

PHOSPHATE ROCK

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: In 2018, phosphate rock ore was mined by five firms at 10 mines in four States and processed into an estimated 27 million tons of marketable product, valued at \$1.8 billion, free on board (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 (DAP) and monoammonium phosphate (MAP) 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, primarily glyphosate herbicide.

Salient Statistics—United States:	2014	2015	2016	2017	2018^e
Production, marketable	25,300	27,400	27,100	27,900	27,000
Used by producers	26,700	26,200	26,700	26,300	23,000
Imports for consumption	2,380	1,960	1,590	2,520	3,000
Consumption, apparent ¹	29,100	28,100	28,200	28,800	27,000
Price, average value, dollars per ton, f.o.b. mine ²	78.59	72.41	76.90	73.67	68.00
Stocks, producer, yearend	5,880	6,730	7,450	8,440	11,000
Employment, mine and beneficiation plant, number ^e	2,100	2,000	2,000	2,000	2,000
Net import reliance ³ as a percentage of apparent consumption	18	4	4	5	5

Recycling: None.

Import Sources (2014–17): Peru, 68%; Morocco, 31%; and other, 1%.

Tariff: Item	Number	Normal Trade Relations 12–31–18
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: Domestic phosphate rock production and consumption in 2018 were estimated to be lower than those in 2017, owing to a decrease in phosphoric acid production caused in part by the temporary closure of a phosphate plant in Florida. Production of DAP and MAP were lower in 2018 because of lower export sales.

In early 2018, the leading United States phosphate rock producer completed its purchase of the phosphate and potash assets of the leading fertilizer producer in Brazil. The acquisition included five phosphate rock mines, one potash mine, and four phosphate fertilizer plants in Brazil, and potash mine projects in Argentina and Canada. The company also acquired the Brazilian company's 40% stake in their joint-venture mine in Peru, which increased its stake to 75%.

U.S. annual mine production capacity was expected to remain steady at 32.5 million tons during the next 5 years. All three producers in Idaho were developing new mines to replace existing mines as they become exhausted over the next decade.

According to industry analysts, world mine production rated capacity was projected to increase to 169 million tons in 2022 from 148 million tons in 2018, excluding official capacity data for China. Production of marketable phosphate rock in China was believed to be between 80 to 85 million tons per year, compared with official production statistics that included some crude ore production, according to industry analysts. Most of the increases are planned for Africa and the Middle East, where expansion projects were in progress in Egypt, Jordan, Morocco, Saudi Arabia, and South Africa.

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World consumption of P₂O₅, contained in phosphoric acid, fertilizers, and other uses, was projected to increase to 50.5 million tons in 2022 from 47.0 million tons in 2018. Africa, India, and South America would account for about 75% of the projected growth. U.S. consumption of P₂O₅ was expected to remain at nearly 5 million tons per year.

World Mine Production and Reserves: Reserves for China, India, and Russia were updated with official Government data. Reserves for Israel and Jordan were updated with information from company reports.

	Mine production		Reserves ⁴
	2017	2018 ^e	
United States	27,900	27,000	1,000,000
Algeria	1,300	1,300	2,200,000
Australia	3,000	3,000	⁵ 1,100,000
Brazil	5,200	5,400	1,700,000
China ⁶	144,000	140,000	3,200,000
Egypt	4,400	4,600	1,300,000
Finland	980	1,000	1,000,000
India	1,590	1,600	46,000
Israel	3,850	3,900	67,000
Jordan	8,690	8,800	1,000,000
Kazakhstan	1,500	1,600	260,000
Mexico	1,930	2,000	30,000
Morocco and Western Sahara	30,000	33,000	50,000,000
Peru	3,040	3,100	400,000
Russia	13,300	13,000	600,000
Saudi Arabia	5,000	5,200	1,400,000
Senegal	1,390	1,500	50,000
South Africa	2,080	2,100	1,500,000
Syria	100	100	1,800,000
Togo	825	850	30,000
Tunisia	4,420	3,300	100,000
Uzbekistan	900	900	100,000
Vietnam	3,000	3,300	30,000
Other countries	1,100	1,300	770,000
World total (rounded)	<u>269,000</u>	<u>270,000</u>	<u>70,000,000</u>

World Resources: Some world reserves were reported only in terms of ore tonnage 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.

¹Defined as phosphate rock used by producers + imports - exports. U.S. producers stopped exporting phosphate rock in 2003.

²Marketable phosphate rock, weighted value, all grades.

³Defined as imports – exports + adjustments for industry stock changes. U.S. producers stopped exporting phosphate rock in 2003.

⁴See Appendix C for resource and reserve definitions and information concerning data sources.

⁵For Australia, Joint Ore Reserves Committee-compliant reserves were about 290 million tons.

⁶Production data for large mines only, as reported by National Bureau of Statistics of China.