800	3,500	100,000
Vietnam	2,500	2,800	30,000
Other countries	2,470	2,410	810,000
World total (rounded)	241,000	261,000	68,000,000

World Resources: Some world reserves were reported only in terms of ore and grade. Phosphate rock resources occur principally as sedimentary marine phosphorites. The largest sedimentary deposits are found in northern Africa, China, the Middle East, and the United States. Significant igneous occurrences are found in Brazil, Canada, Finland, Russia, and South Africa. Large phosphate resources have been identified on the continental shelves and on seamounts in the Atlantic Ocean and the Pacific Ocean. World resources of phosphate rock are more than 300 billion tons. There are no imminent shortages of phosphate rock.

Substitutes: There are no substitutes for phosphorus in agriculture.

^eEstimated. — Zero.

¹Defined as phosphate rock sold or used + imports.

²Marketable phosphate rock, weighted value, all grades.

³Defined as imports – exports + adjustments for industry stock changes.

⁴See [Appendix C](#) for resource and reserve definitions and information concerning data sources.

⁵Production data for large mines only, as reported by National Bureau of Statistics of China.